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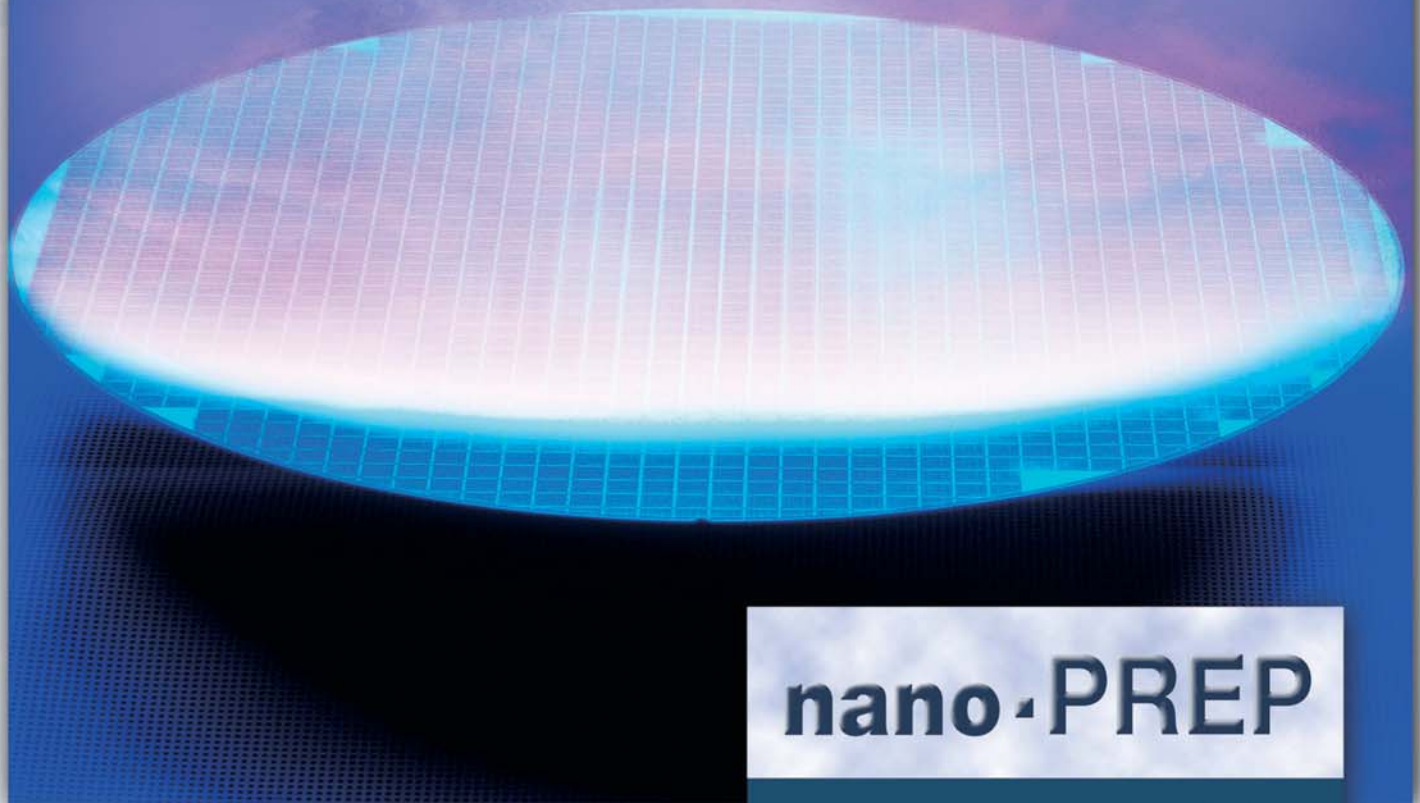
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New concepts and developments in the field of "back end processing" of Microsystems and MEMS, particularly in assembly and packaging.

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Date of distribution: Feb 09, 2005

mstnews 2/05 on "Smart Textiles" in April 2005

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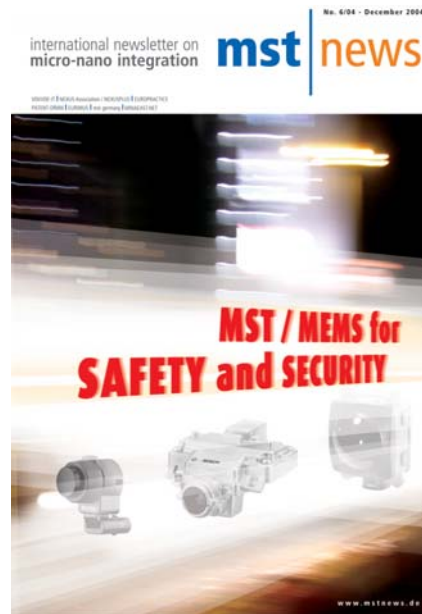
Making our lives more safe and secure is an ambitious and multi-dimensional goal. Security matters are found nearly everywhere, at home, at work, in individual and public transportation, in public health, in production and power industry, in civil services and military defence and so on. Accordingly, there is a wide spectrum of challenges for MSTMEMS technologies to contribute innovative safety and security functions to existing systems and to enable completely new solutions. These challenges are playing an important role for example in the EC security research measures under the current and future framework programmes (see report on the Microsecurity network on page 37).

Quite honestly, the whole range of MSTMEMS technologies can be applied more or less to innovating safety and security matters. I guess the description of all possible approaches would fill a whole series of books. In order to keep this very interesting and important application field manageable as the main topic for this December issue of mstnews, the editors have focused on a particular, detailed aspect of safety and security. One of

the most important safety and security problems with the highest relevance to people can soon be identified: The individual road traffic in Europe leads to 1.3 million accidents annually, with 40,000 deaths. And this affects all of us!

The most obvious approach to improving security in road traffic is automatic obstacle detection and driver support for reacting timely and properly to dangerous situations. You will surely notice that we have focused in our selection of articles on topics that deal with obstacle detection by optical and radar microsystems and appropriate driver assisting functions. I hope you enjoy this issue!

Bernhard Wybranski
Chief editor



Sensors: See article on page 12 ff.;
Source: Robert Bosch GmbH, Germany

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Apr. 05	Smart Textiles
Jun. 05	Design for Manufacturing
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Safety and Security for Vehicles

Sven Krueger and Florian Solzbacher

Safety and security are the most important concerns for road users. Mobility at the cost of safety is not acceptable. An increasing number of technical systems will become available to ensure safety and security. Whether these systems can overcome deployment obstacles remains an open question - unattractive cost-benefit ratios from a customer standpoint in conjunction with, at the least, demanding HMI concepts. Microsystems technology and new approaches might help to overcome these obstacles.

Road Safety is a precondition to take advantage of mobility's benefits. Mobility is an expression of individual freedom and quality of life. Safety and security is, however, valued more highly than mobility (figure 1). Plainly speaking, one rather stops driving than to risk life. Safety and security as well as mobility can be counted as basic needs while activity

and information on top of mobility might contradict or counter safety needs.

In consumer buying behaviour this correlation is not evident. The customer quite often prefers to invest in improved mobility and advanced information systems rather than in safety and security. The underlying understanding is, however, that inherently safe and secure cars are provided by the automotive industry. It is therefore important for the industry to make use of the technological opportunities to produce safer cars at an affordable price. The past two decades have shown tremendous progress and success. Road traffic is a key economic factor. Increasing needs for mobility and

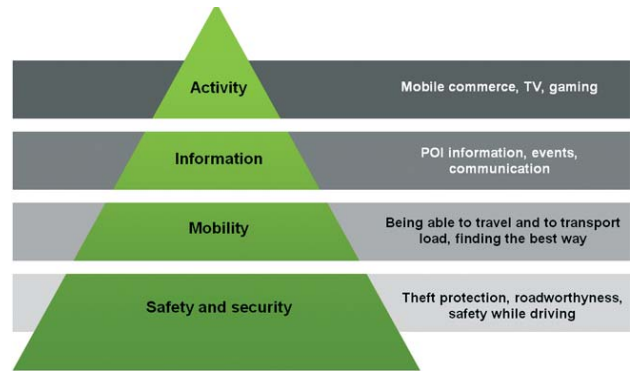


Figure 1: Driver needs

transport in Europe call for action in order to improve road safety. Accidents further amplify the problem of congestion, which more and more affects the whole road network. There is still an unacceptably high number of injuries and people killed in road accidents. 1.3 million accidents happen in Europe annually, in which 40,000 people lose their lives and 1.7 million are injured. The estimated economic damage is about

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160 billion Euros, amounting to approximately 2% of Gross Domestic Product in Europe (Final Report of the Safety Working Group on Road Safety, November 2002). In recent years, the number of traffic accidents and fatalities has been decreasing.

There is convincing evidence that the use of new technologies has contributed significantly to this reduction in the number of fatalities and injuries. Research has shown that more than 90% of road accidents are partly caused by human errors [ESafety 2002]. It therefore must be a chief objective to support drivers' behaviour and perception towards safer traffic.

Automotive Security

Automotive security systems can be understood as anti-theft systems. The introduction of immobilizers effectively lowered the number of stolen vehicles. Supporting systems are theft detection sensors and authorisation systems. Solutions originating in microsystems technology include inclinometers, accelerometers, infrared sensor for cabin monitoring as well as fingerprint sensor and keyless go systems. The described systems are widely introduced and well developed.

Automotive Safety

With regard to socioeconomic impact, the brand perception of an OEM's and individual measures for automotive safety, defined as the capability of the car to protect the occupants and other road users, are increasing in importance. Safety is closely connected with accidents, and for the clustering of safety systems, accident mitigation can be used (figure 2).

1. Normal driving (support and information of the driver, indirectly supports safety)
2. Warning/assistance phase (the vehicle predicts a dangerous situation)
3. Pre-crash phase (the crash is unavoidable)
4. In-crash phase (the crash happens)
5. Post-crash phase (the crash has happened and e.g. emergency services are approaching)

Following this philosophy intelligent safety systems are covering phases 2



Figure 2: Accident mitigation

to 5, therefore starting with warning and assistance and ending with the post-crash phase. Nowadays safety relevant systems are often introduced as comfort systems. By experience, the buyer pays more easily for comfort than for safety. The path clearly shows mitigation of function towards safer vehicles.

Figure 3 gives an overview of automotive safety systems.

The impressive number of safety systems discussed correlates with more than 50 sensors, many of them microsystems. They are the source of information for advanced automatic vehicle handling or communication to the driver.

Examples are: (active) tire pressure monitoring requires a pressure sensor and a transmitter for each wheel; active body control works with position sensors on each shock absorber and an additional 5 accelerometers; air conditioning makes use of at least one pressure sensor, one temperature and humidity sensor and an air quality sensor; parking aids use up to 8 ultrasonic sensors or four 24-GHz sensors, vision enhancement comprising cameras for night vision and blind spot in combination with displays or head up projection; driver monitoring based on cabin camera

and position as well as force sensors for steering wheel and pedal actuation sensing; vehicle stability systems including anti-lock braking system based on 2 accelerometers, 2 gyroscopes, 4 pressure sensors and one yaw rate sensor.

In summary, a great number of sensors and actuators for safety systems are building an ever-increasing market. Frost & Sullivan estimates the market for automotive safety systems in Western Europe at 5.66 billion Euros in 2003 and predicts 6.59 billion Euros for 2010 [Frost & Sullivan 2004]. Within this market active safety systems are a growing position.

The introduction of systems like airbags or the anti-lock braking system (ABS) helped to decouple traffic development from the number of fatalities. But the majority of advanced safety functions under discussion have not yet been introduced into the market. The reasons are manifold, including

- Lack of proper legislative solutions/boundary conditions
- Lack of standardisation
- Lack of applications
- Lack of technology

Some safety features have not been introduced yet, because necessary frequencies are not approved by legislation. The other major legislative drawback is liability. Especially for predictive systems, the following issue remains unsolved: whether the foreseen event would really happen

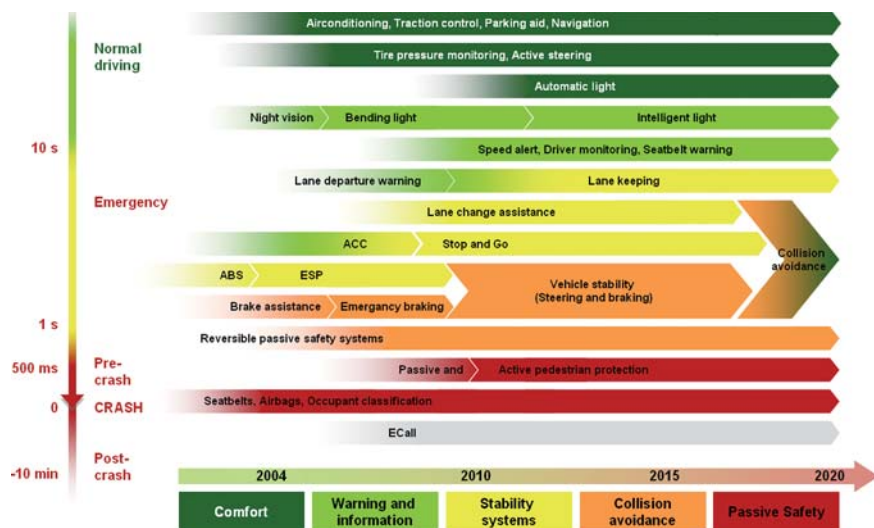


Figure 3: Safety-related vehicle functions

in the way foreseen and whether the automatic systems reaction would be the proper one. Perhaps, a somehow collective liability is needed assuming there is no built-in guarantee for the predictions. However, the technical system on average already acts more reliably than a human.

Talking about communication frequencies also means dealing with standardisation. The automotive industry has not yet solved the problem of systems interoperability, including the need for software updates. The AUTOSAR initiative, developing a common electronics architecture, seems to be the right answer to support interchangeability and volume production. Legislation and standardisation have so far hindered market deployment. Even though first reliable technologies are available, constraints in functionality prevent a widespread use. Therefore, buying a radar sensor just for an ACC system is not too appealing, whereas a few more sensors would open a variety of interesting additional applications. An additional problem balancing between standardisation and function remains the proper human-machine interface (HMI). Complex correlations have to be made transparent and conflicting interests between human and machine perception to be solved. Technology should answer these questions, but it has to be well-tested as well as affordable. Improved solutions and approaches are needed especially in the field of predictive and environmental sensors. Assisting and collision avoidance functions are based on a clear understanding of the traffic and driving situation and state by the vehicle.

Predictive systems have thus moved into the focus of automotive R&D. They are based on obstacle detection or communication solutions. The correlating technologies can be divided into four groups:

Passive light wave technologies (vision): vision-based approaches focus on the analysis

of single images or sequences that have been acquired by a monocular or stereo camera system. Vision sensors must be able to handle a wide range of illumination conditions (from bright light to tunnels, shadows, etc.), resistance against blur due to vehicle motion and blooming due to oncoming headlights and direct sunlight.

Active light wave technologies (Lidar): Lidar (light detection and ranging) based approaches measure range by evaluating the time difference between the transmission of a light pulse and reception of the reflection caused by an object at a certain distance. The time difference

can either be measured directly or by analysing the phase shift of an amplitude or frequency-modulated signal. Laser scan approaches are based on the point-wise illumination of an object using a laser beam and the evaluation of the reflection by a position sensitive (PSD) or imaging device (CCD, CMOS). Since the distance between only one point in space and the sensor can be computed, a mechanically or electronically scanned system must be used in order to acquire the range information in a scene.

Radar: is an acronym for radio detection and ranging and defines a device that transmits electromagnetic

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Figure 4: GM concept car (Cadillac Cyclone 1959) with radar domes

signals ($f = 100 \text{ kHz} - 300 \text{ GHz}$) and receives echoes from objects (targets) within its volume of coverage. Information provided by a radar device includes distance by measurement of the elapsed time between transmission of the signal and reception of the echo, range rate by measurement of the Doppler shift and direction by the use of antenna patterns.

Communication: Car-to-car as well as car-to-infrastructure communication can be used to provide information about dangerous spots. All kinds of communication technologies might be used, including mobile phone technologies, hazard warning systems, WLAN technologies deriving from computer industry, tolling equipment or even modulation of brake lights. In contrast to the vehicle centred technologies used before, communication provides an absolute position as well as further information on the object or event of interest. It therefore has to be coupled with the position of the vehicle.

The technologies are competing or might be combined. Each technology has its drawbacks. Microsystems sensors and actuators are facing strong competition. Even though there is no direct technological competition for MST products, an increasing trend towards eliminating true or perceived redundancies in a cars sensory or electronics networks are being eliminated for cost reasons: i.e. if a specific information necessary to control a process in the car is implicitly contained in an already existing sensor network, the implementation of a new sensor is highly unlikely, even if the sensor performance ex-

ceeds the existing system performance. An example would be the use of wheel speed sensors (ABS sensors) to detect loss of tire pressure in

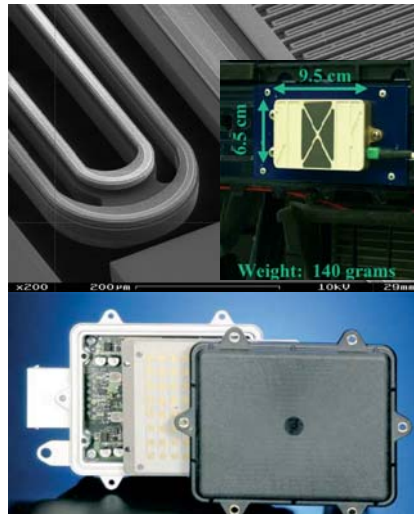


Figure 5: 77-GHz Radar by DaimlerChrysler and 24-GHz Radar by Hella

tire pressure monitoring systems as a cheap alternative to individual tire pressure sensors.

The systems complexity adds new challenges: the increasing integration of functionalities (multiple sensing/actuation quantities, intelligence, communication, power supply), increasing accuracy and stability requirements lead to ever more complex micro systems. Engineers are now faced with a set of problems:

- Required integration densities and fabrication accuracies start to exceed current capabilities
- Many of the required modules (e.g. micro fuel cells as power supply) are far from industrial reliability

- A lack of fabrication tools and basic understanding of some of the mechanisms involved in micro fabrication of devices is becoming visible: MST is a field governed by a few high-potential applications whose processing technology is well understood. In between these peaks, the technological know-how rather resembles a wasteland. Following the initial success of some applications the further development of the technology and science base has been ignored. The technology "well" is not being replenished. Key 1st tier automotive suppliers such as e.g. Bosch as well as 2nd and 3rd tier MST suppliers have already expressed grave concern about this development, which according to them has its origin partially in current federal research and development support programmes that have assumed a phase model for the development of MST rather than a pyramid model, where research is an ongoing activity feeding development and prototyping activities [Gesprächskreis MST].

Harsh environments are becoming an ever-increasing factor: almost all of the future MST applications require operation in harsh environments, i.e.:

- Temperatures typically between 180°C and 450°C , e.g. for engine management systems (piezo-injector nozzle unit, gas sensors) and emissions control (gas sensors, e.g. for NO_x and NH_3 , differential pressure sensors for soot filter control in diesel engines)
- The elevated temperatures entail a multitude of problems affecting the electrical (e.g. semiconducting or conducting) and mechanical (Young's modulus, yield strength, hysteresis) material properties of the chip bulk substrate material or the package/interconnects, as well as the chip metallization systems.
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drifting and hysteresis are frequently observed.

- Acceleration/shock: placement of sensors in vibration-prone areas such as the engine compartment and drive train or the suspension system lead to fatigue of assembly and packaging of the devices.
- Electromagnetic fields due to a multitude of internal (car) and external (wireless networks, RF communication, etc.) sources interfere either with sensor input signal, sensing mechanism, signal processing or output signal.

Due to the huge variety of different applications and their subsequent technical requirements and challenges no concise solution can be given for these problems. As a general indication of a trend, current risk management and RnD strategies however appear to focus on:

1. Establishing a broader understanding of micro fabrication technology and mechanisms leading to a technology toolbox
2. Implementation of and research on new substrate materials (e.g. silicon carbide, SOI, compound semiconductors such as GaAs, GaN, GaAlN, etc.) frequently in combination with existing micromachining technologies as well as multi-layer metallization systems

3. Packaging: higher integration density of hybrid assemblies (silicon, ceramic, polymer substrates; wafer level packaging (electrical (e.g. flip-chip bonding) and me-

chanical (e.g. anodic, fusion, eutectic, glass seal bonding)), encapsulation as well as the study of the relevant failure modes and testing procedures for improved reliability predictions

4. Data fusion and sensor network integration in order to reduce the number of required sensors
5. Standardization of signals on different system levels (IEEE 47??, AMA sensor interface, match-x, etc.) and fabrication processes in order to reduce development cost and required resources

Technological solutions however cannot be seen as being dissociated from application demands and ambient conditions. Radar systems are an example of such applications, having a short but interesting history and promising future.

E.g. Radar

The history of radar goes back to World War II, when the Royal Air Force first used radar systems to detect German airplanes. Since the 1960s, various ideas in the field of automotive applications have been developed and tested, but the devices were either too bulky or too expensive for mass production. One example is the 1959 Cadillac Cyclone. The two-passenger automobile has a clear plastic cover that fits snugly against the panoramic wind-

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shield to give the driver true 360 degree vision. When not in use, the power-operated canopy folds backward beneath the surface of the trunk deck. It automatically lifts out of the way when either door is opened. At a touch of a button, Cyclone's doors move outward from the car three inches. Moving smoothly on ball bearings, they can be slid back for easy entrance. Among its advanced engineering features is a radar device which scans the highway, and warns the driver electronically of objects in its path. Large, twin nose cones in the front of the car house the proximity-sensing units. They electronically alert the driver with both an audible signal and a warning light if an object is in its path. Inside, instruments are clustered like an aircraft dashboard before, and between, the two passengers. An intercommunication system allows passengers to converse with persons outside the automobile without raising the canopy. In 2000 Mercedes introduced the first series automotive radar system as part of the ACC (adaptive cruise control) function (figure 5). This system works at 79 GHz and is based on GaAs technology. But the price of several hundred Euros for this comfort feature is too high to allow a thorough market penetration. Nowadays 24-GHz radar systems

have become introduced. They perform in the short range (Ultra Wide Band radar) and could substitute ultrasonic systems. For distances up to 70 m, i.e. longitudinal assistance systems, 24-GHz long-range systems (CW radar) might be appropriate. But so far, the 24-GHz bandwidth is not open for automotive use. Furthermore it is expected that it might just be licensed for temporary use until the year 2014.

The automotive industry is already working on the next generation of radar systems - bringing together the advantages of the previously introduced 79 and 24-GHz systems. New technologies are considered for frequencies above 70 GHz, allowing inexpensive productions such as those known for the 24-GHz systems. SiGe technology as a potential candidate for these applications is becoming more and more important. Low noise, high linearity, frequencies up to 200 GHz and much lower costs compared to GaAs make this technology very interesting for the lower (60 GHz car-to-car communication) and medium GHz range (above 70-GHz radar systems). The use of SiGe in UMTS mobile communication systems may help a rapid distribution of the technology and reduce fabrication cost. In addition, the technology might offer energy/power savings for a variety of digital applications.

Outlook

Looking at the availability of technologies and automotive functions in the market it is evident that new approaches are indeed needed. One approach might be sensor and data fusion. The use of increasingly more individual sensors for each function is not affordable anymore. The functional sharing of sensors and information within the car, but also the exchange of information with other cars and the environment will limit the number of total sensors used, but may add a bit more freedom in sensor design. Another approach might be even tighter standardisation, leading to higher production volumes. When sensor and communication device cores are becoming industry- and application-independent, the microsystems business may once again become lucrative.

Announcement

We hereby would like to draw your attention to two recently published R&D calls related to intelligent safety systems:

- European Commission, IST call 4, eSafety (see page 37)
- BMBF, Microsystems for ADAS (see page 33)

References

- [1]Frost & Sullivan 2004: "Der westeuropäische Markt der aktiven und passiven Sicherheitssysteme für Personenkraftwagen", innovations report article, 05/06/2004
- [2]A. S. Teuner: "Overview - obstacle detection", Advanced Microsystems for Automotive Applications Yearbook 2002, Springer, 89 pp., 2002
- [3]H. Li, H.-M. Rein and M. Schwerdt: "SiGe VCOs operating up to 88 GHz, suitable for automotive radar sensors", IEE Electronics Letters, vol. 39, n. 18, pp. 1326: 27th September 2003.

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Predictive Safety Systems

Peter M. Knoll

Some sensors that are designed to detect the vehicle environment are already being used. Ultra-sonic parking aids meanwhile have high customer acceptance. ACC (Adaptive Cruise Control) systems have been introduced in the market recently. New sensors, mainly video cameras, are being developed at a rapid pace.

Micro Systems Technology plays an important role in the introduction of active safety systems. The sensor technologies are manifold: Ultra-sonic, Radar, Lidar, and Video sensors, they all help to obtain relevant and reliable data on the vehicle's surroundings. Sensor technology and sensor data processing, sensor data fusion and appropriate algorithms for function development allow the realization of functions for accident avoidance and mitigation.

Driver Assistance Systems for Vehicle Stabilization

Recently statistics have been published [1] showing that accident probability for vehicles equipped with ESP (Electronic Stability Program) is significantly lower than for vehicles without ESP. Additional improvement is expected from systems like PRE-SAFE. It combines active and passive safety by recognizing critical driving situations with increased accident possibility. It triggers preventive measures to prepare occupants and the vehicle for a possible crash by evaluating the sensors of the ESP and the Brake Assist. To best protect passengers, reversible seat belt tensioners, seat positioning and sunroof closure are activated. Today, however, the release of collision mitigation means can be activated only when a vehicle parameter goes out of control or when an accident happens. Airbags are activated the moment sensors detect an impact. Typical reaction times last 5 ms. Nevertheless, there is no doubt that airbags have contributed significantly to the reduction of road accidents and, in particular, of fatalities. But the potential of today's systems is limited.

This high accident avoidance potential can be transferred to an ever higher extent to "predictive" driver assistance systems. They expand the detection range of the vehicle by using surround sensors. With their signals, objects and situations in the vicinity of the vehicle can be included in the calculation of collision mitigating and collision avoiding means.

Predictive Driver Assistance Systems

Many driver assistance systems can be realized by making use of electronic surround vision. Today, the components for the realization of these systems - highly sensitive sensors and powerful microprocessors - are available or under development with a realistic time schedule, and the possibility of the realization of the "sensitive" automobile is fast becoming a reality. Sensors scan the environment around the vehicle, derive warnings from the detected objects, and perform driving maneuvers all in a split second faster than the most skilled driver.

An earlier reaction from the driver can be achieved by early warning. Active driver assistance systems with vehicle interaction allow a vehicle response that is quicker than the driver's normal reaction.

The following sensors are available or under development:

Ultrasonic Sensors

Reversing and Parking Aids today are using Ultra Short Range Sensors in ultrasonic technology. They have a detection range of approx. 2.5m. They have gained high acceptance with customers. The sensors are mounted in the bumper fascia. When



Figure 1: Ultrasonic Sensor 4th generation

approaching an obstacle, the driver receives an acoustical and/or optical warning.

Fig. 1 shows an ultrasonic sensor of the 4th generation. The driving and the signal processing circuitry is integrated in the sensor housing.

Long Range Radar 77 GHz

The 2nd generation Long Range Sensor with a range of up to 200m is based on FMCW Radar technology.



Figure 2: 77 GHz long-range Radar sensor with integrated CPU for Adaptive Cruise Control

The narrow lobe with an opening angle of 8° detects obstacles in front of the driver's own vehicle and measures the distance to vehicles. The CPU is integrated in the sensor housing. The angular resolution is derived from the signals from 4 radar lobes. Series introduction started in 2001 with the first generation.

Videosensor

Figure 3 shows the current setup of the Robert Bosch camera module. The camera is fixed on a small PC board with camera relevant electronics. On the rear side of the camera board the plug for the video cable is mounted. The whole unit is shifted into a windshield-mounted adapter.

CMOS technology with non-linear luminance conversion will cover a wide luminance dynamic range and will significantly outperform current CCD

cameras. As brightness of the scene cannot be controlled in automotive environment, imagers with a very high dynamic range are needed. Due to the high information content of video pictures, video technology has the highest potential for future functions. They can be realized on the video sensor alone or video signals can be fused with radar or ultrasonic signals.



Figure 3: Video camera module

Regarding sensor technology, all aspects of highly sophisticated MST are covered by these surrounding sensors. Sensor performance is still at an early stage and cost of the compo-

nents is still too high to allow widespread application. There is a huge potential for sensor performance improvement and cost reduction by introducing new Micro Systems Technologies.

Surround Sensing Systems and Driver Assistance Systems

Figure 4 shows the enormous range of driver assistance systems on the way to the "Safety Vehicle." They can be subdivided into two categories:

- Safety systems with the goal of collision mitigation and collision avoidance
- Convenience systems with the goal of semiautonomous driving

Driver support systems without active vehicle interaction can be viewed as a pre-stage to vehicle guidance. They warn the driver or suggest a driving maneuver. One ex-

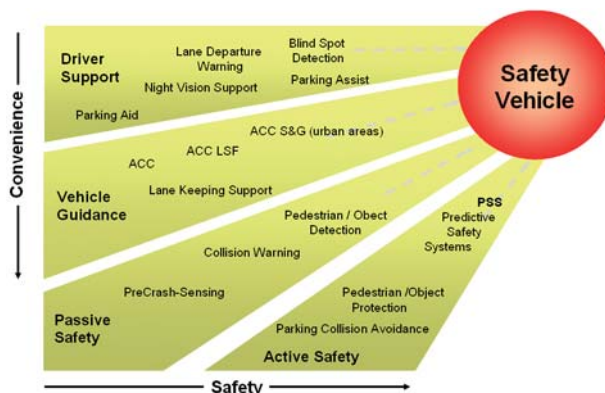


Figure 4: Driver assistance systems on the way to the safety vehicle

ample is the parking assistant of Bosch. This system will give the driver steering recommendations when parking in order to park optimally in a parking space. Another example is the Night Vision Improvement system. As more than 40% of all fatalities occur at night, this function has high potential for saving lives. Lane departure warning systems can also contribute significantly to the reduction of accidents as almost 40% of all accident are due to unintended lane departure.

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euspen's 5th International Conference & 7th AGM

May 8th - May 11th 2005

Le Corum - Montpellier - France

general informations

euspen (the European Society for Precision Engineering and Nanotechnology) links researchers and industrialists across 27 countries in an influential and extended network of people involved in the development, application and commercialization of these ultra-precision. euspen's 5th International Conference is being locally hosted by the University of Montpellier in 2005 and will take place at one of the best conference halls in France, Le Corum Conference Centre.

conference pre-program

This meeting once again provides the opportunity for scientists and engineers from industry, research institutes and universities to meet, interact and network around 4 tutorials, 2 conference keynotes, 2 company and laboratory tours, and the following 8 sessions

- Applications of nanotechnology to new functionalities (optics, micro-optoelectronics, chemical eng., Biomedical, or biological eng.,).
- Latest developments in design and manufacture of large and nano optics
- Mechanical ultra precision machining processes
- Physico-chemical microfabrication processes
- Nanometrology and characterization at nanoscale
- Ultraprecision machines and control
- Microsystems, MEMS, MOEMS and energy sources
- Nano-micro integration, engineering at nanoscale

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Early registration is open until February 18th, 2005.
 Attractive accompanying persons program is being prepared.
 Conference dinner will take place in the heart of Camargue.
 Advanced conference program will be available on the website on January 15th, 2005.

<http://montpellier2005.euspen.com>

The highest demand regarding performance and reliability is put on active safety systems. They range from simple parking stops, which automatically brake a vehicle before reaching an obstacle, to Predictive Safety Systems (PSS). Bosch will develop the Predictive Safety Systems in three stages:

PSS1 prepares the brake system for a possible emergency braking. In situations where there is the threat of an accident, it prepares for it by building up brake pressure, brings the brake pads into very light contact with the brake discs and modifies the hydraulic brake assist. The driver gains important fractions of a second until the full braking effect is achieved.

PSS2 warns the driver against the danger of driving into the vehicle in front. In about half of all collisions, drivers crash into the obstacle without braking. The second generation, PSS2, does not only prepare the braking system; it also gives a timely warning to the driver about dangerous traffic situations by triggering a short, sharp operation of the brakes.

PSS3 performs an emergency braking in the case of an unavoidable accident. The third developmental stage of the Predictive Safety System will not only recognize an unavoidable collision with a vehicle in front, but the system will in this instance also trigger automatic emergency braking with maximum vehicle deceleration. This will especially reduce the severity of an accident when the driver has failed to react at all to the previous warnings. Automatic control of vehicle function demands a very high level of certainty in the recognition of objects and the assessment of accident risk. In order to be able to reliably recognize that a collision is inevitable, additional systems - such as video sensors - will have to support the radar sensors.

Outlook

The political institutions have put the right emphasis on their programs to reduce fatalities and road traffic accidents, e.g. the European Union with the e-Safety program, with the vision to reduce fatalities by 50% by 2010, and the German government with programs such as INVENT. Carmakers and suppliers have responded to

these programs and are trying to make their contributions to achieving this goal [2].

In conjunction with these programs, there is a big challenge for Micro Systems Technology: Sensor Technology and sensor (data) fusion, setup and connecting technologies, reliability and data security. The price of the components will play a dominant role. Only costly components allow a widespread distribution of safety technologies, which is a precondition for the effectiveness of future accident prevention and mitigation.

References

- [1] Anonymous statistics of accident data by the Statistisches Bundesamt, Wiesbaden, Germany (1998 - 2001)
- [2] Knoll, P.M.: Predictive Safety Systems - Steps towards Collision Avoidance, VDA Technical Congress, Rüsselsheim, Germany (2004)

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"3D-SIAM": 3D Sensor Technology for Forward Looking Safety Systems in Automobile

Friedrich Zywitzka, Dr. Joachim Massen, Marcus Brunn, Christian Lang and Thomas Goernig

Fast and robust 3-dimensional perception of the vicinity is a key technology for future automotive comfort and safety systems. In 3D-SIAM, a project funded by the BMBF (German Ministry of Research and Education), a test vehicle is to be developed that will be able to recognize and classify obstacles in its own lane, follow a vehicle ahead automatically ("Stop & Go") and recognize an unavoidable crash in an early phase ("Pre-Crash"). It uses a new and innovative sensor, a 3D camera, whose pixels consist of so-called Photonic Mixer Devices (PMD). Within the project, the potential and constraints of the PMD technology are evaluated.

PMD Technology

This approach to 3D vision systems is based on silicon imagers, which can

be used not only for the acquisition of 2D grey-scale images, but also for the acquisition of the corresponding 3D distance images. Photonic Mixer Devices represent a new kind of active pixel sensors (APS), manufactured in standard CMOS technology. With a PMD camera, a complete 3D scene can be monitored and therefore PMD technology offers high potential for automotive applications with respect to both active and passive safety, as well as comfort systems.

Perception of traffic situations requires image sensors with high resolution, high dynamic range and high frame rate. CCDs (charge coupled devices) are well known as imagers in consumer applications, but their limited dynamic range and the risk of blooming make them not very suitable for automotive applications.

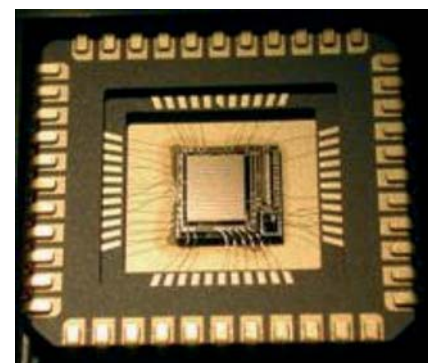


Figure 1: PMD imager chip

Therefore CMOS active pixel sensors (APS) are gaining importance. They offer a higher dynamic range (up to 120 dB), and their physical concept does not involve the risk of blooming. These imagers provide grey-scale or colour images and therefore give a 2D representation of the scene being monitored.

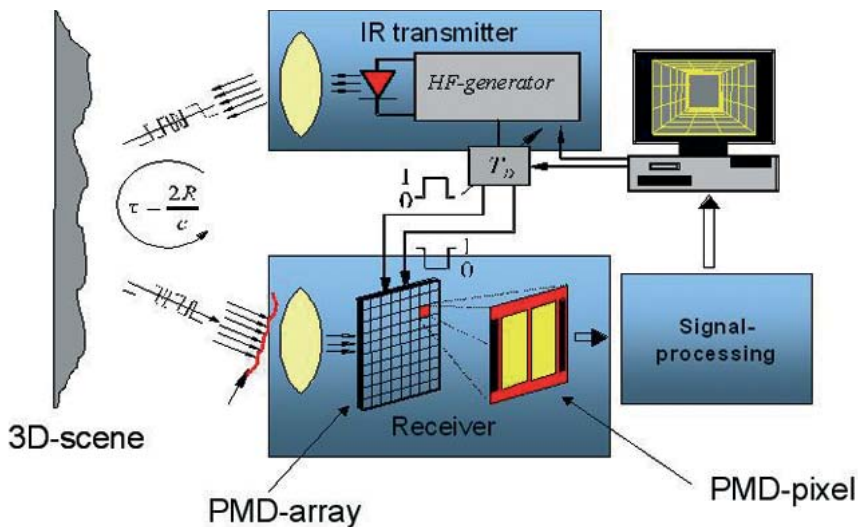


Figure 2: Schematic of a PMD camera system.

Robust vision systems for obstacle detection and classification, however, require 3D image data. As an alternative to stereo image acquisition, imagers with Photonic Mixer Devices provide the 3D image data of an entire scene as an array of voxels (volume pixels). PMDs can therefore be used to get depth information as well as grey-scale information of a scene.

Functional Principle of the PMD

A camera with Photonic Mixer Device is based on the time-of-flight principle, e.g. on the phase delay of reflected RF-modulated light, which is transmitted by an active scene illumination unit with LEDs of 850 nm wavelength. While 3D laser radars need scanners, a PMD camera uses intensity modulated incoherent light for simultaneous illumination of the

whole 3D scene. The modulation frequency is in the range of 10 to 20 MHz. The back-scattered phase front of the RF-modulated light contains the complete depth information within its local delay. The incoming wave front is correlated with an accordingly modulated electrical field within each pixel. As a result, the pixels provide a quasi-stationary RF interference pattern. The principle of a PMD camera is therefore similar to that of the RF-modulation interferometry (RFMI).

Like other CMOS APS imagers, a PMD imager with a matrix array of pixels is manufactured in a conventional CMOS process. Each light-sensitive element contains additional circuitry for signal conditioning and amplification. It provides low-frequency output signals, which contain the distance information of each element. Due to an integrated electronic suppression of background illumination within each PMD pixel, the camera is insensitive to sunlight or to any artificial light source besides the modulated illumination unit. The 3D im-

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AMAA
2005

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ADVANCED MICROSYSTEMS
FOR AUTOMOTIVE APPLICATIONS

MARCH 17-18, 2005, BERLIN, GERMANY

Scope of the conference:

Over the past years enormous progress has been made in the microsystems area in transforming research results into marketable products. Nearly all economic sectors did benefit from these developments. Automobiles today are inconceivable without microsystems. New and improved functions related to safety, performance, comfort and emission reduction are in the majority of cases based on microsystems. They constitute in many cases the unique selling proposition of a new automotive product. ABS, break assistance, stability control and further safety features, applications in air-condition systems, powertrain and engine management are examples for the indispensable role of microsystems in modern automobiles. Microsystems and their underlying technologies are often the driving forces in order to satisfy new customers' requirements.

New: Demo Day, March 16, 2005

The AMAA 2005 event offers the unique opportunity to see and test cars equipped with advanced driver assistance systems. Cars provided by A.D.C., Agalia, Bosch, Continental, Daimler Chrysler and IBE0 feature systems like lane departure warning, lane keeping assistance, full range ACC, pre-crash functions, crash mitigation and traffic sign recognition. Most of the cars are available for a real driving experience either on a closed circuit or on normal roads depending on the functions. The demo day will open at March 16, 2005 at approx. 12:00. Details will be shown on the AMAA web page as soon as they are available.

AMAA Conference Chair: Dr. Jürgen Valldorf
Phone: +49 3328 435-183, Email: valldorf@amaa.de

W W W . A M A A . D E

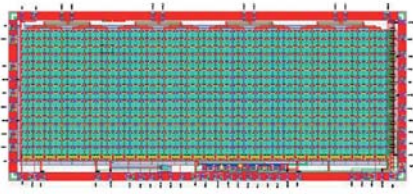


Figure 3: PMD-chip design

age data therefore are not affected by varying illumination conditions.

The acquired distance image can be read out via a row- and column-select addressing unit.

Applications in 3D-SIAM

The 3D-SIAM camera is based on a PMD imager with 16x64 pixels. The sensor chip unit is mounted behind the windscreen, while the two 850 nm LED illumination units are built into the fog lamp position of the test vehicle. As the infrared light is invisible to the human eye, it will not be noticed by other traffic participants. 3D image processing is provided by a microprocessor unit and connected with the HMI (for demonstration) and the engine control unit.

Application Stop & Go and Pre-crash

Obstacle detection is one of the most important tasks with respect to active safety. The PMD sensor system measures the distance of an object in front of the vehicle. It acquires the 3D image and the corresponding grey-scale image of a scene at the same time and with the same field of view. This helps to increase the quality of the detection and classification results. In 3D-SIAM two applications are to be realized within one system:

- 1) The Stop & Go-system uses obstacle detection in the range of up to 10 m and is able to follow a vehicle ahead in a traffic jam with low

speed by providing control signals for the engine control unit. A wide beam arrangement has been selected for the sensor system to cover the complete area in front of the vehicle.

- 2) The Pre-crash sensor system calculates the speed of an approaching object from distance information; the speed is calculated from repetitive measurements. With the wide beam and pattern recognition arrangement it is also possible to calculate the direction of the approaching object. With this information it is very early known, before the actual impact occurs, which restraint device should be activated. It is also possible to estimate which severity the impact will have since the relative impact speed is calculated from the sensor signals. This information is used to control restraint devices like adaptive force limiters or adaptive airbag systems as well as reversible restraint devices.

Outlook

Future systems for active safety will include vision systems and will support features such as lane departure warning, lane keeping, lane change assistance, automated stop & go and collision warning. PMD would offer an image making device with the potential to classify objects like cars, pedestrians or all kinds of obstacles. A further application of the PMD-sensor is to use it for pedestrian protection systems, as they will be introduced in Europe from mid-2005 on, according to the ACEA self-commitment. In a later step, even automated emergency braking or collision avoidance will be introduced.

As the innovative PMD imagers can be realized in CMOS technology, they offer cost effective solutions for forward looking safety systems in automobile. 3D perception is of great importance not only for automotive applications, but also for robotics, security, production technology or the consumer market. First series of automotive PMD camera systems are foreseen for 2006. A rapid increase in demand for such systems is expected.



Figure 5: Test Vehicle with PMD camera, Illumination units, LDWS camera, Radar and IR ACC

Partners

Conti Temic microelectronic GmbH, Ingolstadt,
A. D. C. GmbH, Lindau,
DaimlerChrysler Forschung- und Technologie, Ulm,
S-TEC GmbH, Siegen,
ZMD Zentrum Mikroelektronik Dresden AG,
Fachhochschule Trier,
Universität Siegen

Duration of Project

8-1-2001 until 7-31-2006

Responsibility

Rainer Heinstejn, VDI/VDE-IT

References

- [1]H. Riedel, A. von Dahl, C. Lang, S. Marian, F. Zywitza: "3D Vision Systems for Active Safety," SAE 2002, March 4-7, 2002, Detroit, USA
- [2]Friedrich Zywitza: "Umfeldsensorik: ein innovativer Sensor für Fahrerassistenzsysteme - Photonic Mixing Device (PMD)", IIR-Fachkonferenz 2003, October 14-15, Nürtingen, Germany
- [3]Friedrich Zywitza: "Photonic Mixing Device PMD - eine 3D-Kamera für Fahrerassistenzsysteme", TÜV Konferenz Sensorik in Sicherheits- und Assistenzsystemen, 2004, February 10-11, Cologne, Germany

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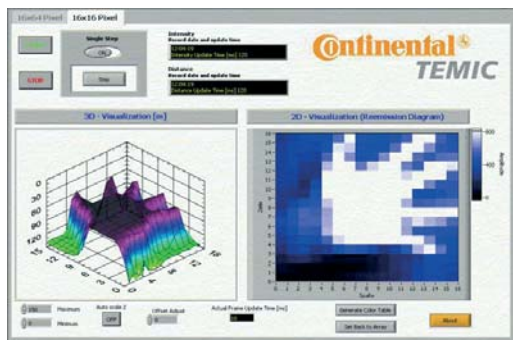


Figure 4: Example of a PMD image
3D image (left), grey-scale image (right)

EVENTS

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Paris - France

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www.zvei.org
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Jan 22 - 27, 2005

Photonics West 2005
<http://spie.org/>
San Jose, CA - USA

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Abstracts due date: Dec 20, 2004 to <http://spie.org/Conferences/Calls/05/eom/SubmitAbstract>
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July 31 - Aug 04, 2005

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Abstracts due date: Jan 17, 2005 to <http://spie.org/Conferences/Calls/05/am/SubmitAbstract>
San Diego, CA - USA

Oct 05-06, 2005

Micro System Technologies 2005
Main topic from 2005: Microsystem Packaging and Fabrication
Abstract due date: Feb 25, 2005
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AMAA 2005 - Advanced Microsystems for Automotive Applications - on March 17-18, 2005, Berlin, Germany

Hotel Steigenberger Berlin
Los-Angeles-Platz 1

NEW: Demo Day: March 16, 2005

Scope of the conference:

Over the past years enormous progress has been made in the microsystems area in transforming research results into marketable products. Nearly all economic sectors did benefit from these developments. Automobiles today are inconceivable without microsystems. New and improved functions related to safety, performance, comfort and emission reduction are in the majority of cases based on microsystems. They constitute in many cases the unique selling proposition of a new automotive product. ABS, break assistance, stability control and further safety features, applications in air-conditioning systems, power train and engine management are examples of the indispensable role played by microsys-

tems in modern automobiles. Microsystems and their underlying technologies are often the driving forces for satisfying new customers' requirements.

Demo day:

The AMAA 2005 event offers the unique opportunity to see and test cars equipped with advanced driver assistance systems. Cars provided by A.D.C., Agalia, Bosch, Continental, DaimlerChrysler and IBEO feature systems like lane departure warning, lane keeping assistance, full range ACC, pre-crash functions, crash mitigation and traffic sign recognition. Most of the cars are available for a real driving experience either on a closed circuit or on normal roads depending on the functions. The demo day will open on March 16, 2005, at approx. 12:00. Details will be shown on the AMAA web page as soon as they are available.

Some of the participating companies are:

3SOFT, A.D.C. GmbH, Aglaia Gesellschaft für Bildverarbeitung und Kommunikation mbH, ASTRI, Audi AG, CTS Automotive Products, DaimlerChrysler AG, Hella KG Hueck & Co, IBEO Automobile Sensor GmbH, Melexis NV, Mitsubishi Electric Corporation, NIPPON SOKEN laboratory, Raytheon Commercial Infrared, Robert Bosch GmbH, SensoNor, Torotrak (Development) Ltd, Volkswagen AG, VTI Technologies Oy, X-Fab Semiconductor Foundries AG, Zeiss Optronik GmbH

Contact:

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E-Mail: valldorf@amaa.de

COMS2005 on August 21-25, 2005, Baden-Baden, Germany - First Call For Papers

The 10th International Conference on the Commercialization of Micro and Nanosystems (COMS 2005) is the leading conference on the commercialization of MEMS/MST/micromachining and nanotechnology. COMS 2005 will be jointly organized by Forschungszentrum Karlsruhe and the Micro and Nanotechnology Commercialization and Education Foundation (MANCEF). The Abstract Submission Deadline is 20 Mar 2005.

The Conference fosters the commercialization of micro and nanotechnologies and addresses commercialization issues unique to these emerging and disruptive technologies. COMS 2005 will bring together key people from across the world and from every sector of industry, including leading practitioners in the field, equipment suppliers, end users, customers, Government representatives, education and financial experts. COMS2005 addresses recent advances in micro/nanotechnology and their

impact on commercial markets. Topics include, but are not restricted to:

- Industry and Business overviews
- Business models
- Building a customer/end user base
- Niche and high volume applications
- The Role of Roadmaps
- Packaging issues
- Challenges of micro-nanosystems, integration and prototyping
- Reliability and standards
- Design, production tools and test
- Emerging applications in communications, life sciences, consumer products, environment, automotive, space, medical diagnostics, instrumentation and security
- Commercialization of Silicon and HARMST technologies
- Next generation of small technologies
- Commercialization of nanotechnology
- Social implications of nanotechnology
- Equipment and supply chains

- Challenges in the management and manufacture of small technologies
- Building successful Micro-Nano-Technology regional clusters
- The role of Venture Capitalists / Business Angels in commercialization
- The role of foundries, specialist centers in commercialization
- The role of governments, development agencies and universities in commercialization
- Education and workforce development

New: 15 student posters will be accepted and these students will receive a reduction of 50% in the conference fee. The best two papers will get cash awards as prizes. The posters will be judged on their content related to the commercialization of MEMS/MST and nanotechnology applications.

For more information:
www.mancef.org/coms2005.htm

Nanotechnology Business Leaders from Around the World Gathered on October 05 – 07, 2004, Chicago, USA

CHICAGO, Oct. 5-7, 2004 -- An increasing number of U.S. companies are shipping nano-enabled products, are profitable and are projecting rapid revenue growth over the next five years, attendees heard at the largest nano business conference in the U.S. And companies large and small are incorporating the word "nano" into their marketing campaigns as a sign to consumers of improved performance and value, said speakers at NanoCommerce 2004, held Oct. 5-7 in Chicago.

More than 400 business leaders at NanoCommerce 2004 heard about business opportunities, partnerships and marketing strategies from an extensive lineup of speakers, including Motorola, Wilson Sports, PPG, DuPont, Guidant, McKinsey & Company, Easton Sports, Solutia, Hewlett-Packard, Nanosys, Nanogate, Cambrios and many others. Companies from Germany, the U.K., Australia, Japan, Switzerland and Korea attended the event. An action-packed exhibit floor showcased the more than 40 exhibitors from the U.S., Japan and the U.K. The exhibit floor featured an Internet Café and company presentations from an additional 25 companies.

NanoCommerce, known for the number of business partnerships that are formed during the annual event, introduced an innovative online networking program that allowed attendees to identify potential partners and exchange information before, during and after the conference. NanoCommerce is produced by Small Times Media and was supported this year by the U.S. NanoBusiness Alliance.

"BRAND NANO"

"Don't be afraid to brand nano - it is everything," said Brian Dillman, vice president of global marketing for Wilson Racquet Sports. "We feel it from a consumer standpoint. It will be huge."

Dillman said the nascent technology is crucial to the manufacturing, mar-

keting and even the moniker of nCode, a line of tennis rackets launched in May. In ordinary rackets, tiny voids exist between the individual carbon fibers that can create stress and weak points. In nCode rackets, nanoscale crystalline structures of silicon dioxide fill those voids, which Dillman said boost the strength, stability and power of the racket.

"The 'n' is for nanotech," he said. "We've redefined the molecular structure of the racket; we've broken the code."

In a separate panel discussion at NanoCommerce 2004, venture capitalists expressed skepticism about firms embracing "Brand Nano" and expecting it to boost their value.

"A TWO-EDGED SWORD"

Matt McCall, managing director of Draper Fisher Jurvetson-Portage Ventures, compared it to companies putting an "e" in front of their name in the late '90s. "It's a two-edged sword - whenever you get a premium, you know you'll get a discount when (the market) snaps back. Don't do that unless you really like rolling the die."

One company that has enjoyed nano-enhanced success on the consumer front is opting for a compromise approach. Nano-Tex's nanoscale additives offer such qualities as resisting stains or softening the touch in more than 20-million garments in 40 retail brands.

In a special presentation, Nano-Tex inventor David Soane and company CEO Donn Tice described how their technology has been developed and successfully integrated into the \$2 billion textile industry. Billionaire Wilbur Ross Jr., the financier who bought bankrupt textile giant Burlington Industries in part to acquire its majority stake in Nano-Tex LLC, sent prepared remarks describing how he envisions cutting edge technology injecting new value into "old economy" businesses, including the textile industry.

The company now works with more than 40 retail brands and more than 50 manufacturers worldwide, and appears in more than 20-million garments.

PRODUCTS AND PROFITS

Commercialization and profitability are much more of a reality than many believe. Preliminary results of the 2004 National Small Tech Commercialization Survey, presented at NanoCommerce 2004, show that the majority of U.S. companies surveyed are shipping nano-enabled products, are profitable and are projecting rapid revenue growth over the next five years.

"While people typically portray the industry as not having products, it was interesting to note that over 80% of the companies in this survey were working with real products that were at least as far along as the beta stage testing," said Patti Glaza, COO of Small Times Media. Small Times worked with the Nanotechnology Commercialization Group, a group of graduate students at the University of Michigan Business School, to conduct the survey.

"The majority of companies are extremely optimistic on the level of growth they will achieve over the next five years - reporting expectations of expanding over 4x their current size," Glaza said. No companies reported zero growth.

Using conservative calculations, the survey showed there are at least 12,000 people directly working at nanotechnology companies in the US today, she reported. Companies expect a 25% growth next year in employment levels.

NanoCommerce 2005 will be held next fall in Chicago. For information about NanoCommerce 2005, please contact Kelli Felker Marketing Director at Small Times E-Mail: kellifelker@smalltimes.com.

Micro- and Nanotechnology in Brazil

Report: 1st Int'l Seminar on Sep. 15-18, 2004 in Manaus, Brazil

Advanced technologies are being initiated in the Manaus Free Trade Zone. Manaus is the capital of the Brazilian state of Amazonia, located in the heart of the tropical rain forest. It has become the largest electronic production site in South America. Within the already existing CT-PIM (Technological Center of Manaus Industrial Pole), the initiation and implementation of a Microsystems Technology Park is planned. Additionally, by the end of December 2004 the CBA (Amazonian Biotechnology Center) will be operational, hosting up to 200 researchers in the area of biodiversity research at the final stage.

Electronics Market Brazil

In Brazil, there exist a few production sites for passive electronic components, mainly capacitors, resistors, and connectors. However, there is no commercial-scale semiconductor manufacturing in the country.

On the other hand, Brazil has the largest production base and the largest market for consumer electronics goods in South America, with manufacturing sites in the Free Trade Zone of Manaus and in the area of Sao Paulo. The GDP growth in Manaus, which is the largest electronic production region in South America, has been around 10% during the last few years, reaching sales of more than US\$ 10 billion in 2003. Nearly 50% of the sales are generated in the electronics sector. Nearly 90% of the sales are realised within the country. This situation is leading to a rapidly growing demand in the area of electronic components, mainly of semiconductor devices, which have to be imported. As a result, the trade balance deficit in this sector is increasing. The Brazilian government has launched a national policy for microelectronics in order to revert this trend. The focus of this policy is laid on strengthening R&D capabilities and the marketing of intellectual property by improving infrastructures for R&D and (higher) education. This policy should create opportunities for innovation in the electronics industry in the country.

In this context, the Superintendence of the Manaus Free Trade Zone

(SUFRAMA, www.suframa.gov.br) as a branch of the Brazilian Ministry of Development Industry and Foreign Trade is active in the development of the industrial cluster in Manaus (PIM), a cluster of more than 430 enterprises with more than 350,000 employees.

Micro- and Nanotechnology

Starting in 2005, a technological centre for microsystems technology (CMS-CTPIM) is going to be built in Manaus. The planning phase is nearly completed at this time. This centre should include a "Microsystems R&D Centre" including the necessary clean rooms, equipment, etc., as well as a "Microsystems Product Innovation Reference Centre" stimulating industrial application and industrial development. A strong emphasis is additionally being laid on the development of know-how in the design area. Already today, aspects of microsystems technology are taught in the local university, an activity to be expanded. Additionally, human resources on the level of technicians should be trained by initiating dedicated education programs.

During the last 2.5 years, a number of possible co-operation partners and vendors worldwide have been contacted and supporting joint activities were negotiated. The results of this phase were presented during the International Seminar on Micro and Nano Technology (MINAPIM 2004), in Manaus (www.suframa.gov.br/minapim). This seminar had about 200 participants, mainly from all over Brazil, but from foreign countries as well. It has been part of the 2nd Amazonian International Fair, a product showcase and large conference held every two years. Speakers from all over Europe, from the US, from Korea, and from Brazil described their ideas for activities related to the upcoming launch of the CMS-CTPIM.

Biotechnology: Potential application area for microtechnology?

As early as 2002 a research centre in the area of biotechnology was launched. The CBA as a department within SUFRAMA will be operational by December 2004 when a first staffing phase is completed. The more

than 25 laboratories are ready at this stage already. It is foreseen to concentrate the Brazilian research in the area of bio-diversity within this modern facility. The CBA's main objectives include developing new technologies based on integrated research, performed by a network of regional and national laboratories. Priority will initially be given to science, technology and technological innovation, beginning with work in phytotherapy, cosmetics, and extracts, with the aim of giving greater competitiveness to the bioproducts and agricultural products produced in Amazonia by developing techniques which yield greater productivity, quality and maximum added value.

An additional rather new aspect is the prospect of the convergence of micro- and nanotechnology with biotechnology. As both activities are still in a ramp-up phase (or even in an earlier phase), it would be possible to develop biotechnological research in a way that this area could be one of the first "customers" of the Manaus based new microsystems technology activities. The Manaus Free Trade Zone has a chance to develop a worldwide unique biomicrotechnology cluster, integrating the possibilities of "jungle-related" biologic or biotechnical with dedicated microsystems research and development.

Conclusions

Based on the solid industrial growth and the broad production experience in consumer electronics, the Manaus Free Trade Zone has the (financial) resources for initiating R&D activities as a starting point for future economic activities in the region. In order to maintain a certain independency of foreign suppliers of (critical) components for electronic products, the initiation of a broad microsystems technology how is considered important. The possible integration of microsystems technology and biotechnology would allow a further step in the direction of becoming a significant worldwide actor in micro- and nanotechnology.

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Report: Workshop on Wafer Bonding for MEMS Technologies on October 11-12, 2004, Halle, Germany

Initially, only an ordinary public state report meeting regarding the national research project "Mikroprüf" under the German Microsystems Programme (www.mstonline.de) was intended, but the final result, which was achieved within only a few months, was much more. Even the organisers themselves were very surprised: An international workshop on wafer bonding with about 90 participants from 13 countries, even from the USA, with 34 oral presentations during two days and a small exhibition with participation from the renowned European wafer bonder manufacturers AML, EVG and Süss-Microtec was achieved on the campus of the University of Halle in Saxony-Anhalt.

The main topics of the workshop ranged from

- direct bonding at low and high temperatures,
- anodic and glass bonding and

- glass frit, metallic and polymer bonding to
- bonding equipment and market (trends).

The very positive international response to this workshop from research institutes as well as MST/MEMS companies, industrial applicants and equipment manufacturers was taken as a clear sign of the high relevance of bonding technologies for the packaging of microsystems, in particular on the wafer level, as a cost-effective packaging solution. And it seems that wafer bonding still needs its own, particular platform of information exchange in Europe: The participants unanimously voted for a continuation of such a kind of workshop, if possible next year!

The workshop in Halle was organised by Max-Planck Institute of Microstructure Physics and by the con-

sortium of the above-mentioned research project "Mikroprüf", the German companies STEAG microParts, Bosch, XFAB and Hegewald&Peschke and the research partners Fraunhofer Institute for Material Mechanics in Halle and the Center for Microtechnologies of the University of Chemnitz. The aim of research on and development of this project is to set up methods and equipment for measuring the quality and reliability of wafer bond connections for microsystems. This project was launched in April 2003 and will terminate in March 2005. It is accompanied by VDI/VDE-IT, the Microsystems Programme manager of the German Ministry of Education and Research. More information is available at www.microtesting.de

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Report: "Seeing at the Nanoscale II" on October 13 - 15, 2004, Grenoble, France

This year's conference "Seeing at the Nanoscale" gave an up-to-date overview of the technology and application of scanning probe microscopy (SPM). The theme of the conference was "Exploring Nanostructure Imaging, Characterization and Modification using SPM and Related Techniques". To address these topics the two and a half day symposium included nearly 40 oral presentations by mainly academic researchers, poster sessions and an award presentation. The event was sponsored and organized by Veeco Instruments Inc. in conjunction with the micro/nano networks Minatec, Nano2Life and Phantoms. Veeco is a leading provider of metrology and process equipment solutions used by manufacturers in the data storage, semiconductor and telecom/wireless industries. Veeco's metrology tools are used to measure at the nanoscale and process equipment tools help create nanoscale devices. The tools and devices are also enabling instruments used in the advancement of scientific research and

nanotechnology. Minatec is a competence centre and a talent pool dedicated to innovation in micro- and nanotechnology located in Grenoble. Nano2Life and Phantoms are European networks of excellence on nanobiotechnology and nanotechnology, respectively.

This year's conference was the second in the series "Seeing at the Nanoscale". By moving the conference from Santa Barbara (USA) to Europe this year, communications and research sharing within the global nano-scientific community was further encouraged. The symposium was attended by researchers in nanoscale metrology and nanoscience applications and was an international multidisciplinary event that attracted hundreds of scientists from all over the world. Nanotechnology is foreseen to be a key technology in the future and is gaining more and more public attention. The continued advances made in nanosciences and nanotechnology will result in new materials,

devices and systems with enhanced properties. Critical to these advances is the ability to image, probe and alter nanostructures and scanning probe microscopy is an important tool to address these aspects.

The conference included 5 technical sessions: 1. Biomolecules and Biological Processes, 2. Materials and Polymer Systems, 3. Measurements of mechanical, electrical, optical, thermal properties of materials at the Nanoscale, 4. Instrumentation: New Tools and Techniques for Nanoscience and 5. Theory and Physics of SPM. In terms of application of SPM, biological and biotechnological examples clearly dominated the conference. However, most of the presentations were dedicated to basic research, thus showing that nanotechnology is still in its infancy concerning commercial exploitation.

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Report: The 2004 Int'l Semiconductor Conference (CAS 2004)

The **2004 International Semiconductor Conference (CAS 2004)** was the 27th event of an annual sequence and the 14th edition with international participation (www.imt.ro/cas). Beginning with 1995 CAS is an IEEE event, sponsored by the IEEE EDS. The Conference profile was gradually extended from semiconductor device physics and technology to micro- and nano-technologies.

The organizer of the CAS Conference was IMT-Bucharest (National Institute for R&D in Microtechnologies). CAS 2004 brought together 143 scientists from prestigious research centers (LAAS Toulouse, IMT Bucharest, Fraunhofer Inst. Berlin, FORTH Heraklion), universities (Cambridge, Darmstadt, Bucharest) and also from industry. The conference program had 14 sections with 11 invited speakers, 100 regular oral and poster papers. The contributed and invited papers were published in the CAS Proceedings, delivered to the participants at the beginning of the conference. This year's "**Microphotonics**" session

was a joint session together with the **WAPITI Project (STREP/FP6)** - Wafer-bonding and Active Passive Integration Technology and Implementation.

Just after the closing of CAS 2004 the **PATENT workshop** was held, organized by the **Reliability Cluster of the NoE "Design for Micro & Nano Manufacturing - PATENT-DfMM"**

(IST/FP6). The workshop included a scientific session with contributions from members of the Reliability Cluster; topics on MEMS: failure modes, test structures, reliability testing, design rules. The CAS participants had full access to the scientific session.

The **Autumn School "Advanced methods for Systems on Chip for Ambient Intelligence"**, organized by the **REASON** project (REsearch And Training Action for System On Chip Design) (IST/FP5), was also held right after CAS 2004, bringing together participants (both teachers and students) from Romania and Europe. The school topics were focused on: Design of Cellular Automata Based

Cipher; Measurement, modeling and simulation of thermal dynamics in microelectronic structures; Hierarchical test approaches for digital systems; Future trends in System on Chip Design.

Next year, **CAS 2005 will be held from 3rd to 5th October**, in the beautiful mountain resort of Sinaia, Romania. **Main topics** will be: Micro- and nanotechnologies for transducers, interfaces and microsystems, biomedical and environmental application; Nanoscience and nanoengineering; Novel materials and intelligent materials; Power devices and microelectronics (including CAD); Microoptics and microphotonics; Micro-machined devices and circuits for microwave and millimeter wave applications.

Contact:

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Report: Future Technology Polymer Electronics on October, 18, 2004, Munich, Germany

The conference on "Future Technology Polymer Electronics: intelligent plastics - the next revolution in electronics" was organized by the VDMA for more than 150 participants.

At the opening session Karlheinz Kreuzer from the German Federal Ministry of Education and Research outlined the Ministry's funding activities. In the field of polymer electronics and organic displays, about 35 million was allocated to fund RTD activities from 2001 to 2006. In the future too, Polytronic will be an important field for funding, focusing on improvements in flexible process technologies, high-frequency RFID applications and performance of OLEDs.

In the first technical session Ulrich Buller from FhG-IAP, Potsdam, and Udo Heider from Merck Chemicals gave an interesting overview over chances of polymers in several applications like OLEDs/ displays, solar cells, field effect transistors, or sensors. Both highlighted the huge potentials

of organic semiconductors (OSC) as active material in electronic devices. But: polymers will not and cannot compete with silicon technology.

Their chances of success are lying in the field of applications, which require low-cost fabrication and assembling combined with low performance as well as applications combining several functionalities on flexible substrates.

Hans Hofstraat gave an interesting talk about the activities of Philips Research Eindhoven, focusing on the vision of ambient intelligence. As an example, he described the successful demonstration of a 64-bit organic RFID chip working at a carrier frequency of at least 125 kHz. A similar result was presented by PolyIC; future research & developments are now targeting 13.56 MHz. The intention to go to higher frequencies definitely requires improved materials. With reference to that, for instance Avecia's roadmap, presented by Tom McLean, showed that OSCs are scheduled to

meet requirements concerning charge carrier mobility and stability by the end of 2006.

Christian Polscher from DHL Solutions focused his talk on the requirements of an end user and the benefit of using RFIDs in logistics. Based on market studies and his own experience, he highlighted the fact that the main advantage of RFID technology is that it will lead to significant cost savings mainly for outlets and retailers assuming a broad implementation in all items.

In summary, the conference provided a good overview from research to application scenarios and brought together experts from different fields like material sciences, machine builders, technology providers, and potential end users.

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Impressions from MICRONORA 2004, held on Sept. 28 - Oct. 01, 2004, Besancon, France

MICRONORA, the International Microtechnology Trade Fair, was held for the 15th time in Besancon/France, from Sep. 28 - Oct. 01, 2004. At this year's event, covering an area of 20,000 square metres, 871 exhibitors and 14,718 visitors.

Focus on precision engineering

This event, on one hand, is an international trade fair with a specific technical focus (precision mechanics, microtechnology, watch production), but, on the other hand, a showcase of the regional industry, regional research, and regional service providers, too. The regional focus in this context should be seen as transnational, between France and Switzerland. 34% of the exhibitors originated from 15 foreign countries, nearly half of the foreign exhibitors were French though.

In comparison to the MicroTechnology in Hanover/Germany, MICRONORA allows suppliers of equipment and tooling for ultra precision milling to exhibit jointly with the users of such machinery, the suppliers and manufacturers of precision engineered miniaturised components and parts. The possibility of these groups of exhibitors to meet at a joint trade fair can be seen as a specific feature.

With a special section within the fair called "Zoom", for several years now

MICRONORA has been illustrating specific application areas for microtechnology: "aeronautics and space" in 2000, "medicine" in 2002. In 2004, "microelectronics and micromechanics" was chosen as a specific topic. 25 mostly French exhibitors from microelectronics and (silicon-) micromechanics were present, again consisting of suppliers and users, booth by booth.

Special Events

As an additional highlight, MICRONORA awarded the "Micron d'Or", a prize dedicated to innovative microtechnology products that were presented the first time at the trade fair. This innovation prize is awarded in six categories, products, tools, equipment, etc. As an example, one category was won by the company SILMACH (www.silmach.com), a Besancon based spin-off of the local CNRS research institute.

Organised by the Innovation Relay Centre "Grand Est"/France, partner within the network of Innovation Relay Centres (<http://irc.cordis.lu>), a brokerage event "Micro-Nanotechnologies: when microelectronics and micromechanics meet" was organised, where 200 one-to-one meetings between technology suppliers and potential users or partners were held. This kind of event already has a long tradition, held simultaneously with

MICRONORA. A catalogue of all technology offers of the 2004 event can be downloaded at: www.euro-innovation.org/documents/Catalogue_micronora_2004.pdf

MICRONORA 2006

The next MICRONORA will take place on Sep. 26-29, 2006. It is to be anticipated that the trade fair and additional activities will be an interesting event to attend.

Exhibiting at MICRONORA for regional players in the area of microtechnology and precision engineering is a must. The strong microtechnology focus of the region around Besancon and the western part of Switzerland is not only an interesting market for vendors and suppliers from this region though. The international and transnational scope of MICRONORA will therefore surely increase. On the other hand, the strength of the existing regional market with its traditional regional relationships was clearly noticeable. A well-defined strategy and a well-prepared concept to enter this rather closed market seem to be indispensable in order to benefit from exhibiting at MICRONORA in the longer term.

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SHORT News

Osram Opto Semiconductors Continues to Rely on Photolithography Solutions from SUSS MicroTec AG

Osram Opto Semiconductors has placed an additional follow-on order for SUSS LithoFab200 Production Lithography Cluster for its high volume light emitting diode (LED) production. The cluster is used for the manufacturing of nitride and arsenide/phosphide based LEDs. The LithoFab200 enables the streamlining of the LED production process by automating and integrating all photolithography process steps, namely coat, bake, expose and develop, in one modular cluster system. For the fabrication of light emitting diodes it

is crucial to maximize both the number of LED wafers processed per unit time as well as the number of good LEDs per processed wafer. With its production proven equipment design the LithoFab200 enables exceptional process scalability and fast time-to-market for new device designs, while reducing cycle times and excess wafer inventory. LED production is a maturing technology. In the years to come, as the race to conquer the general lighting market heats up, the trend of increased production efficiency is expected to continue and broaden. LED producers are setting up aggressive schedules for cost control in all aspects of the

LED manufacturing process. SUSS is committed to support the industry's thrust towards lowering the all-important 'lumen-per-dollar' benchmark for LEDs by supplying lowest cost-of-ownership production solutions. SUSS MicroTec's dedication to the LED and compound semiconductor industry is also reflected by the other SUSS product lines for related applications, namely automatic equipment solutions for LED bonding, LED testing, metal lift-off and nanoimprinting of small features for next generation light emitting devices. SUSS MicroTec is a leading supplier of production, process and test technology for the semiconductor industry.

SUSS maintains its leadership position with over 7,000 systems installed worldwide. Headquartered in Munich, Germany, SUSS has 5 international manufacturing sites and provides support from sales and service centers in North America, Europe, Asia and Japan. See www.suss.com.

EV Group and Datacon Announce Cooperation on AC2W Technology

EV Group and Datacon Technology AG announced an agreement on development in the field of advanced-chip-to-wafer (AC2W) technology and on joint strategic marketing and sales activities to promote the cooperation. The unique technology combines Datacon's leading expertise in chip-bonding and key flip-chip bonding technologies with the unique wafer-level know-how from EV Group. It has been developed in a joint R&D project. The EVG540C2W chip-to-wafer bonder permanently bonds a wafer with single devices, e.g., chips, under defined process conditions, after they have been fixed with a temporary fixing agent in a high-precision flip-chip bonder from Datacon. The technology used for the bonding process is called SOLID F2F, in which "SOLID" stands for solid liquid interdiffusion, a technology that uses a metal soldering process. F2F stands for face-to-face and describes the orientation of the two chips with their active side facing each other. The new equipment platform has already been successfully installed at Infineon AG, a major semiconductor device manufacturer. AC2W technology offers high device density through stacked devices, short interconnects and higher functional density. It provides unique advantages for chip manufacturers as it enables the integration of various device technologies such as hybrid integration of IC and MEMS functionality. It can generate packages that are an alternative to expensive embedded processes. And it saves device manufacturers time and money by combining highest throughput and utilization of well established flip-chip and die attach processes with the permanent bonding process under well-controlled process parameters. Datacon, a leading supplier of flip-chip and die bonding equipment, founded in 1986 in Radfeld, Austria, consists of an international group of companies that develops and pro-

duces high-precision machines for leading microelectronics companies worldwide. Datacon employs some 400 staff worldwide, including around 100 in research and development, see www.datacon.at

EV Group, founded in 1980, is a global supplier of wafer bonders, aligners, photoresist coaters, cleaners and inspection systems for semiconductor, MEMS and emerging nanotechnology markets. Headquartered in Schärding, Austria, EV Group operates via a global customer support network, see www.EVGroup.com

New MST Training Courses and CD-ROM

In 2005, FSRM Swiss Foundation for Research in Microtechnology proposes following five new course topics in its programme "Training in Microsystems":

- Existing and New MEMS Emerging Markets
- Photon Detection and Counting Techniques
- Laser Micromachining
- High Density Packaging and ASIC's - Synergies in Miniaturization
- Polymer Optoelectronic Technologies and their Applications.

Together with 30 further topics they form a large course offer of short application oriented training courses given by renowned specialists all over Europe. In 2005, totally 50 course sessions will take place in Berlin, Munich, Barcelona, Stockholm, Zürich, Vienna and eight other European cities. The courses last between 1-2 days and are all given by specialists from renowned research institutes, universities and companies. Since 1993, year of the first MST courses organized by FSRM, already over 3000 engineers and researchers participated in these courses and thus got trained in specific topics in a relatively short time.

The course offer is completed by the new CD-ROM "World of Microsystems". It describes microsystems markets, technologies and products in three languages (English, German and French) and in a very user friendly, interactive way. Movies, a detailed glossary and direct links to nearly 200 mentioned manufacturers and institutions complete the information. Further information, demo version of the CD, course descriptions and agenda: FSRM, CH 2001 Neuchâtel, +41 32 720 09 00 and <http://www.fsrn.ch>

MANCEF and SEMI Sign MOU

-Agreement Calls for Joint Hosting, Promotion of Events- SEMI and the Micro and Nanotechnology Commercialization Education Foundation (MANCEF) have signed a memorandum of understanding (MOU) for mutual support of programs in the areas of MEMS and nanotechnology. The agreement highlights the expanding relationship between the two organizations to further the development of small technologies worldwide. SEMI and MANCEF will work to offer MEMS and nanotech events to engineers and other technical professionals across the global micro-nano community, specifically events in Germany, Taiwan, and the USA planned for 2005. Under the terms of the MOU, SEMI will organize a MEMS Standards Workshop at the Commercialization of Micro and Nano Systems (COMS) conference series, next held August 23-25, 2005, in Baden-Baden, Germany. MANCEF will promote and market MEMS events at SEMICON West 2005, held July 11-15 in San Francisco, California. In addition, both organizations will discuss the holding of co-sponsored events next year at SEMCON Europa and SEMJCON Taiwan.

SEMI is a global industry association serving companies that develop and provide manufacturing technology and materials to the global semiconductor, flat panel display, MEMS and related microelectronics industries; please see www.semi.org MANCEF is an educational non-profit organization globally reaching the people, organizations, and governments interested in commercializing micro and nano technologies. Information is available at www.mancef.org

New Int'l LIGA Interest Group formed

An interactive workshop on the 'Applications and Commercialisation of LIGA' held at the COMS2004 conference in Edmonton, Canada, was attended by over 30 delegates from centres around the world, including the US, Canada, Australia, and Germany.

There was a consensus from the meeting that to enable LIGA technology to be exploited effectively, the range of interest and size of the global community needs to be determined and a

commercialisation strategy established. An International LIGA Interest Group was formed at the workshop and is open to all who may be interested in the activities of the Group. This Group will initially provide a communications exchange for people doing research, for practitioners, manufacturing and marketing companies. Web pages will initially be provided by MANCEF, (Micro and Nanotechnology Commercialisation and Educational Foundation) on the MANCEF Website (www.MANCEF.org/LIGA) The LIGA technique was first developed at Forschungszentrum Karlsruhe (FZK) in Germany in the 1980s. Its strength is based on the precision of X-ray lithography. This requires intense, parallel beams of high energy X-rays, only obtainable from synchrotrons. Many of its practitioners and users are associated with or are located close to synchrotrons. For progress to be made in commercialisation there is an increasing need to determine where the technical and practical boundaries exist for the development and cost-effective production of marketable products; and to relate these to developments in nanotechnology.

During the last ten years much emphasis has been placed on improving the technique and developing prototypes microstructures but only a relatively few of these have become marketable products. The challenge is establish design rules and reliable manufacturing methodologies; also to extend the range of materials that can be electro-formed or micromoulded. The new Group will benefit from the valuable experience gained over many years from the commercialisation activities at ANKA in Germany, CAMD and Sandia in the US. This initiative is also timely as COMS2005 will be hosted by FZK at Baden-Baden, August 21-25, 2005 and include a workshop on HARMST and LIGA. Organisations and companies are kindly invited to join the interest Group. Membership is free at this time. Please contact David Tolfree, Technoprenuer Ltd and VP Europe MANCEF; Email:d.tolfree@dl.ac.uk

Coventor Ships Kyocera Package Libraries for MEMS Enabled Products

Coventor Inc., is now shipping standard package libraries for MEMS applications in partnership with Kyocera

Corp., an industry leader in IC and MEMS packaging solutions. The package libraries, developed jointly by Coventor and Kyocera, will contain software models of a variety of MEMS compatible open tool hermetic ceramic packages, which are currently offered in Kyocera's product portfolio. The package libraries are shipping now and all design information will be made available at no charge to new and existing CoventorWare software customers. The package libraries will initially target RF, inertial and infrared MEMS applications and will include elements such as package mask, process descriptions, material property data, and 3D detailed models. The libraries will initially enable users to couple MEMS devices and Kyocera standard packages for analysis of thermomechanical effects, low- and high-frequency coupled RLC effects, as well as failure modes and design for reliability in the future. In addition, coupled device/package macro model extraction is supported for Cadence and Synopsys environments which will provide users with the ability to include package stress effects at the system level thereby creating more robust designs. Kyocera packaging libraries are available immediately.

Coventor, Inc. headquartered in Cary, NC provides a comprehensive suite of software tools for the development of micro-electromechanical systems (MEMS), microfluidics and semiconductor process applications. CoventorWare is an industry standard platform adopted by leading MEMS and microfluidics manufacturers around the globe, and by an extensive network of university partners. Coventor is a privately held company with offices in Cambridge, MA and San Mateo, CA. European headquarters is in Paris, France.

For more information please contact sales@coventor.com or visit www.coventor.com.

Hot Embossing System at the MEMS and Nanotechnology Exchange from Jenoptik Mikrotechnik

One of the world's leading MEMS foundries, the MEMS and Nanotechnology Exchange located in Reston, Virginia, USA, has purchased a Jenoptik HEX_03 system, a state-of-the-art Hot Embossing tool. The MEMS and Nanotechnology Exchange tested sev-

eral Hot Embossing tools from different vendors before deciding on the HEX_03. One of the reasons for the choice was the excellent results achieved in the Jenoptik application lab, such as the high force, which is necessary to get good mold fill. The large force range of the HEX_03 system allows a wide variety of applications. One of the biggest advantage of the Jenoptik Mikrotechnik equipment is the active de-embossing system that keeps the features clean and ensures high throughput. In addition to these advantages, the HEX_03 system provides detailed process information, which simplifies troubleshooting and reduces process development time.

The MEMS and Nanotechnology Exchange has decided to pursue Hot Embossing technology, because it allows a variety of microdevices to be rapidly prototyped. The foundry, a provider of high-quality foundry and consulting services, expects it will have broad applicability to a wide variety of devices. Their 49 individual state-of-the-art foundries collectively offer the most comprehensive and diverse set of implementation solutions for MEMS, micro- and nano-technologies found anywhere in the world. Jenoptik Mikrotechnik GmbH is a technology leader in the field of Hot Embossing for manufacturing microfluidic and micro-optic devices. The company located in Jena, Germany, was founded in 1996 and is a 100%-subsidiary of the Jenoptik Laser and Optik System GmbH. It has installed more than 50 Hot Embossing Systems in the leading R&D institutes and MEMS companies in Japan, USA, and Europe. The portfolio consists of Hot Embossing Equipment, LIGA-Scanner, Monochromators, EUV monitoring systems, and Technology Services. For more information please contact Mr. J. Fröhling, Director Sales and Marketing, johannes.froehling@jenoptik.com, or visit www.jo-mikrotechnik.com

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"FlexiDis", a New IST Integrated Project Started on Oct 1, 2004

A group of 20 European companies, research institutes and universities, all with an active interest in future display technologies, today announced that they together started FlexiDis - an integrated project to research, develop and initiate market studies of high-performance flexible displays. Partially funded under the European Union's 6th Framework Program as part of the IST (Information Society Technologies) priority, the FlexiDis project encompasses 26 million Euros of direct effort, enabling the project to leverage a critical mass of infrastructure and manpower resources worth substantially more than that amount.

Flexible displays based on plastic and metal foil substrates are seen as the next major step in display technology, freeing users from the flat rectangular format of current displays and the fragility of glass. They will unleash the imagination of designers to put displays where it was previously impossible to do so, such as on the contoured surfaces of car dashboards, rolled into narrow tubes or built into clothing. One day they may

even bring to reality the video newspaper featured in the Harry Potter movies. Ultimately the industry would like to manufacture them on plastic substrates using reel-to-reel processing.

To demonstrate the success of the project the FlexiDis group has set itself two goals. The first of these is to develop a flexible and low-power electronic paper (e-paper) display that enables mobile access to newspapers, e-mails and maps, and could eventually be rolled up to fit inside a tubular container - what it calls a 'display in a small volume'. The second is to develop a 'video-photograph' - a paper-thin robust flexible display that will enable users to view full-color video as well as still images.

Both types will be pixel-based active-matrix displays with a backplane incorporating thin-film transistors (TFTs). The bendable e-paper display will initially be based on electrophoretic materials laminated onto plastic substrates incorporating organic TFTs (plastic electronics), while the video-photograph will be based

on organic LED (OLED) materials deposited on metal or plastic foils, driven using inorganic (silicon) TFTs.

The FlexiDis project will run for three years and currently comprises the following organizations:

Universities: Ecole Polytechnique Fédérale de Lausanne, University of Cambridge, University of Stuttgart

Institutes: CEA-LETI, CNR Rome, CNRS Ecole Polytechnique de Palaiseau, IMEC, Institute of Polymer Mechanics at University of Latvia

Industrial Partners: ASML, Avecia, BMW, LEGO, Nokia Research Center, NovaLED GmbH, Philips Center for Industrial Technology, Philips Research, Plastic Logic, STMicroelectronics, Thomson, Unaxis Display Technology

Contact:

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Philips Research, The Netherlands
E-Mail: coordinator@flexidis-project.org
www.flexidis-project.org

MASMICRO Project Kick-off Meeting, Glasgow, Sept 28-29, 2004

The MASMICRO project kick-off meeting was held at the University of Strathclyde with representatives from all 36 partners and two Project Officers from the EU Commission. The MASMICRO Project is an EU FP6 Integrated Project, launched on 1 July 2004. Project duration is four years.

The overall objective of the project is to develop an integrated manufacturing facility for the mass-manufacture of miniature/micro-products, and a technology transfer/training package for transferring the knowledge to and developing skills in industry. A multi-discipline (horizontally) and integration (vertically) approach is used for the implementation of the project. Research is being conducted to resolve individual fundamental and technological issues concerning the mass manufacture of miniature/micro-products, with a view to achieving several break-

throughs. Demonstration of the mass-manufacturing facility to be developed will be subject to validation trials and production applications. Knowledge and technologies generated will be directly transferred to the targeted groups, through demonstration, training and SME take-ups programmes.

The MASMICRO consortium is comprised of 36 partners who provide expertise in disciplines such as Design, Materials, Mechanics, Processing Technologies, Tool/Machine Fabrication, Manufacturing Automation, Metrology, Software Development, Dissemination/Exploitation, and Project Management. The project is managed by an experienced team with several boards being involved in decision-making - Project Co-ordination Board, Project Technical Board, Project Exploitation Board, Project Training Board and Project Advisory Board.

The MASMICRO consortium seeks:

- collaboration with existing EU projects and Eureka projects;
- link to EU networks and industrial associations;
- exchange of experience in developing industrial training programmes;
- exchange of experience in developing "Virtual Enterprise";
- venture capital for exploitation of project results;
- potential interest referring to formulating new projects;
- provision of the services, through participating organisations.

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www.masmicro.net



2nd NEXUS IP & NoE meeting to be held in Prague, Jan 12-13, 2005

On 12-13 Jan 2005, the 2nd NEXUS IP & NoE meeting will present the activities of both IST and NMP micro- and nano-related projects. The aim of the meeting is twofold: The first is to provide a means to further the exploitation of ideas developed in one project into other projects and to promote the use of ideas in alternative industrial sectors; the second is to provide a forum for Western and Eastern partners to meet. This meeting provides an ideal opportunity for selected Eastern partners (NMS and ACC) to present their

capabilities and for both Eastern and Western partners to plan joint projects. The detailed agenda for the meeting is available on the NEXUS website home page www.nexus-mems.com.

NEXUS has launched this initiative to help IPs and NoEs to find the best suitable partners to join their projects. Potential Eastern partners (companies and research labs) and SMEs from the West are listed in an online directory at www.nexus-mems.com/viewacc.asp.

Potential Eastern partners (companies and research labs) and SMEs from the West wishing to be listed, please contact the NEXUS News editor by E-Mail nexus-news@4m2c.com.

NEXUS Steering Committee: Focus on re-vitalising the USCs & MWGs

The NEXUS Steering Committee met at the Systems Engineering Innovation Centre (SEIC) at Loughborough in the UK on 21 Sept 2004. The Committee's focus at this meeting was on reviewing the operational effectiveness of the USC & MWG activities with a view to updating their remit in line with European strategies and plans for IST. To this end, the Steering Committee members have under-

taken to each champion a topic or domain-grouping from the USCs and MWGs. The new plans and objectives for the USCs and MWGs will be publicised to all members in upcoming issues of the NEXUS e-zine.

On behalf of the NEXUS SC
Ayman El-Fataty, SEIC, UK
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NEXUS User Supplier Club Pharmaceutical and Diagnostic with new coordinator

The current coordinator Coulton Legge has resigned from this post. He has announced that Julie Deacon will take over. She has had many years of experience in these industrial sectors and therefore has a good appreciation of the USER requirements, while her recent background

of working for CRL in microsystems also enables her to evaluate, from a SUPPLIER'S angle, the potentials for the technology.

Contact:
Julie Deacon, PERA, UK
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New FP6 Marie Curie research training network "Advanced Methods and Tools for Handling and Assembly in Microtechnology - ASSEMIC"

ASSEMIC is devoted to training and research in handling and assembly at the micro-dimension, involving advanced methods and tools and providing a multidisciplinary, complementary approach. This is to be achieved by combining the research competence of R&D centres and universities, with the application-orient-

ed view from SMEs and industrial partners.

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NEXUS Contact

NEXUS News is provided to NEXUS members and other interested mst-news readers by the NEXUS Association.



The NEXUS Association is partly funded through the NEXUSPLUS project within the EC IST programme in FP6 to:

- Disseminate and cross-fertilise between FP6 Integrated Projects and Networks of Excellence.
- Increase ACC participation in NEXUS activities and within EC FP6 projects.



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NEXUS Membership

NEXUS Membership is open to all companies and institutes, worldwide, that are able to contribute expertise in areas relevant to microsystems technology.

To apply for membership, complete the online questionnaire for the NEXUS Who's who on the NEXUS website:

www.nexus-mems.com

EUROPRACTICE Start-up Funding Forum Attracts the Investment Community

This was the fourth Europractice VC Funding Forum and this year it attracted over 20 investors. The event was held at the Institute of Physics, London, on 4th November 2004. It was organised by Technology for Industry Ltd (TFI), Yole Developpement (Yole) and KBI Commercial Ltd (KBIC) and was supported by the European Commission through Europractice.

A competition was held aimed at providing assistance for 10 micro- and nanotechnologies (MNT) start-up projects to prepare for and be presented to investors at a specially designed funding forum, in addition to a range of follow-up support actions. The competition was open to all companies working on MNT, including components manufacturers, those offering specific process steps (front-end, back-end, packaging), dedicated microsystems equipment - or innovative MNT based product

manufacturers and service suppliers (CAD tools, design houses, packaging, integration, test, etc.).

All submitted projects were received at the beginning of August and examined by a panel of independent experts: J Malcolm Wilkinson, TFI (UK), Jean-Christophe Eloy, Yole (France) and Rob Turner, KBIC (UK).

The criteria used for the selection of the winning projects included:

- Time to market
- Intellectual property position
- Risk identification and management
- A focused business offer, targeted at a specified commercial opportunity
- Return on investment
- Implementation process
- Market potential
- Degree of innovation

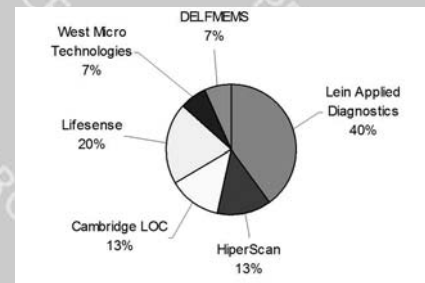


Figure 1: Most interesting start-ups as evaluated by the participants

The final selection was made comprising 10 of the most promising MNT start-up projects from Belgium, Estonia, France, Germany, Greece, Italy and the UK.

The event held in the celebrated surroundings of the Institute of Physics, London, hosted almost 40 attendees, including 21 representatives from the investment community and 9 start-up incubators from throughout Europe. Attendees were given elevator pitches by each start-up company, followed by a number of longer breakout sessions, which allowed funders to liaise more closely with start-ups.

The first event was held as part of COMS 2001 in Oxford, and was highly successful in attracting both funders and high quality start-ups alike as was the second event, which was held at the Institute of Physics in 2002. The third event was held in Frankfurt in 2003.

To contact any of above start-ups please email infor@tfi-ltd.co.uk.

Contact:
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or: infor@tfi-ltd.co.uk
www.europractice.com

Start-up	Product	Investment Sought
Aisthisis	Pressure sensors for medical catheters and automotive applications	€1.5m
Asper Biotech	Microarrays for genotyping and pharmaceutical development	\$3m (€2.4m)
Cambridge Lab on Chip	Pumping of fluids in microscopic channels for biotechnology	£400,000 (€575,000)
DELFMEMS	Provision of MEMS reliability testing, analysis and process optimisation	€700,000
dsTEC	Peak flow meter for the accurate diagnosis of asthma and COPD	Seed £130k (€187,000) First round £1m (€1.4m)
HiPerScan	Micro Scanner component	Seed €50,000 1st round €1.6m
Lein Applied Diagnostics	Non-invasive monitoring of blood glucose	£4.0m (€5.8m)
Lifesense	A device for monitoring UV sunlight exposure	€500,000
MCB	Devices for early stage screening of pharmaceutical and cosmetics	€600,000
West Micro Technologies	High quality micromoulds and micro metal structures	£1m (€1.4m)

The Start-up Companies presenting at this year's forum

The New Bosch Bulk-Micromachining Foundry

During the Europractice AMICUS project, Robert Bosch GmbH started to expand its offer in micromachining foundry processes towards bulk micromachining products, targeting at novel applications in new segments such as Life Science or Consumer. The well-established Bosch surface micromachining foundry offers three scheduled Multi-Project-Wafer runs per year in a well-defined standard process.

The new bulk micromachining foundry, in contrast, uses customer dedicated processes in order to address specific requirements. Therefore, an extensive process catalogue with state-of-the-art processes was compiled for the benefit of our customers. These were invited to submit project proposals and Bosch offered to evaluate the high-volume production feasibility of those pro-

jects based on its large manufacturing experience in the field of bulk micromachined automotive sensors (production volume well above 100 million devices).

Within the scope of the project, more than 30 contacts with various companies have been established. These companies include big players as well as start-ups. For about 50% of the contacts, detailed technical evaluations have been carried out concerning high-volume production feasibility. Some of these contacts were extended towards joint projects and volume production ramp-up of components.

The large manufacturing know-how and the experienced staff makes the Robert Bosch GmbH the number-one choice for customers looking for reliable and stable high-volume produc-

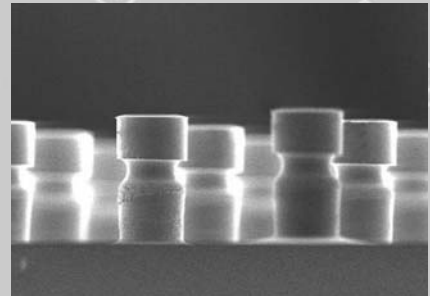


Figure 1: Life science analysis chip manufactured during the AMICUS project using a sophisticated ASE process

tion of MEMS devices. The basis for the extension towards non-automotive markets was laid during the Europractice AMICUS project.

Contact

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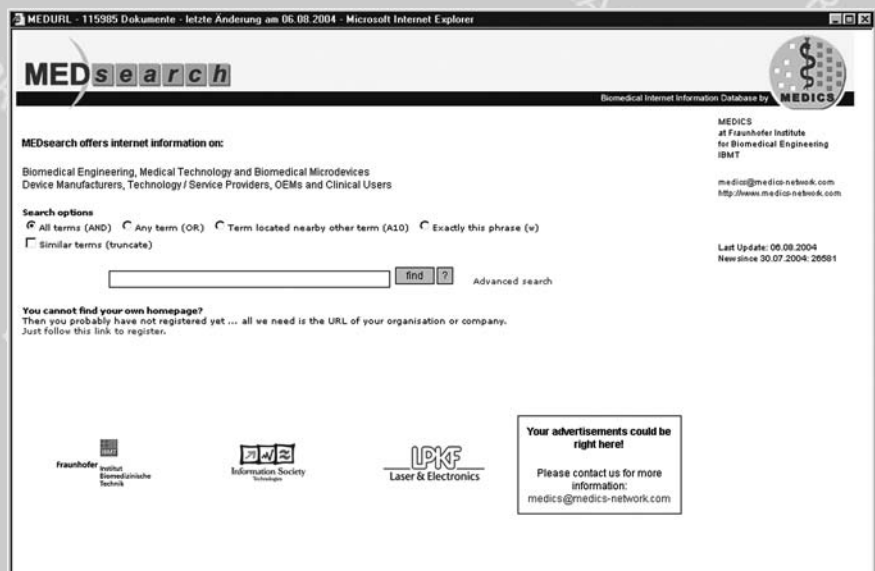
News from MEDICS, the Competence Centre for Biomedical Microdevices

We are happy to present to you a complete redesign of our web pages. We have increased overall usability and ease of use to help our customers to get a better overview over the contents. The site now features a fully database-driven event list, which allows visitors to submit proposals for event entries and, thus, to inform the community of biomedical professionals on where to be.

www.medics-network.com

MEDICS' search engine MEDsearch has been redesigned in the same process and now allows a quick search option from the MEDICS site. MEDsearch provides 100% manually selected information on and for all players within the biomedical market.

www.medics-network.com/med-search



MEDURL - 115985 Dokumente - letzte Änderung am 06.08.2004 - Microsoft Internet Explorer

MEDsearch Biomedical Internet Information Database by MEDICS

MEDICS at Fraunhofer Institute for Biomedical Engineering IBMT
medico@medico-network.com
<http://www.medic-network.com>

Biomedical Engineering, Medical Technology and Biomedical Microdevices
 Device Manufacturers, Technology / Service Providers, OEMs and Clinical Users

Search options
 All terms (AND) Any term (OR) Term located nearby other term (A10) Exactly this phrase (e)
 Similar terms (truncate)

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medics@medics-network.com

fraunhofer Institut Biomedizinische Technik
 Information Society
 LPKF Laser & Electronics

Last Update: 06.08.2004
 New since 30.07.2004: 20581

MEDICS' search engine MEDsearch

MEDICS also provides an electronic newsletter. Registration is available on the website.

Contact:

Fraunhofer IBMT - MEDICS Coordination Office, Germany
 Andreas Schneider, Head of MEDICS
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www.medics-network.com

Europractice Extension to the East

Europractice partners will have their next 6-monthly meeting in Prague during the second week of January 2005. These meetings are usually only open to project partners; however, for the upcoming meeting, potential new partners from the Associate Candidate Countries (ACC) and the New Member States (NMS) will be invited to establish contacts with existing and new Europractice initiatives. ACC and NMS countries include Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia.

Europractice currently has five partners from the ACC/NMS, and the aim is to add ten partners, half of whom should be industrial, into the next phase of the project. Work is currently being undertaken to identify po-

tential new partners using the existing coordination team and two sub-contractors.

Potential partners from the ACC/NMS will be invited to participate in the January meeting, convened to allow them to demonstrate their capabilities to existing Western Europractice partners. A booklet will be produced with details of each of the potential ACC/NMS partners. In addition the capabilities of potential ACC/NMS partners will be placed directly on the Europractice website, so that interested parties will be able to identify suitable ACC/NMS partners.

Organisations from the West that are seeking Europractice partners in the ACC/NMS, please browse the directory on the Europractice website at www.europractice.com/ACCpartners.asp

Organisations from ACC/NMS countries that are interested in joining future Europractice projects, please contact us by E-Mail.

Organisations from Bulgaria, Hungary, Poland, and Romania, please contact:

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E-mail: CMoldovan@imt.ro

Organisations from Cyprus, Czech Republic, Estonia, Latvia, Lithuania, Malta, Slovakia, and Slovenia, please contact:

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BIA, Estonia

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www.europractice.com

LICOM-Workshop "Micromechanical Thermal Sensors"

On October 21st, LICOM organized a workshop for industry at the premises of LICOM coordinator HSG-IMIT. The workshop was dealing with the great variety of sensors based on thermal effects e.g. thermal flow sensors, inclination sensors or humidity sensors. These were presented by speakers from academia and industry. The workshop was attended by over 40 participants mainly from industry which proves this topic to be of great interest.

As the feedback from the participants was very encouraging, LICOM plans to repeat this event in spring 2005 in changing localities. For further information regarding the dates please visit the homepage www.licom.net or subscribe to our newsletter service on the same site.

Contact

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www.microfluidics.de

International Cooperation Forum "Wireless Systems for Biomedical Applications & Devices", 26 April 2005

Wireless technologies are taking healthcare by storm. The competence centre MEDICS is organising an international cooperation forum "Wireless Systems for Biomedical Applications & Devices" that is based on the successful "one-to-one" concept.

Please reserve the 26 April 2005 in your calendar.

More information will follow in mst-news and other relevant media.

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For information on specific activities within Europractice, please contact Competence Centers, Design Houses and Manufacturing Centers directly. Contact information can be found at www.europractice.com

First public workshop organized by the Reliability & Characterisation Cluster of PATENT-DfMM

The first public workshop of the Reliability & Characterisation Cluster of PATENT-DfMM network of excellence was held in Sinaia, Romania, 7-8 October, as a joint event with the IEEE International Semiconductor Conference (CAS 2004). The program solely contained contributions given by cluster members: "RF-MEMS reliability research at IMEC" (Ingrid De Wolf, IMEC Leuven), "Reliability research at IXL Bordeaux" (Claude Pellet, IXL Bordeaux), "Accelerated testing: from Microelectronics to MEMS" (Marius Bazu, IMT Bucharest), "Laser accelerated aging of semiconductor chips" (Lucian Galateanu, IMT Bucharest), "BUTE activities in material characterisation" (Andras Poppe, BUTE Budapest), "WP3 database - first results" (Adrian Frumusel, IMT Bucharest), "Recent work at IEF on materials, testing and packaging of MEMS" (Alain Bosseboeuf, IEF Paris), "Material characterisation at LAAS Toulouse" (Karim Yacine, LAAS Toulouse), "Standardization at micro & nano" (Virgil Ilian, IMT Bucharest), Late news: "About a new STREP in microfluidics" (Catalin Tibeica, IMT Bucharest). Other speakers were: Hoc Khiem Trieu from Fraunhofer IMS Duisburg, Erwan de Gourcuff from Heriot-Watt University, and various participants in CAS 2004. On the second day, the main issues for the next period were discussed during an internal meeting of Reliability & Characterisation Cluster of PATENT-DfMM.

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PATENT-DfMM Workshop planned before DTIP 2005

A public workshop on "Design for Micro & Nano Manufacture" is planned to take place on 30-31 May in conjunction with DTIP. This workshop will be co-organised with the NEXUS MWG Design Modelling Simulation and will feature intermediate results from the Network of Excellence "Design for Micro & Nano Manufacture", and also discuss industry's needs in this area.

DTIP (Symposium on Design, Test, Integration and Packaging of MEMS/MOEMS) will take place at Hotel Eden au Lac, Montreux, Switzerland, 1-3 June 2005 and has recently published a Call for Papers. For more information:

<http://tima.imag.fr/Conferences/dtip>

Contact:

Patric Salomon
E-Mail: info@patent-dfmm.org

softMEMS bought CAD Business Unit from MEMSCAP

softMEMS was created earlier in 2004 by Mary Ann Maher, previously CTO and head of the CAD Business Unit at MEMSCAP, to focus on the CAD tools business. MEMSCAP has sold to softMEMS an exclusive license to sell, market and develop its MEMS design tools, including MEMS Pro and MemMaster. softMEMS also hired most of the previous employees of the MEMSCAP CAD Business Unit, so the transition happened without loss of know-how. softMEMS is maintaining the same product strategy. softMEMS is now a member of the PATENT-DfMM Industry Advisors Board.

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www.softmems.com

PhD Job Opportunity at HWU

The MicroSystems Engineering Centre is looking for an EU PhD candidate for this newly open position within the Scottish Manufacturing Institute. The candidate must have expertise in software programming (C++ based or Java) and a working knowledge of microsystems technology. The work will deal with haptic based sensing design for the manufacturing and simulation of MEMS. More details can be obtained from the contact.

Contact:

Marc Desmulliez
Heriot Watt University, MISEC
Edinburgh, Scotland
E-Mail: m.desmulliez@hw.ac.uk
www.hw.ac.uk

Post-doc job opportunity at IMEC
IMEC is looking for a post-doc to work on FEM and reliability of MEMS

Starting date: January 2005.

Contact:

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Co-ordinator of WP3
IMEC, Leuven, Belgium
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www.imec.be

DfMM Contact

DfMM News is provided to mst-news readers by the project "Design for Micro & Nano Manufacture (Patent-DfMM)", a Network of Excellence funded by the European Commission DG INFSO E5 within the Information Society Technologies (IST) Programme of FP6.



The NoE Patent-DfMM aims to establish a collaborative team to provide European industry with support in the field of "design for micro nano manufacture" to ensure that problems affecting the manufacture and reliability of products based on micro nano technologies (MNT) can be addressed before prototype and pre-production.



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EURIMUS II: 5th Annual Progress Monitoring Meeting (APMM)

The fifth "Eurimus Annual Progress Monitoring Meeting" was held in Bilbao, Spain, on 13th -14th October, 2004.

Only Eurimus projects running for at least 6 months were invited to report on their progress. Therefore 9 projects were presented to 12 members of the Eurimus Technical Committee and to the French, German, Finish, and Israeli Public Authorities (PAs) representative. Among those projects, SPI, ISIS presented their work for the first time. All running projects responded to the invitation to present their progress. Regarding the project Gyrosil, they will make a final presentation in December, because their project will be finished by that date.

The principle of the 2004 "Annual Progress Monitoring Meeting" was the same as that of previous meetings, i.e. it consisted of an oral presentation given by each project leader (sometimes helped by other members of the Consortium) in the presence of the Eurimus Technical Committee. The meeting is organised in camera to guarantee the confidentiality of presented reports. All NPAs were invited to attend the presentations of the projects relevant to them.

After the meeting, an evaluation sheet was issued by the Technical Committee on each project and sent to the project coordinator (to be distributed within the Consortium) and to the Public Authorities affected by the project.

The following items had to be taken into account in any of the presentations:

- Progress according to the work plan (milestones and deliverables)
- Technical highlights
- Cooperation between different partners
- Funding aspects
- Exploitation and market prospects

Technical Committee meeting - Project Outlines (POs) evaluation

The evaluation of the Project Outlines submitted for the 2nd call of EURIMUS II took place in Bilbao on 15th October. It was preceded by a meeting with the EURIMAC representatives (National Public Authorities). The objective was partly to transmit the feedback on the POs from NPAs to the Technical Committee.

Five projects were submitted and evaluated, i.e.:

- EPADMID (European Platform for Advanced Active Implantable Medical Devices) EM91.
- MicroTrack (μ -IMU for Medical Tracking Systems) EM92.
- Braille MEMS (MEMS technology applied to low-cost Braille and tactile displays) EM93.

- MAGNIMIC (low-cost portable Biosensors based on Magnetic Microsystems for in-situ/on-line applications) EM94.
- SMARTIS (Smart Thin Films on Alumina Substrate) EM95.

Two POs (EPADMID and SMARTIS) were accepted to submit a Full Proposal (FPP) and the other three (MicroTrack, Braille MEMS and MAGNIMIC) required a new PO submission.

EURIMUS calls in 2005
Two calls will be launched in 2005.
Below the calendar:

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	Call n°3	Call n°4
Call launches	Thursday 13th January	Thursday 11th August
Closing date for PO registration	Friday 11th February	Friday 9th September
Closing date for PO submission	Thursday 3rd March	Thursday 29th September
TC evaluation meeting	Friday 11th March	Friday 14th October
Closing date for FPP registration	Friday 8th April	Friday 11th November
Closing date for FPP submission	Thursday 28th April	Thursday 1st December
TC evaluation meeting	Thursday 12th May	Thursday 15th December
Board labelling meeting	Friday 13th May	Friday 16th December

New Announcements Under the "Microsystems" Programme

The Federal Ministry of Education and Research (BMBF) has released four new announcements under the "Microsystems" programme to fund specific thematic projects. Eligible for funding are projects that are concerned with the use of microsystems technology (MST) in the growth industries of smart labels, driver assistance systems and preventive micro medicine and projects that support medium-sized enterprises in the development of microsystems.

Smart labels revolutionise logistics

A lorry loaded with textiles is arriving at an intermediate storage facility. Are all ordered sweaters in the agreed colours and sizes on board? Which goods belong to which store? Possibly in the near future, industry, logistic service providers and trade will be able to track the route their products have taken all the way from the manufacturer to the retailer using smart label systems, which assure that the goods arrive at their destination on time and complete. In addition, smart labels allow an accurate data collection in warehouses with goods receipt and issue and permanent inventory.

The BMBF is funding "Microsystems Technology for Smart Label Applications in Logistics" with 15 million Euros to provide the technological bases for a wide use of smart labels and to strengthen the competitiveness of German industry in this segment. Research facilities and enterprises still have the chance to submit drafts for industrial collaborative projects by **December 8th, 2004**.

For several core sectors in the German economy - trade, consumer goods, automotive and electronics industry - smart labels are opening up new ways to optimise their logistic processes. The long-term goal is to transfer logistic controlling to the logistic goods themselves. They will then move by themselves through the material flow nets as "smart objects" and will get co-ordinated with other objects as well as with their environment.

Microsystems technology offers promising solution approaches for the development of high-performance, reliable and cost-effective smart label systems. By funding these

specific projects, the BMBF is seeking to overcome currently recognisable technological bottlenecks.

Saving lives with driver assistance systems

A child is running onto the street and the car stops immediately - even before the driver has overcome his moment of shock. Such "intelligent" vehicles could very soon become reality. The BMBF is funding with 15 million Euros the project "Microsystems Technology for Driver Assistance Systems". Research facilities and enterprises have the chance, until **January 21st, 2005**, to design a draft for an industrial collaborative project in the thematic fields "Microsystems Technology to Enhance Environment and Surrounding Recognition" and "Microsystems Technology to Enhance the Man-Machine Interface".

Microsystems technology offers promising approaches through the development of sensors and actuators to elevate the efficiency and attractiveness of underlying systems as well as the technology base to enhance communication between vehicle and driver. The extent of the necessary R&D demand within microsystems technology by far exceeds the capacity of single components suppliers. The BMBF will contribute to higher road safety and mobility and to maintaining and enhancing the appeal of German cars with targeted funding in this area.

Microsystems Help to Cure Cardiovascular Diseases

In many countries cardiovascular diseases belong to the most common illnesses. They cause the most cases of death and they cause the most in-patient and ambulant emergencies. If the disease is diagnosed too late or controlled and medicated insufficiently, it can gravely impair the whole apparatus.

The BMBF now supports the development of monitoring systems for the prevention and the diagnostic monitoring of cardiovascular patients.

These systems are able to control e.g. blood pressure, pulse, heart rate or respiration round the clock. The patient has not to stay in hospital for that.

Microsystems technology allows new methods for the long-time-monitoring of cardiovascular patients. Monitoring systems will be miniaturised so far, that they can be directly integrated in the everyday life of the patients. In a little while, diminutive sensors implanted in or fixed outside of the body will be able to detect e.g. hypertension or dysfunction of the cardiac rhythm. The sensors do not handicap the patient.

Using a telemetric system, the data will be sent to the doctor - 24 hours a day and seven days a week (24/7 monitoring). Then the medic will be enabled to prepare pattern of the patient for the individual disease and he will also be informed within seconds, if the sickness deteriorates. The development of intra- and extracorporeal monitoring systems enabling individual long-time-monitoring for the optimal therapy at home or in the hospital is supported by the BMBF with 15 million Euros. Research facilities and enterprises can submit drafts for collaborative projects until **February 11th, 2005**.

Easier Access to Development Tools

The BMBF is funding the assignment of computer-based development tools to strengthen the competitiveness of the medium-sized industry in the growth field of microsystems technology. The development of efficient MST products is a complex process, because many different microtechnologies and physical principles have to be integrated and aligned with each other. The fastest and most cost-efficient way to that development objective is using computer-based tools for the draft and the simulation of new microsystems or microsystem components. Products can be designed optimally, because by using those tools multiple variants can be tried.

Small- and middle-sized companies often are not able to afford the introduction of these CAD tools, because they require considerable investment, expensive training and orientation courses for the staff at the beginning. The ministry provides 2.5 million Euros for the specific project "First use of computer-supported tools for design and simulation in microsystems technologies" in support

of the introduction and first-time use of modern development tools. Medium-sized companies may submit their concepts by the end of **September 2005** to receive government aid. The development und enhancement

of sophisticated microsystems or components that depend on computer-supported design tools not used in the company before will be financially supported.

More information on the announcements can be obtained from the internet or directly from the project manager VDI/VDE-IT.
www.mstonline.de/foerderung
Phone: +49 3328 435 101.

MST-Students need an International Focus

The forum for empowering competencies in microsystems technology (MST) that takes place annually has become an important platform for discussing relevant aspects of education and training in this high-potential field of technology. At this year's forum, held for the 4th time, experts from education and industry as well as graduated microtechnologists debated the consequences of the Bologna process for the academic level of MST qualification. What are the needs for German education in MST to remain competitive and become more international within the Bologna process of harmonizing the European higher education area? Authorized representatives from ASI-IN, DAAD, BLK and universities provided a glimpse of the German situation.

MST can be seen with an international demand in research, development and commercialization. Flexibility and mobility of highly educated specialists will be the factor of competitiveness. The German educational system and the technological research activities are highly recognized all over the world. These advantages should be kept within the process of harmonization, although the graduate system is going to be customized to the standards of bachelor and master degrees. Several courses of study are reorganized and accredited already.

Around 1.9 million students worldwide are studying abroad, in the

United States 30% and in Germany and Great Britain 12% each. Germany is attractive for foreign students all over the world. Several exchange programmes, managed by DAAD, can be taken advantage of to strengthen the German situation esp. in the field of MST. These accompanying activities could be used by universities and specific technological projects on a higher level and therefore would underline Germany's effort to take a greater part in international education for Microsystems Technology within the process of harmonization. In 2005 first steps for establishing an European Network of Excellence will follow.

On the second day the participants in the forum discussed the results of dynamic technological developments for vocational training. The ongoing process of diffusion in MST into various fields of application requires a dynamic development within the apprenticeship. What are the opportunities in this field to include new requirements from industry into apprenticeship in order to solve the demands made by industry and by apprentices? The according process will be started with a discussion paper.

Graduates of vocational training are highly motivated to participate in further training and gaining higher degrees of education. They choose MST because this guarantees working at the edge of technological development. To advance the personal drive of young professions the con-

cept of "work based learning" could be considered. It gives the opportunity to build up a personal and more individual way of higher qualification in this profession and links to the academic level of MST education after all.

The documentation of the Forum can be found at www.mst-forum.de
Sabine Globisch
VDI/VDE Innovation + Technik GmbH

Contact

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Events

Mikrofluidics for Analytic und Diagnostic Applications

December 9, 2004
Institute for Microtechnology
Mainz
ackermann@vdivde-it.de

MATCHDRUCK

December 13, 2004
Stahnsdorf
fernholz@vdivde-it.de



Experts discussed the needs for German education in MST.

MINAEAST-NET



Specific Support Action from FP 6 (2004-2006): Micro- and Nanotechnologies going to EASTern Europe through NETworking" (MINAEAST-NET)

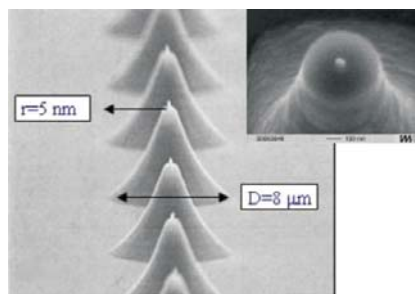
Again about MINAEAST-NET (see also www.minaeast.net). The main objective of the MINAEAST-NET project consists in networking on Micro and Nanotechnologies, according to priority thematic areas 2 (IST) and 3 (NMP) from FP 6. MINAEAST-NET will be a network of networks formed by research bodies from several ACCs and NMSs that are coordinators of local networks formed by national high quality centres of research active in this field. MINAEAST-NET intends to provide the premier source of information about resources and results in MNT from NMSs and ACCs and about the strong points of the ACC organisations; will help in offering to NMS and ACC researchers training and consultancy in preparing proposals, but also in structuring consortia; will support interaction between NMS, ACC and MS organisations to initiate FP6 proposals through organising meetings, workshops and support travel costs.

Coordinator: National Institute for Research and Development in Microtechnologies, Romania.

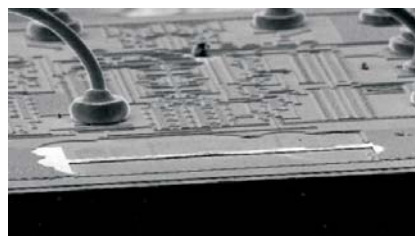
We are continuing the presentation of institutes and laboratories involved as partners in MINAEAST-NET. The National Institute for Research and Development in Microtechnologies (IMT-Bucharest), founded in 1993, is a Romanian Institute for R&D working in micro- and nanotechnologies.

IMT represents a "technological pole", with a Micro-Nanofabrication Facility (the only "clean room" available in Romania for research and education), a mask shop, laboratories for computed-aided simulation and design in microsystems and microelectronics, characterization equipment, a centre for education and training and a technology transfer centre in micro-engineering (CTT-Baneasa). This is a "pole", because it is integrating research in various disciplines, as well as various activities:

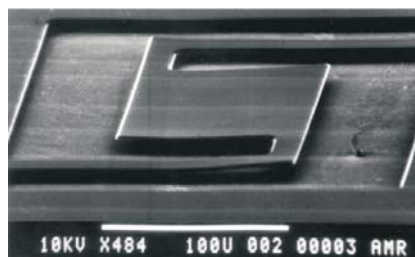
research, education and training, innovation and technology transfer. Moreover, IMT and University "Politehnica" of Bucharest, together with the private company ROMES SA, are developing MINATECH-RO, a scientific and technological park in micro- and nanotechnologies. Examples of such microfabricated devices are given below:



Nanoelectrode array - Laboratory of Nanotechnology (Dr. Irina Kleps, irinak@imt.ro)



Resonant gas sensor - Laboratory for Microsystems in biomedical and environmental applications (Dr. Carmen Moldovan, moldovan@imt.ro)



AuSiO₂ movable micromirror - Laboratory for Micro- and Nano-photonics (Dr. Dana Cristea, danac@imt.ro)

The thematic areas of research in IMT are (www.imt.ro):

- Nanostructured materials, nanotechnologies and nanostructures: carbon nanotubes, carbide and DLC, nanoelectrode arrays, field emission nanostructures, porous silicon.
- Microstructures and micro-nanosystems for sensing applica-

tions: chemical, mechanical, optical sensors, micro fluidics.

- Micro/nanostructures for biomedical applications
- Microstructures and MEMS and MOEMS for communications: RF and Optical MEMS.

IMT-Bucharest is involved in 8 research projects from FP6 on both priority 2 (IST) and priority 3 (NMP): PATENT, AMICOM, 4M, NANOFUNPOLY, Nano2Life (associate partner), ASSEMIC, WAPITI, MI-lab on Chip. IMT is also involved in other four support projects devoted to micro- & nanotechnologies in Eastern Europe (NMSs and ACCs): ROMNET-ERA (coordinator), MINAEAST-NET, BRIDGE (subcontractor) and NEXUS PLUS (subcontractor).

IMT is the organizer of the annual International Semiconductor Conference CAS (IEEE Event), with topics in micro- and nanotechnologies. CAS 2004 - 27th Edition, took place on October 4-6, 2004, Sinaia, Romania, see www.imt.ro/cas
Announcement: CAS 2005 - 28th Edition, October 3-5, 2005, Sinaia, Romania (www.imt.ro/cas)

MINAEAST-NET project

Micro and Nanotechnologies going to EASTern Europe through NETworking

EU Contract no.: 510470 (SSA in FP 6)

Project coordinator:

National Institute for R&D in Microtechnologies (IMT-Bucharest)

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Special presentation of this project in MST News and MNT Bulletin (www.imt.ro/MNT)

2005-06 IST Work Programme has Been Published

The European Commission has published its new work programme for the next two years under the "Information Society Technologies" programme. The full text .pdf version is available from:

ftp://ftp.cordis.lu/pub/ist/docs/ist_wp2005-06_final_en.pdf

Facing the Challenge - Independent Mid-term Report on the Lisbon Objectives and Targets

The European Commission has published the results of the independent expert group who were invited to contribute to a mid-term report about the Lisbon achievements. The group was chaired by the former Prime Minister of the Netherlands, Mr Wim Kok, and accompanied by several high-level representatives from research, industry and politics.

The Lisbon strategy, which was agreed on in March 2000 between the leaders of the European member states, aims to develop Europe as "the most dynamic and competitive knowledge-based economy in the world".

The conclusions of the group are disappointing: an overloaded agenda, poor co-ordination and political action between the member states did not help to close the gap between Europe and the USA and Asia. Furthermore, Europe did not cope with the obstacles of a slowly growing and aging population. "Time is running out and there can be no room for complacency. Better implementation is needed now to make up for lost time," the expert group warns.

While individual member states have made progress in one or more policy priority areas, concerted progress is still missing. To reach the goal, it is necessary for the European institutions and representatives of member states to initiate action with greater commitment and involvement by all citizens. What is more, it is necessary to create a common awareness of the fact that by working together all nations of Europe will benefit.

Five urgent actions were proposed by the expert group:

- Increasing Europe's attractiveness for researchers and scientists
- Completing the internal market in terms of the free movement of goods and capital
- Reducing the administrative burden
- Answering European employment needs
- Building leadership in eco-industry and pursuing policies that lead to long-term and sustainable improvements in productivity through eco-efficiency.

"In order to ensure that Member States take up their responsibilities, a new focus is required along three lines: more coherence and consistency between policies and participants, improving the process for delivery by involving national parliaments and social partners, and clearer communication on objectives and achievements," the high-level expert group demands. The group therefore proposes that clear responsibilities should be set up between all relevant institutions: the European Council, the Member States, the European Commission, the European Parliament and the European social partners.

More information:
http://europa.eu.int/comm/lisbon_strategy/index_en.html

Technology Offers and Requests from the Network of Innovation Relay Centres

Electraflex - low-cost high-performance flexible piezoelectric vibration and shock sensor

An established Scottish SME in contract electronics manufacturing specialises in innovative leading-edge surface mount placement techniques. Their design team originally developed their innovative patent-pending shock sensing technology in response to a specific customer request for a highly sensitive device for characterising vibration associated with glass breakage. Partners are now being sought to apply the technology in other applications and to

help develop its adoption in alternative markets.

Innovative Devices for Irrigation & Climate Control Systems

An Israeli company leading in the field of control systems for the agricultural market is looking for innovative sensors & valves to provide information on climate conditions for greenhouses. The sensors & valves developed should already be on the market. The company is interested in the transfer of the new technology; one way to do this may be a joint venture.

Optical Fibres System for Flame Detection

A Belgian manufacturer of industrial furnaces for various sectors is looking for a technical solution capable of detecting flames around burners. The expected solution should be based on optical fibres techniques and should already be available on the market. The Belgian company is willing to establish technical cooperation or a commercial agreement with technical assistance.

Info at: kreibich@vdivde-it.de

CeBIT 2005

On the occasion of CeBIT 2005, the world's leading fair for information and communication technologies, with more than 6,000 exhibitors and around 500,000 visitors in 2004, the ICT TG of the IRC network will again organise the brokerage event "IRC future match". It is aimed at providing exhibitors and visitors of the fair with assistance to find partners in Europe for product development, common research & development, manufacturing, marketing or licensing agreements, joint ventures or similar partnerships. Companies, universities and research institutes in the ICT sector from all over Europe are invited to use this unique opportunity to establish new cross-border contacts for future collaboration. The participation is free of charge!

Please contact:
Ms Marion Laue
ml@tt.uni-hannover.de

eSafety - Co-operative Systems for Road Transport IST Call 4, 11/16/04 - 03/22/05, 1,120 Million Euros

The 4th call of the 6th framework program of the European Union was published on November 16th. The eSafety initiative specifically addresses its demands. It is the objective of eSafety to develop and demonstrate Co-operative Systems for road transport. Cooperative Systems (as an extension of autonomous or stand-alone systems), where vehicles communicate with each other and the infrastructure, have the potential to greatly increase the quality and reliability of information available about the vehicles, their location and the road environment, thus enabling improved and new services for road users. Such systems will enhance the support at the command of drivers and road users and will provide for:

- greater transport efficiency by making better use of the capacity of the available infrastructure and by managing varying demands;
- increased safety by improving the quality and reliability of information used by advanced driver assistance systems and allowing the im-

plementation of advanced safety applications.

The agreed conception of Co-operative Systems for road transport is: "Road operators, infrastructure, vehicles, their drivers and other road users will cooperate to deliver the most efficient, safe, secure and comfortable journeys. The vehicle-vehicle and vehicle-infrastructure cooperative systems will contribute to these objectives beyond the improvements achievable with stand-alone systems." Research proposals should focus on:

- advanced communication concepts,
- open interoperable and scalable systems architectures,
- advanced sensor infrastructure,
- dependable software, and
- robust positioning technologies

that are to be integrated into cooperative systems delivering core functions for vehicle safety and transport efficiency. Proposals shall indicate in what way vehicles will be used across Europe and internationally. Consortia

have to ensure the involvement of all stakeholders, e.g. road operators and authorities, service and communications providers, OEM and suppliers. It is further requested to incorporate partners from the new member states and from SMEs.

This specific objective concerns 82 million Euros for IPs, NoEs (60%) and STREPs, CAs and SSAs (40%).

The provided information is based on the recent publication of the 4th call and information gathered during the eSafety clustering day (Brussels, November 8th, 2004).

Additional information

www.cordis.lu
www.nks-mst.de

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Microsecurity - Important Capabilities for Homeland Security Challenges

Bernd Michel and Thomas Winkler

Microsecurity stands for microtechnology and security. Most modern technologies have to be taken into account to get a real breakthrough in advanced security research and application. Miniaturization by micro- and nanotechnologies on the one hand and reliability research on the other (microreliability, nanoreliability) have been shown to be a must to overcome the existing gap in practical applications of security related microtechnology research. The authors report on a European Microsecurity Network to be constructed and some related activities within the Fraunhofer IZM and the Fraunhofer Society in cooperation with industry.

Making Europe more secure for its citizens is the main goal of European security research. The achievements of most modern technologies, e.g. micro- and nanotechnologies, have to be applied to reach this goal. Miniaturization and System Integration are important fields that will have to be included in the schedule of most important security measures. Microsecurity - a European network initiated by the Fraunhofer Micro Materials Center in Berlin, is under construction to combine security measures, microtechnology research activities with safety and reliability research in various fields of industry, transport and life sciences as well. The institutes of the Fraunhofer Soci-

ety's microelectronics branch have developed the so-called safetronics concept, which stands for the combination of advanced safety and reliability research based on the latest achievements in electronics and micro- and nanotechnologies. This activity of nine institutes will lead among other results to new MEMS concepts for security applications and will also provide new fundamental results and new applications in the field of health monitoring systems. This approach is based on a very comprehensive "health concept" that includes health for people, structures, goods, buildings, public infrastructures, etc. This "generalized health concept" is very close

to the American understanding of health concept and somewhat different from the classical German (or European) understanding of health that is mainly directed towards a human health concept. From the more general understanding of "health" it follows that the "health" of structures etc. is also included.

In Germany we also have two different words - "safety" and "security" - for the German word "Sicherheit". In the past, safety was mainly understood as "safety and reliability", which means the ability of structures, technical systems etc. to fulfil defined functions under specified conditions over a given period. The aim of safety research was to avoid malfunctions (and resulting damage or disaster) due to incapability or loss of capability of the system to react adequately to certain, sometimes randomly occurring, conditions or requirements. Typical but different examples of safety through reliability are aircraft, automotive electronics and software.

Recently, security has become more and more important. Security is aimed at the protection of people, goods, technical structures, public infrastructures and information against threats. Security means the ability of structures and organizations to detect, resist and combat terrorist attacks.

Making Europe more secure for its citizens while increasing its special industrial competitiveness is the main goal of European security research. The Preparatory Action on 'Enhancement of the European industrial potential in the field of Security Research 2004 - 2006' constitutes the European Commission's contribution to the wider EU agenda for addressing key security challenges facing Europe and her partners. It focuses in particular on the development of a security research agenda to bridge the gap between civil research, as supported by EC Framework Programmes, and national and intergovernmental defence programmes (see the Commission's website:

http://europaeu.int/comm/research/security/index_en.html for more information).

The achievements of most modern technologies, e.g. micro- and nanotechnologies, will have to be applied to reach this goal. Miniaturization and System Integration are important fields to be included in the schedule of most important security measures. The Fraunhofer Micro Materials Center (MMCB) at the Fraunhofer Institute IZM in Berlin is going to initiate and support the European preparatory actions and projects in the field of modern micro- and nanoelectronics security and reliability. The Microsecurity network initiated by the MMCB intends to combine security measures and microtechnology research with reliability research. An important topic of the activities may be described by the slogan "Electronics for safety needs safe electronics". Special materials- und reliability-centred topics which are in the focus of the network are:

- Detection of smallest particles in overcrowded environments
- Tools for instantaneous, automated and reliable surveillance of structures and infrastructures, algorithms for data fusion and pre-selection of possibly dangerous deviations
- Sensorics in interaction with communication technology and environment
- Modularization and system integration, multi-purpose systems.

The Berlin Fraunhofer Micro Materials Center at IZM has been successful as part of the international consortium of preparatory action (PASR 2004) within the new framework programme. The EU intends to fund 6 projects and 3 supporting activities out of some 180 proposals. Among these positively evaluated 6 projects the project IMPACT, guided by TNO Rijswijk, will be implemented, where IZM will mainly contribute reliability aspects (experts increasingly use the terms microreliability and nanoreliability for this kind of reliability for micro- and nanostructured materials and components).

Besides the large European activities, German SME activities have become more and more important in security research and application as well. SecuPART e.g. is a network for security related pattern recognition tech-

nologies that started a month ago. Under the guidance of the Fraunhofer Group Microelectronics as network manager, and seven SMEs from Berlin, Brandenburg, Saxony and Bavaria, the Fraunhofer Institute IZM started the setup of an SME security network sponsored by AiF (German Association of Industrial Enterprises). The aim of this network is to further develop and apply advanced grey value correlation techniques (digital image correlation methods - DIC techniques) within the practical field of security related applications. DIC techniques will become important tools in most modern sensors, MEMS, MOEMS and NEMS applications in the microsecurity field.

These advanced imaging tools will be found among the key techniques for advanced applications in many fields of homeland security and general security applications of cost-effective and reliable sensing networks worldwide. This trend will be very important, as leading international specialists reported at the US National Sensor Conference held in Lake Tahoe two years ago. Microsecurity therefore will not be a vision only. It will increasingly become an important field of research in the security related branches worldwide.

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ICAR Infrared Camera for CaRs

O. Legras and H. J. Lenz

The use of infrared systems for high-volume and low-cost applications is now in the pipeline thanks to the development of new technologies: uncooled infrared focal plane array and infrared glass. We present developments after three years of project activity, in particular results obtained on detectors and optics manufactured for the ICAR project. The aim of this project is to see a pedestrian from a distance of at least 190m and vehicles from about 500m to be able to avoid them if necessary.

Uncooled Infrared Focal Plane Array

Uncooled infrared detectors are based on the thermal detection of incoming IR flux instead of the quantum mechanism used in high-performance cooled detectors like those made from CdHgTe or InSb. The infrared flux is detected at each pixel site by measuring an absorber temperature increase as a function of the amount of IR energy absorbed in the structure. The difficulty is then to integrate these functions in a small pixel pitch keeping a high thermal insulation between the readout integrated circuit, which acts as a heat sink, and the absorber in close contact with the thermometer.

Microbolometer Technology

The requirements of enhanced vision driver applications are mainly constrained by the cost of the system. In order to fulfill DVE requirements we have decided to reduce the focal plane area by decreasing the number of pixels from the current 320x240 pixels with a pitch of 45 μm to 160x120 pixels with a pitch of 35 μm . To maintain a high level of performance despite the decrease in pixel pitch, we have enhanced microbolometer performance by increasing thermal insulation and reducing the electrical 1/f noise in the amorphous silicon thermometer. Besides, the microbolometer focal plane arrays need to be packaged under vacuum in a complex package with an infrared window. Regarding the DVE device, we switched from the standard metallic

device used for 320x240 pixels to a ceramics one. The development and the mastering of the second generation of microbolometer technology enable us to decrease the pixel pitch to 35 μm , keeping the same level of performance. Profiting from this possibility, we have designed a 160x120 array with a number of innovative on-chip features to simplify the use of this focal plane, keeping a very small silicon ROIC area down to 0.7 cm^2 in order to reduce wafer-level processing costs per die. This new 160x120 array is designed to fulfill medium-resolution, low-cost applications. One of the most promising functions is the possibility, with device power on, to automatically acquire pixel non-uniformity coefficients and to store them in on-chip memory for performing the current compensation during the following normal image acquisition and readout sequences. This automatic mode of operation could be changed to an external driving mode with non-uniformity coefficients stored in an external memory. Most of the biases are generated inside of the ROIC for user-friendly operation.

Low-Cost Infrared Lenses

Usually IR lenses are made from germanium or zinc selenide monocrystalline ingots that are cut into blocks and then polished to obtain IR lenses. This method is long and expensive and a new approach is under development for manufacturing IR lenses from IR glass. This type of material could be directly molded into the final lens shape, decreasing the resulting cost of manufacturing while keeping a high performance level by using Fresnel lenses or aspherical lenses.

Umicore IR Glass S.A. is a company specialized in the production of chalcogenide glasses and optics by molding. Umicore IR Glass has developed a new chalcogenide glass composition. This glass, named GASIR2, is fabricated by using high-purity germanium, antimony and selenium ($\text{Ge}_{20}\text{Sb}_{15}\text{Se}_{65}$) in a completely sealed silica ampoule. An industrial process has been developed to pro-

duce this glass with well-controlled properties. This process ensures a good reproducibility of glass quality and the refractive index. The reproducibility of the refractive index is better than 1.5×10^{-5} at 10 μm .

To obtain low-cost infrared optics, additional important conditions should be fulfilled: low-cost starting materials, inexpensive process for ingot production and inexpensive process for lens fabrication. GASIR2 glass contains 20% of germanium and the other 80% of starting materials are relatively cheap. Consequently, the cost of bulky GASIR2 glass is significantly lower than that of germanium and zinc selenide.

Lenses in GASIR2 glass can, of course, be produced by polishing or single point diamond turning. But the main competitive advantage of this glass is associated with the fact that even very complex lenses (asphero-diffractive for example) can be produced directly by molding, eliminating the costly polishing or single point diamond turning used for other infrared lens material. A high-precision molding technology has been developed to produce low-cost chalcogenide glass lenses with a good performance level. Spherical, aspherical and asphero-diffractive lenses have been manufactured with very accurate surface precision. The form defect of the molded surfaces can be lower than 0.5 μm with a typical roughness of 25 nm.



Figure 1: A molded Asphero-diffractive Lens in GASIR2 Glass (Ø 60 mm)

When depositing an antireflection coating onto the molded lenses, the reflection losses can be reduced, resulting in 98% transmission, compared to 70% for uncoated lenses. A durable coating has also been developed as a protection for exposed lenses. Coated asphero-diffractive GASIR2 optics has been used in infrared cameras and good resolution thermal images have been obtained. The performances are comparable to those of an optic made with aspherical germanium.

GASIR2 offers an alternative solution to germanium for thermal imaging, especially for medium- and high-volume applications.

Camera Design

The driver reaction time (under normal conditions) is around 1sec at 130km/h, the covered distance is around 30m. On wet road, the braking distance is 1.5 higher than on dry tar (100m); we then have defined there a status for the need of a distance of 180m (30+1.5x100). Concerning FOV, we need to cover at range distance at least the road width plus sidewalk. The system is therefore a trade-off between range, FOV and die size to be compliant with the specifications and to be as low as possible in terms of cost.

These requirements lead to the realized Camera Design. The Field of View of the camera is 18° horizontal and 9° vertical, that means only 80 of the 120 lines of the detector are used. A sharp image is given from a distance of 5m to infinity.

The power consumption is less than 5W at 12VDC, the weight is less than 0.8 kg and the size is 110x80x80 mm including optics.

The camera will be operated by a RS232 interface and the Video Output Format is in accordance with CCIR Standards.

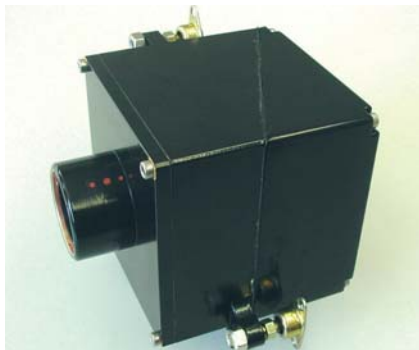


Figure 2: ICAR Camera

Human-Machine Interface

Optical automotive displays for driver support systems should be quickly readable in all conditions in order to minimize the so-called "eyes-off-the-road time". For automotive all important visual information from the vehicle to the driver is shown in the instrument cluster. Due to the increasing amount of information the instrument cluster layout is changing and now often includes re-configurable displays showing different information in different situations (on driver's needs).

An example for a display with a short accommodation and 'eyes-off-the-road time' is the Head-up Display (HUD), which positions a virtual image close to the horizon line. State of the art for automotive vision enhancement is a system to permanently display a monochrome thermal image in front of the driver; the image is generated by a liquid crystal display (LCD), and is magnified and mirrored into the car windscreen.

For the ICAR project, CRF developed and equipped its demonstrator vehicle with a new concept of human-machine interface taking advantage of HUD technology and image processing technology. The aim was to achieve system end-user high acceptance and usability. Bosch GmbH has developed the new HUD; it is designed for night vision systems and is built with automotive components. The image is generated by a 16:9 LCD display; the light path goes from the display to the aspheric-coated combiner, which magnifies and reflects the image towards the driver. The virtual image for the display is of 15° Horizontal and 5° Vertical FOV; this fits well the thermal sensor image. To reduce the accommodation time of the driver, the distance from the virtual image to the eye point of the driver is set to 2 meters. The mechanical dimension of a virtual image display is typically a critical feature, as previous realizations have significant impact on the interior design of a passenger car. The device developed is quite compact and can be easily integrated in new car cockpits; the device is self-contained (don't use the windscreen as a combiner), so it is independent from windscreen design. The second innovation introduced on the project is the use of image processing techniques to improve the

thermal images and make the information better understandable. Two main activities have been carried out: adapt and improve the images (by software contrast and sharpness adjustment) and detect and highlight potential hot obstacles (vehicles, pedestrians, animals) in the vehicle trajectory. Color graphics symbols allow the driver to quickly identify the dangerous object on the HUD.



Figure 3: ICAR - HMI in the dash board and HMI - Prototype at the steering wheel

Outlook

High potential is expected from advanced Microsystems to develop low-cost and high-performance systems to improve vehicle safety during night and difficult weather conditions, using affordable Driver Vision Enhancement systems. In the ICAR project, (within the EURIMUS framework) we are developing a camera for car application. The first results in focal plane and lens material development will be integrated in the design of the infrared camera components that will be tested under real conditions at the end of 2004.

Consortium

ULIS (Leader)
CEA / LETI
UMICORE IR Glass
CEDIP
Centro Ricerche FIAT
VALEO
Carl Zeiss Optronics

Detailed information about microbolometers is available at www.ulis-ir.com and about IR Glass at www.optics.unicore.com

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PreVENTive and Active Safety Applications (PreVENT)

Edwin Bastiaensen and Peter Mengel

PreVENT will develop, test and evaluate safety-related applications, using mostly existing advanced sensors, positioning and communications devices integrated into on-board systems for driver assistance. UseRCams, being a subproject, focuses on the development of an active 3D sensor, vital in providing improved obstacle detection and classification at short range.

PreVENT - Integrated project under the 6th Framework Program (02/2004 - 01/2008)

The year of the Integrated Project (IP) began with the commencement of activities of the PreVENT IP (PreVENTive and Active Safety Applications) in February 2004. Supported by the EC and under the leadership of DaimlerChrysler with the management support of ERTICO and IMC, this four-year undertaking involves over 50 members from the public and private sectors to develop and validate a variety of preventive safety applications in a number of sub-projects and activities. The start of the PreVENT Integrated Project (IP) is the culmination of the close collaboration between partners of and organizations EUCAR, CLEPA and ERTI-

CO. As part of the EUCAR Integrated Safety Initiative, PreVENT - which is in line with the eSafety initiative from the European Commission, plans to implement many of the recommendations of the EC's Communication on Information and Communications for Safe and Intelligent Vehicles.

While contributing to this key action, PreVENT will develop, test and evaluate safety-related applications, using mostly existing advanced sensors, positioning and communications devices integrated into on-board systems for driver assistance. In short, PreVENT will help drivers to avoid accidents. Depending on the importance and timing of the foreseeable danger, the types of systems examined in PreVENT will alert drivers as early as possible, warn them, and if there are no reactions from the driver, actively assist and intervene accordingly in so far as possible.

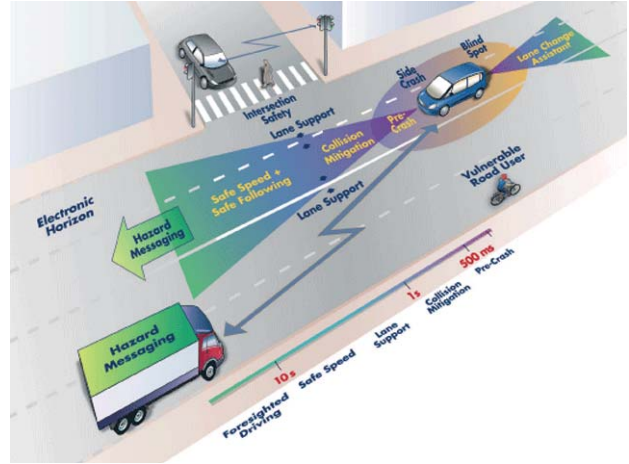


Figure 1: Sensor integration for safer driving

Besides this key focus on saving lives, PreVENT priority areas have been defined to contribute towards a rapid market implementation of such systems, by helping to overcome the major barriers for their introduction. It also intends to enlist the cooperation of national and European programs. PreVENT consists of a number of subprojects in complementary function fields:

- Safe Speed and Safe Following,
- Lateral Support and Driver Monitoring,
- Intersection Safety,

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- Vulnerable Road Users and Collision Mitigation.

An additional cross-functional field covering methodologies, common architectures, liability issues, and technology or standardization oriented activities (digital maps and sensor data fusion) safeguards the integrated approach.

One of the future highlights of the project set to take place in 2007 will be the PREVENT Safety Demonstration, which will involve all the consortium members and national initia-

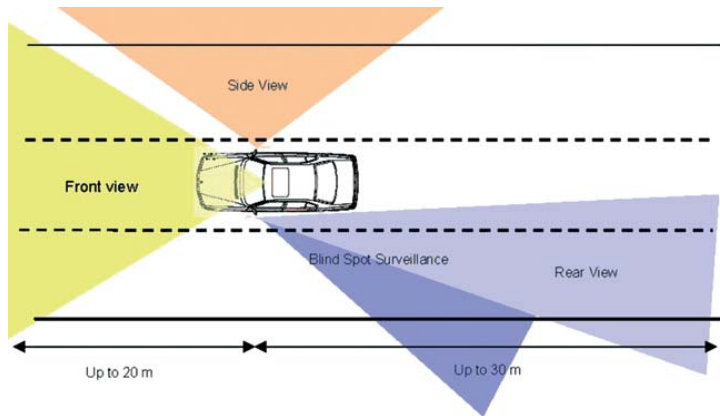


Figure 2: UseRCam's vicinity monitoring

tives to present the main results of their activities and raise political and public awareness of preventive safety applications and their contribution to road safety in general.

The PREVENT consortium brings together more than 50 partners with key representatives from the industry, public authorities, universities and various public/private organizations, including a total of 12 OEMs, 16 suppliers, and 23 institutions and others. The Core Team consists of DaimlerChrysler, BMW, VTEC (Volvo), Ford, Renault, CRF (Fiat), PSA Peugeot Citroën, Siemens VDO Automotive, Robert Bosch, Sagem and IN-RETS. The IP management is carried out by ERTICO and IMC.

3D Camera Development in the Sub-Project UseRCams

UseRCams focuses on the development of an active 3D sensor, vital in providing improved obstacle detection and classification at short range. It will be especially suitable for collision mitigation, protection of vulnerable road users and blind spot detec-

tion. A 3D camera prototype will be developed based on a nanosecond-pulsed laser and a customized CMOS photosensitive sensor with short integration time; it will deliver distance information based on time of flight measurements, combining high lateral resolution with a range of up to 20m, independent from background illumination. Associated algorithms will allow detection, location and classification of traffic objects. The sensor system will be tested for applications covering pre-crash, blind spot detection and side- and rear-end collision warning.

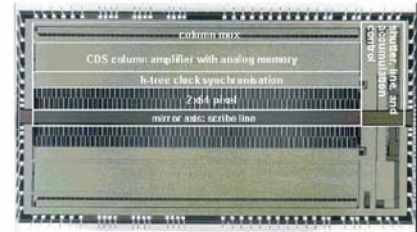


Figure 3: 3D-line image sensor prototype with 4X64 pixels (source: FHG/ IMS Duisburg)

ble Short Time Integration). The final microsystems will be capable of directly measuring the shape, type and volume of moving traffic targets (pedestrians, vehicles) and determining the direction of movement. Integrated in the target applications, they will provide a close to 100% reliability rate (as regards the identification of passing targets) with a false alarm rate counting close to 0% despite varying ground reflectivity and ambient light (sunlight). The consortium partners for this sub-project are:

- Siemens AG, Corporate Technology
- Siemens VDO Automotive AG
- BMW Forschung und Technik GmbH
- Centro Ricerche Fiat
- Technocentre Renault
- Volvo Technology AB
- Fraunhofer Gesellschaft
- Lewicki Microelectronic GmbH

UseRCams is a subproject within the integrated project PREVENT. The sensor development, based on microsystems technology will lead to a new quality of obstacle detection and therefore perfectly fit in the IP and OEM safety function roadmap.

For more information:

www.prevent-ip.org

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The concept and developments are devoted to customization, application and evaluation of an active 3D range camera for Road User protection and Collision mitigation concerning:

- Near to intermediate front/side distance range (20m-25m) of cars
- Lateral proximity of trucks (blind spot surveillance)
- Implementation of 3D-algorithms for object (obstacles, pedestrian) detection and classification independently of surface reflectivity and ambient lightening conditions
- Performance evaluation with car/truck demonstrators on typical traffic scenarios and obstacle occurrence

The R&D challenge aims at the development of a new generation of low-cost 3D-sensors in fully solid-state microsystems technology. Fast and robust, three dimensional image acquisitions will be based upon CMOS photosensitive circuits with ultra-short integration time, IR laser pulse sources and time of flight measurement principles (MDSI- Multiple Dou-

CMOS Imaging: From Consumer to Automotive

Arnaud Darmont

New market view

Vehicle manufacturers are developing many new features for vehicles that will increase both safety and driver assistance. CMOS imaging will play a key role in those two fields. Safety applications include, among others, lane tracking for departure warning, collision avoidance, occupancy detection for smart airbags, driver vigilance monitoring and blind spot detection. Driver assistance can include night vision, park assist, road signs recognition and automatic headlamp control.

Lane tracking uses a camera to verify the position of the vehicle compared to the lane markings and provides a warning to the driver if the vehicle strays from the lane unintentionally. The use of rumble strips at the edge of roads has reduced the number of fatal accidents in recent years. Electronic in-vehicle lane departure warning systems will similarly increase motorway safety. In the not too distant future, lane tracking could be included in the cruise control function for smooth guidance. It could also be combined with collision avoidance for speed regulation and automatic braking.

Occupancy detection for smart airbags requires the system to know the type of passenger (child, small, large, tall or just an inanimate object) and the passenger's position (upright, reclined, leaning forward) to properly deploy an airbag during a crash event.

Driver vigilance monitoring is a video process to detect the typical movements of a tired driver (movements of the head, eyelids, eye focus and tracking). Drowsiness and sleeping drivers are a major cause of motorway accidents affecting both private and commercial drivers.

Blind spot detection checks for the presence of a vehicle in the side view mirror blind spot. It can display the picture (passive solution) or give a warning (active solution). The warning can be a sound or a small colored light inside the mirror itself.

Significant research in the last decade has prompted development of sophisticated algorithms and systems. From the system point of view, much of the research has been on the image sensor itself and many patents have been awarded for image sensor technology that fulfill the stringent specifications of this new market.



Figure 1: Lane tracking and blind spot detection

The choice of an image sensor - Melexis solution and experience

These new features require a new kind of image sensor. CCDs usually have a too high cost and serious technical disadvantages like blooming; they are thus not well suited for this new market. Consumer CMOS sensors are optimized for linear response with high sensitivity and low noise but do not meet the dynamic range requirements for safety applications in automobiles. Automotive sensors are derived from industrial sensors that already had some high dynamic range features and a wider temperature range. These sensors usually come in a ceramic package and work with a high quality lens. An industrial example of high dynamic range has been in the monitoring of soldering processes.

For automotive, Melexis introduces MLX75006 (CIF) and MLX75007 (PVGA) automotive grade CMOS camera ICs sensitive for visible and near infrared light. Their integrated glass lens options, fail-safe features, plastic package and wide temperature range make them the ideal fit for automotive safety and driver assistance systems.

Their unique overmolded plastic package with optional integrated glass lens stack simplifies customers' assembly and protects the IC and bond wires against scratches and light. This compact "camera module" solution can be pick and-placed and reflow soldered as any other electronic component. It is focus free and does not require any adjustment. A low leakage process fabrication process and built in temperature compensation capabilities like offset compensation, leaking pixel detection and interpolation make the MLX75006 and MLX75007 the first and only image sensors on the market to achieve an extended temperature range from -40 to 105°C.

The programmable pixel response with linear, multiple slopes or logarithmic behavior can be used to reach the required level of dynamic range. This flexible pixel can be fully controlled by the user and operates as a global shutter, a feature similar to CCDs and that was formerly impossible in CMOS sensors. Global shuttering (also called synchronous shutter or "snapshot") avoids the picture lag or skewing that appears when the imager is in motion or when imaging a moving scene. Furthermore, many real-time and in-field integrity checks are built in to comply with the stringent and fail-safe requirements for safety related applications. The sensor informs the control application of any failure of the programming interface or the

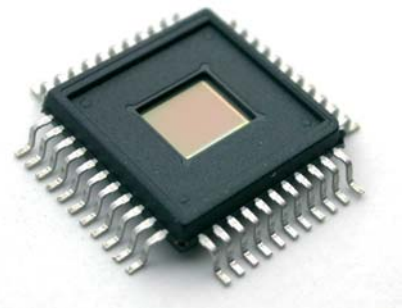


Figure 2: MLX-CMOS camera IC

readout interface and it has test modes for application diagnosis. The camera IC offers the ability to monitor its communication lines (uplink

and downlink) as well as the on-chip analog and digital circuitry. This monitoring feature, as well as the integrity checks, are unique and make the sensor suitable for safety applications, including the "2-box" design solution where the sensor is separated from the control electronics. The sensor offers other features like the possible readout of different parts of the same image without re-acquiring a new image and the ability to readout non-rectangular windows of interest.

Since 1999, Melexis has gained considerable experience in automotive optical product development, packaging, testing and manufacturing with its 128 x 1 pixel linear optical array (1D). The MLX90255 and its derived ASICs measure torque and angle position in steering systems (Elec-

tronic Stability Program, Electric Power Steering). The logical next step was the development of two-dimensional arrays for general automotive imaging. These 2D sensors can easily be combined and synchronized as a pair to create a 3D vision system. The interface has been studied for easy connectivity, control and synchronization of several image sensors and light sources.

This solution is planned for mass production in 2005 with the MLX75006 CIF (352x288) and MLX75007 PVGA (750x400) resolutions. Both are available in a choice of black & white or color versions. Engineering samples of each are currently available. Engineering samples of the integrated glass lens solution will be available in January 2005.

In the field of vision, Melexis is a technology leader in the automotive IR-spectrum imaging field (thermal imaging) with single zone, dual-zone or multi-zone (up to 10x10 pixels) IR thermopiles. These sensors can be used in air conditioning systems and some vision applications. Melexis' future developments in optical sensing include Time-of-Flight, a 3D distance measurement method based on the propagation delay of light.

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Exploratory Study on the Potential Socio-Economic Impact of the Introduction of Intelligent Safety Systems in Road Vehicles

Johannes Abele, Herbert Baum, Christiane Kerlen, Sven Krüger, Torsten Geißler and Wolfgang Schulz

Introduction

Transport is a key factor in modern economies. With an increasing demand for transport services the European Union needs an efficient transport system and has to tackle the problems caused by transport: congestion, harmful impact on the environment and public health, and the heavy toll of road accidents. The cost of accidents and fatalities is estimated at 2% of Gross Domestic Product in the EU (eSafety 2004).

In recent years, the number of traffic accidents and fatalities has been decreasing. There is convincing evidence that the use of new technologies has contributed significantly to this reduction in the number of fatalities and injuries. For this reason, the eSafety initiative aims to accelerate the development, deployment, and use of Intelligent Safety Systems. Intelligent safety systems for road vehicles are systems and smart technologies for crash avoidance, injury prevention, and upgrading of road holding and crash-worthiness of cars and commercial vehicles enabled by modern IT.

The research focus for the assessment of the socio-economic impact of intelligent safety systems (ISS) is twofold. On the one hand, the objective of this study is to provide the methodological basis. On the other hand, the suggested methodology should be tested by way of example to explore the attainable socio-economic benefits of intelligent safety systems in Europe. It has to be noted that socio-economic impact is considered in a broader perspective including private profitability aspects and additional economic benefits (employment and distributional effects).

State of the Art

Since the late 1980's, there has been a large number of studies dealing with the impact of Intelligent Traffic Systems on road safety. The development of Advanced Driver Assistance Systems and further Intelligent Road Safety Systems raised the question of their potential impact. Several projects funded by EU Member States or the European Commission and stud-



Figure: Overall methodology of the study

ies by the automotive industry and equipment suppliers have already provided some data on their impact. A large number of projects deals with technological research and development and provides a basis for further progress of the field (e.g. AIDE, CARTalk, CHAMELEON, EDEL, GST, HUMANIST, INVENT, PReVENT, PROTECTOR, RADARNET, SAFE-U). Several projects are focused on accompanying measures in order to develop the sectoral innovation system and strengthen networks and co-operation (ADASE II, GST, HUMANIST). Some projects reflect on the implementation of safety systems and on measures to support the application of new technologies (ADVISORS; RESPONSE). Finally, a number of projects discuss costs and benefits of the technologies that were investigated



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(ADVISORS, CHAUFFEUR, DIATS, E-Merge, STARDUST, TRL-report). However, a systematic assessment and coherent analysis of the potential socio-economic impact of Intelligent Road Safety Systems is not yet available. In addition, such an analysis is further complicated by the fact that many systems are not yet widely deployed.

Reflecting on the socio-economic effects of ISS, it is necessary to distinguish different levels of impact:

1. Operational analysis dealing with the technical assessment of operational effectiveness
2. Socio-economic evaluation and
3. Strategic assessment

This study argues that an assessment of the socio-economic impact of intelligent safety systems has to combine these different evaluation approaches.

Approach of the Study

In order to assess the socio-economic impact of intelligent safety systems, it is necessary to define which safety technologies will be taken into consideration and discuss their market deployment. Then it will be possible to reflect on traffic effects that are the basis for the socio-economic benefits of intelligent safety systems.

The technology work package will provide a short description of intelligent safety systems and discuss their potential impact on road safety. It is necessary to consider safety functions inter-dependencies and their combined potential influence on road safety. At this point it is possible to account for possible drawbacks. New Technologies can, for example, contribute to an increase in accidents due to drivers' distraction or reduce the traffic flow.

The market work package will propose a model describing the diffusion of intelligent safety systems. The

target figure is the rate of equipment with intelligent safety systems at a given date. In order to get this figure, it is necessary to reflect a large number of influencing factors indicating the market potential and potential user acceptance.

Apart from that, the project will analyse traffic effects which result from the market introduction of intelligent safety systems. This work package requires data covering the latest available traffic forecasts in the member states of the European Union (e.g. traffic development, accidents). The outcome of the model will be a methodology to assess the impact of intelligent safety systems for different stakeholders.

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MNT Activity in the UK

A study was commissioned a few years ago by the Government to investigate the status of Microsystems and Nanotechnology (MNT) in the UK, and to determine the way forward. Following the publication of the Taylor Report, a number of initiatives were put in place.

In order to ensure that the UK wins a share of the predicted global market of \$1,000 billion within the next ten years, significant Government funding is being invested. For example, this year 2004, more than \$225 million is being invested in academic research, and this figure is set to rise in subsequent years.

In 2003 the Government announced an injection of \$162 million investment in MNT over 3 years, with additional support by the English Regional Development Agencies, and the Devolved Agencies of Scotland, Wales and Northern Ireland; as well as seeking matched industrial funding. The money was split into \$90 million for applied research and \$72 million for capital projects.

Also, the MNT Network was established at the beginning of 2004 with the appointment of the Director, Professor Hugh Clare. The MNT Network is a joint venture between the DTI and the Development Agencies. The remit of the MNT Network is to establish and support with time a flourishing MNT infrastructure in the UK. Further information on the activities of the Network is available on <http://www.microandnanotech.info/>

The UK Government has committed to significant levels of funding for science over the next ten years with the launch of the Technology Programme earlier this year. A proportion of this substantial investment will be used to support MNT activity

The UK is recognised for its excellence in science, and the high standing of its academic institutions in the world. The high level of investment in the science base has ensured that the UK is at the forefront of research in many of the fields making up MNT. The way has been led by the two Interdisciplinary Research Cen-

tres (IRCs) in Nanotechnology at Oxford and Cambridge. These IRCs are receiving funding of \$18 million each over a 6-year period, from January 2002. In addition to Oxford and Cambridge there are upwards of a further ten significant centres located in UK universities, including the London Centre for Nanotechnology (Picture), and about 60 major groups in total across all universities.

The UK also has a number of internationally renowned public research laboratories which have MNT related programmes, such as the National Physical Laboratory (NPL) (Picture); Council for the Central Laboratory of the Research Councils (CCLRC), which includes the Rutherford Appleton Laboratory in Oxfordshire, and the Daresbury Laboratory in Cheshire; the Advanced Materials Research Institute (AMRI); Centre for Applied Microbiology Research (CAMR); Defence Science and Technology Laboratory (Dstl); Materials Engineering Research Laboratory (MERL); and the Unilever Centre for Molecular Informatics, etc.

Upon his appointment, the Network Director Professor Hugh Clare, started the process of defining the MNT strategy for the UK, and the strategy and organisation of the MNT Network to achieve the overall objectives.

The approach developed for the UK is to create a Network of both academic and industrial institutions engaged in MNT activity, and establish a virtual centre with open access managed through the Network. This organisation of facilities is designed to have a strong manufacturing and product focus.

The strategy for MNT activity in the UK has been identified in four Key Areas. These are:

- Nano-particles, Nano-materials and Novel Materials
- Nano-biotechnology, Pharmaceutical, Medical
- Nano-metrology, Characterisation and Standards

- Nano-Fabrication - silicon, glass, plastic, metal, etc.

The UK MNT manufacturing base has grown very strongly in recent years with more than 500 active companies and institutions. A Directory of UK MNT companies is being established <http://www.mnt-directory.org/> which is fully searchable. A couple of examples of the breadth and depth of MNT activity in the UK includes ink-jet technology, which was developed in Cambridge. Many of the companies which grew out of the early work are based in the area; large-scale production of carbon nanotubes by Thomas Swan & Co Ltd; more than 2,000 people are employed in the manufacture of computer disc drive by Seagate (Picture); the UK has 2 centres licensed for stem-cell research.

Other major MNT centres include BioCity, Nottingham (Picture); QinetiQ Nanomaterials, Farnborough; Optic Technium, St Asaph (Picture); IN-

EX, Newcastle; MNT, Packaging Centre (planned), Liverpool (Picture); QinetiQ, Malvern; CIP, Ipswich (Picture); EMFab, Plymouth; and Begbroke Park, Oxford. These are state-of-the-art facilities, which also include generous provision for incubator units.

A strong science base; good facilities; a rapidly growing industry base; incubator facilities; and access to funding (London and Cambridge boast two of the highest concentrations of Venture Capital in Europe) make the UK an excellent country to do business in MNT.

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