Mechatronics Systems

The synergistic combination of mechanical, electrical, and computer engineering
- emphasis on integrated design for products
- optimal combination of appropriate technologies
Mechatronics
Micro to Macro Applications
Micro Factory

• Desktop sized Factory
• Contains processing unit, a transferring unit, an assembly unit, and an inspection unit.
Mazak Horizontal Machining Center

New highly advanced HMC with 15.7” pallet. You can select accuracy levels, spindle speed/torque to optimize performance.

The most diversified power-house of HMCs, from stand alone to palletized production systems. Heavy-duty cutting to high-speed machining. 3-axis machines to 5-axis simultaneous machining.

Deliver the highest accuracies to levels up to 8 times better than ISO standards.

Applications range from automotive to aerospace, heavy industrial machinery to energy, medical to die/mold.
Finn-Power Express Benders

Express Benders
Finn-Power Express Benders automate complex bending and eliminate tedious work stages.
- Fully automatic operation cycle – from loading the sheet to unloading the bent parts.
- Up to 11 gauge capacity
- “Negative” bend capability
- Extremely accurate
- Can be integrated into Finn-Power’s Flexible Manufacturing Cells & Systems
Cleveland Steel Tool Ironworker

So much action; So little time

With multiple workstations, go from one operation to another w/o stopping for time-consuming tooling changes.

Choose from compact 25 Ton, to the heavy-duty metal-eating 100 Ton.

Get more holes, more cuts, more bends, and just more metalworking.
High Speed Train Systems

- Train Position and Velocity constantly monitored from main command center.
- All Trains controlled from main command center
- Error margin in scheduling
  - no more than 30 seconds

Bullet (Shinkansen)
Top Speed: 277 mph
Country: Japan

TGV (Train a Grande Vitesse)
Top Speed: 320 mph
Country: France
Mechatronics Systems in Automobile

**Typical Applications**
- Brake-By-Wire system
- Steer-By-Wire
- Integrated vehicle dynamics
- Camless engines
- Integrated starter alternator

**OEM Driven**
- Reliability
- Reduced weight
- Fuel economy
- Manufacturing flexibility
- Design freedom
- Advanced safety features
- Cost
Mechatronics Door System/Module

- "Smart" Mirror motor-unit
- "Smart" Window Lift-unit
- CAN Bus
- 3 wire LIN Bus
- "Smart" Doorlock
- Switchboard with CAN Bus Gateway
Seat System/Module

Seat Harness Architecture showing various smart connector interconnections solutions
Lane departure warnings mimic the sound of rumble strips. The sound comes from the side toward which the car veers. A waking driver can apply correction in the right direction instantly.
Smart Kitchens

• MORI survey commissioned by Motorola

• 1/3 of European consumers want technology to make home life easier and more fun

• Two most desired smart products:
  - One-button washing machine
  - Intelligent oven

• Consumers want technology to:
  - Reduce environmental waste
  - Save energy costs
DigitalDNA Technology in the Kitchen
- Networked appliances
- Motor controls
- Smart sensors
Washing Machine System Solution

Power Supply
Rectifiers/Regulator
MC7805

Pressure Sensor
MPX5006/MPX2010

TUB

8-bit MCU

Motor Driver (IGBT Inverter)
MGP4N60ED
MGP7N60ED
MGP11N60ED

User Interface

Motor/Pump

MC7805

Motorola

Dave's Control Center

MC68HC08MP16

SSAC9616-A

MC7805

Motorola

Dave's Control Center

MC68HC08MP16

SSAC9616-A
Smoke Detector System

Smoke Test

Smoke Signal

LED Driver

Horn Driver

Horn

To other units, Escape lights, Aux. Alarms, etc.

Smoke IC

I/O

Ion Chamber (or Photo Chamber)
Local Area Networks
Linking the Entire Home
Medical Systems

Pace Maker: Used by patients with slow or erratic heart rates. The pacemaker will set a normal heart rate when it sees an irregular heart rhythm.

Implantable Defibrillation: Monitors the heart. If heart fibrillates or stops completely it will shock the heart at high voltage to restore a normal heart rhythm.