

# Defence Technology in Changing Times



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# Outline

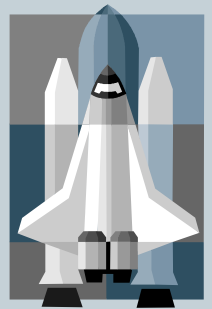
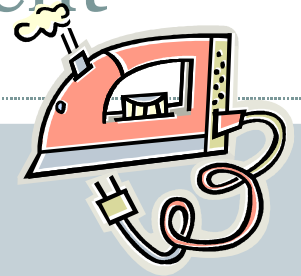


- Inherent Insecurity with Embedded Systems
- India has the Capability
- Over next ten years

# Embedded Systems are all Prevalent

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- Processors are embedded today in every thing
  - Telephones, TV, Music systems
  - Cars, trucks, road signals
  - Washing machines and Refrigerators
  - Light controls and energy meters and Building management lights
  - Electronic transaction systems, ATMs
  - All production machinery
  - Guns, weapons of any kind, monitoring systems
  - Toys, weighing machines
  - All security systems
  - Voting Machines
  - Almost all medical devices
  - And **everything else**



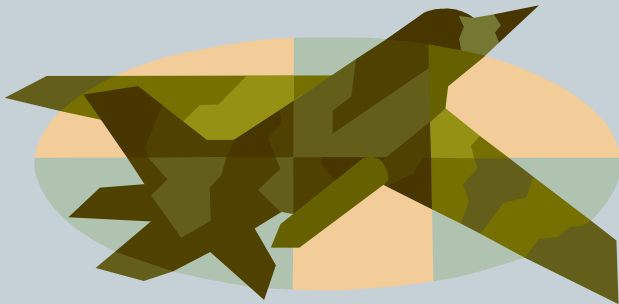


ATM s like this has four to five processors

A typical modern car has tens of processors



Aircraft has hundreds



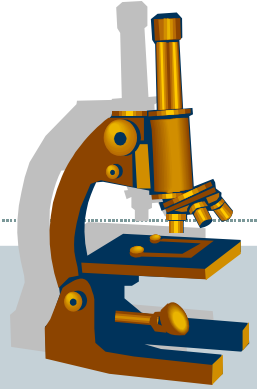
# Furthermore

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- Most systems now **communicate** with each other
  - People and Devices are getting networked
    - Pace is to increase exponentially from now on
  - Increasingly on wireless and infrared
    - ✦ One does **not even know** of the communication capabilities of most devices

# Embedded Systems

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- Are inherently **insecure**
  - A circuit or a code can be embedded at any level, which may be **hidden**
  - Functionality **only known to designers**
  - When connected, a designer can **by pass most security systems** subsequently installed and do any thing with the system
    - ✦ Most designers implement such code, so as to debug systems deployed in the field
    - ✦ But always open to mischief



# Elements can be embedded at multiple level

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- Processors, micro-controllers
  - Easy to embed by initial designer, Extremely difficult to detect
- Field Programmable Gate Arrays (FPGAs), peripherals
  - Easy to embed even later on, Extremely difficult to detect
- Real Time Operating Systems (RTOS)/ kernel
  - Easy to embed any time, Extremely difficult to detect
- Assembly level Software
  - Easy to embed any time, Extremely difficult to detect
- High level Software
  - Very easy to embed anytime, Easier to detect if source code available

# India has the capability

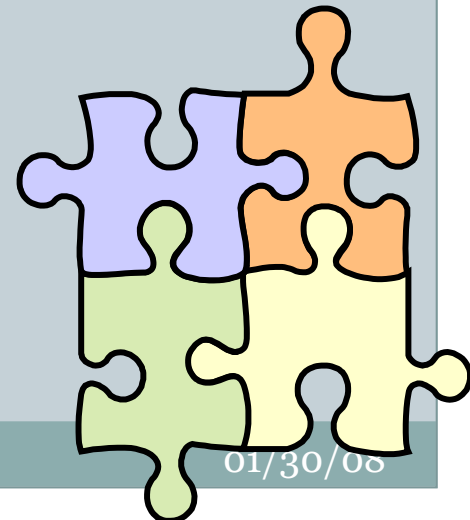


- **Nano was not an accident**
  - Was not possible twenty years back
    - ✦ Tata Indica and Scorpio preceded it
- **Wireless in Local Loop Design shows the strength**
  - ✦ Companies like Midas and Tejas has the best of breed engineers
  - Center of Excellence in Wireless Technology aims to make India in leaders in Wireless Technology over the next ten years
- **We are the Design House for the World**
  - Sasken, Tata-Lxi, Wipro designs most of telecom and IT systems

# Has the best R&D Engineers

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- **India can design and develop and innovate**
  - Processors, FPGA, peripherals, Operating Systems, Assembly level and high level software
  - Mechanical and Optical Systems
- **Need the right Public-Private Model**
  - To get the best in India to work for us
  - And to tap Indian Engineers abroad



# Over the Next ten years



- India has to aim to become leaders in a few defense technology areas
  - ✦ While it continues to buy
- Need a strong push for R&D
  - ✦ But not in the conventional manner
    - Would need a consortium of academic, private sector and public sector R&D
- Directed Research may be required

# Imperatives

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- For India's security and independence
  - Develop its own technologies
    - ✦ For strategic reasons
  - In public and in private sector
    - ✦ Indian companies, Government has to support indigenous R&D and technologies by buying Indian whenever possible