Positioning for tomorrow

- Economic evolution
- Anticipate, create the future
- Build on regional strengths
- Go with synergies
Small Tech: Why Size Matters

• Microsystems
  – 1 millionth of a meter
  – Feature size and fabrication process similar to IC
  – Ink jet printer heads, auto sensors, airbag accelerometers

• Nanotechnology
  – 1 billionth of a meter
  – Feature size and fabrication process similar to nature
  – Sunscreen, catalysts, coatings
  – Future: Drugs, electronics, power
Small Tech synergies

- **Life Sciences**: Next-generation drug delivery, prosthetics, new drugs
- **Energy**: Cleaner fuels today, fuel cells tomorrow
- **Homeland Defense**: Sensors for air, water, airport security
Small Tech is Here Today

• Nanomaterials (U.S.) $200m in 2002, $1b by 2007, $4.5b by 2012*
• MEMS (U.S) $3.9b in 2002, $8.3b in 2007**
• 42 small tech companies in MI, most related to auto industry
• Auto industry is biggest user of MEMS

Sources: * The Freedonia Group  **In-Stat/MDR
Geography of Auto Production –
Will Detroit Continue to be the Industry’s Hub?
Federal Reserve Bank of Chicago/Detroit Branch
November 3, 2003

MEMS Unit Shipments in the Automotive Industry

(Units in Millions)

Source: In-Stat/MDR 1/03
Total MEMS Accelerometer Market: Product Realisation Out of Total Market Potential (World), 2002-2010

Note: All figures are rounded. Source: Frost & Sullivan
Existing Auto Applications

After tire pressure, rollover sensing is next: A Volvo XC90 takes a tumble in a company crash test. The new SUV comes equipped with a roll stability control system that uses gyros to sense imminent rollover and, if necessary, activate stability and traction control systems. If a rollover does occur, the system pre-activates inflatable safety curtains and tightens up the seat belts.

Steve Crosby, publisher
Existing Auto Applications

The 2003 Mercedes-Benz S-Class sedan’s PRE-SAFE system senses emergency braking or skidding to tighten seat belts before a crash. It also adjusts the front and rear seat positions when an accident threatens by, for example, moving reclined seats to a vertical position. In the event of an imminent rollover, the system closes the sunroof.

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Existing Auto Applications

The 2003 Ford Taurus telematics and safety concept car uses sensors to determine the seating position of the driver and passengers before it activates the passive seat-belt restraint system in response to crash and pre-crash sensors.
What is it?

Subtech is all about how everywhere it today's automobiles, how detecting moves is monitoring fuel pressure.

Mabs sensors are primarily used to monitor engine and car systems, along with parking sensors. Airbags use lithium-ion batteries and other body parts as well as a rechargeable battery.

Automotive Applications

This integrated information from Bosch, at right, reveals where a vehicle is likely to roll over and roll. Information to the car's stability control system. It can also help to reduce victims and display certain airbags, which roll from the sides and protect occupants.

Highly sensitive accelerometer, like the one from Analog Devices, which can detect when a car is rolling, are used in vehicle safety systems.

The accelerometer in a vehicle can detect when a vehicle is rolling, and it can also be used to detect when a car is rolling. An accelerometer can be used to detect when a car is rolling, and it can also be used to detect when a car is rolling.

An active wheel speed sensor like the one from Bosch is part of the vehicle's anti-lock braking system (ABS). It can be used to detect the friction between the tire and the road. When a tire is rolling, the wheel speed sensor can detect the friction between the tire and the road. When a tire is rolling, the wheel speed sensor can detect the friction between the tire and the road.

Bosch - the world's leading supplier of automotive technology. Bosch is making the world drive better.

42 smalltimes May / June 2003

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Michigan’s Strengths

• MEMS: U-M one of top two in U.S.; Wayne State has Delphi lab
• Nano: Cutting-edge research at U-M, MSU, CMU and others; Donald Tomalia is a world pioneer in dendrimers
• Strong tech transfer and VC investments
Recommendations

• Position Michigan to become world leader in small tech auto applications
• Industry and state support for university research, commercial startups
• Exploit synergies with life sciences, energy, homeland defense