Opportunities in VLSI and Embedded
Global Impact of Semiconductor Industry
Indian Semiconductor Market
Job opportunities in Semiconductor
System to VLSI semiconductor
Semiconductor: Relevance to economy

- Electronics - Key Enabler of added value and jobs

- Source: FSA USA, 2005

10% of world GDP

Rs. 200 Lakh Crore

Rs. 8 Lakh Crore

$213B

$1,020B

Automobile, Petrol, Chemical, Aviation

- Traditional Manufacturing

- Electronics Industry

- Service providers

Telecom operators... $5,000B ...Broadcasting C\text{ies}...

Source: FSA USA, 2005
Big Picture (Consumer Electronics)

- Digital Still Camera
- Digital TV
- PDA Cameras
- Internet Audio Player
- Digital Camcorder
- I-Video Phone
- iPod
- PC
- Video Phone
- DVD
- Digital Video Recorder/Home Video Server
- Cellular Video Phone
- Network Cameras
Global Impact of Semiconductor Industry

- Semiconductor chips impact is ~ 10% of World GDP
- Impact to growth of countries
  - USA
  - Japan
  - Taiwan, South Korea
- Semiconductor is all pervasive
  - Consumer electronics: Radio -> LCD TV @ home
  - Computer -> Tablet PC
  - Automobile: LED indicator -> Automatic Car
  - Industry automation
  - Medical, Energy, Retail, etc
SOC integration is one of the ways to achieve area, power, cost improvements.

How does it look inside the chip?
Die photo of a typical SOC ..

- Real world (temperature, voice, air, sound ..) is Analog
- Any system will need the analog/Mixed signal front end.
- As the technology advancing, complexity of Mixed Signal Design increasing due to
  - Digital CMOS Process
  - Deep Submicron effects which are not always favorable to Critical analog blocks.
  - Lower power supply.
  - Integration.
  - Etc.
Semiconductor Impact: Internet Age – The Market

1 per department (100 people)

1 per person

many per person
Where does Sankalp work go?

- Digital Still Camera
- Digital TV
- PDA Cameras
- Internet Audio Player
- Digital Camcorder
- I-Video Phone
- Video Phone
- Cellular Video Phone
- iSTB
- DVD
- Digital Video Recorder/Home Video Server
- Network Cameras
Impact to Common man!

Multiple applications in one product

Camers ICs
MP3 Player
Mobile Phone
FM Radio

Integrated smallest product
Lowest Cost

Single Chip (IC) SoC
## Semiconductor Business/Job Options

<table>
<thead>
<tr>
<th>VLSI Design</th>
<th>HW/Board Design</th>
<th>Embedded Software</th>
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**Foundation: Electronics Graduate**
Semiconductor Design (India)
Semiconductor Design (India)

- Growth: CAGR 17.5%
- 2012 to 2020:
  - $10.6B to $60B
Semiconductor Design Industry

- Significant verticals for ESDM
  - Local consumption growing
System to VLSI Semiconductor

- System Design
  - Medical, Automotive, Mobile
  - End equipment competency
  - Leads to better products

- Volumes sale
  - Scope for cost reduction
  - Scales drive business

- VLSI design
  - Volumes + available chip manufacturing capacity

- System Manufacturing
  - Local need and market
  - Spurs local system design

- Spare capacity
  - Any spare capacity is free
  - Capex is spent and variable is small cost.

- VLSI manufacturing
  - Growth of local competency
  - Growth of available capacity
What will you choose?

What are these graphs?

Applicable to whom.

Years:

Time

1

2

Rewards

Knowledge

Social Status

Fame

Electronics Engg. in Application s/w (finance, BPO)

Electronics Engg. in Semiconductor Job
Long term look!

- Electronics Engg. in Application s/w (finance, BPO)
- Electronics Engg. in Semiconductor Job

Rewards
Knowledge
Social Status
Fame

Years: 1 2 3 4

Time
Summary

• Opportunity is huge
  • ESDM growing to $60B of local market
  • Electronics invading all aspects of life

• Talent availability
  • Great talent but need industry orientation
  • Next big opportunity after IT growth

• Time is opportune
  • ISA plans to enable 50 fabless companies by 2020
  • Govt. understands importance of ESDM
Questions ?
Thank You!