NANOIOTECH – The Future of Nanotechnologies for IoT & Smart Wearables

Semiconductor Technology at the Core of IoT Applications

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Success Factors for new smart connected Applications

Technology
- Embedded Analytics
- Embedded Memories
- Ultra Low Power
- FD SOI MEMS
- Sensor Fusion
- Actuators
- RF Connectivity
- Sensors
- System in Package
- Image Processing
- Wireless Charging
- Power Harvesting

System
- Application Programming Interfaces
- End to end architecture
- Software
- Interoperability
- Privacy
- Standardization

Security

Market Adoption
- Business Model
- Regulation
- Sales channel
- Ethic

Ecosystem
- Benefit
- Society acceptance

Usage
Success Factors
for new smart connected Applications

An open field for new ideas and innovation !!
Semiconductor Technology fuels market Innovation

Semiconductor process ➔ Enable performance ➔ Semiconductor Device ➔ Enable performance ➔ Product Device ➔ Enable performance ➔ Applications

Create requirements ➔ Create requirements ➔ Create requirements
The unique IDM value proposition

**Unique strategic advantage** of having in-house technologies for today’s electronic systems.
The IoT is a movement where any system is able to leverage the Internet and its eco-system.
Connected Objects to generate a Data Deluge

- **1250 Billion Giga Bytes** of data generated
  - more bits than stars in the universe

- Already dominated **by data coming from sensors**

- Storage (disk, ram, ...) capacity growing slower than generated data

  *source IDC - 2010*

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Even with a solid improvement of transmission efficiency, the trend is not sustainable in energy & power

Data Generated by Connected objects have to be shrunk by several orders of magnitude before on-the-air transmission

**From Data Quantity to Qualitative Data**
IoT Needs are the Same

- **Processing & Security**
  - Smart Things
  - Ultra-Low Power to High Performance
  - Scalable Security solutions

- **Connectivity**
  - 10 cm to 10 km

- **Power & Energy Management**
  - Nano Watt to Mega Watt

- **Signal Conditioning & Protection**
  - Nano Amps to Kilo Amps

- **Sensing & Actuating**
  - Full range of sensors and actuators
IoT Needs are the Same

FD-SOI enabling Integration Path

- **Processing & Security**
- **Connectivity**
- **Power & Energy Management**
- **Signal Conditioning & Protection**
- **Sensing & Actuating**

**Smart Things**

**Smart Home**

**Smart City**

**Smart Industry**
FD-SOI Enables the Ultimate Integration for Tomorrow’s Connected World

- Ultra low voltage operations with high performance.
- Easy and efficient analog integration (ADC/DACs, RF, LDOs, …)
- FBB for dynamic power/leakage/frequency tuning
- Excellent reliability and soft-error performances
- Performant F_t / F_{max}, Performant passive devices
- Improved noise, Lower parasitic capacitances
- Adapt power consumption to load
- Performance and power efficiency

Network infrastructure

The Internet of Things

Enterprise & Cloud Datacenter

Core Network

Backhaul Mobile Network

Access Network

Radio Access Network

Smart City

Smart Home

Smart Industrial

Smart Car

Healthcare

Core Network

Backhaul Mobile Network

Access Network

Radio Access Network

The Internet of Things

Network infrastructure
The **FD-SOI** Advantage for IoT

- **SoC Architecture**
  - **RF**
  - Analytics
  - **CPU & Memories**
  - **Power Management**

- **SoC Power Consumption**
  - Previous Generation (40LP)
    - Power Supply Loss: 30 mW
    - RF: 8 mW
    - Analytics: 6 mW
  - FD-SOI 28nm
    - Power Supply Loss: 8 mW
    - RF: 3 mW
    - Analytics: 2 mW
    - CPU & Memories: 2 mW
    - Other: 1 mW
  - FD-SOI 28nm Power optimized: 6 mW

Up to X5 Power Consumption Improvement with **FD-SOI**.
Success Factors for new smart connected Applications

Facilitate **DEPLOYMENT** of new ideas and innovation!
STM32
Versatile Embedded Processing Platform

10 Series
More than 700 part numbers
>2.5 Billion Parts Shipped

Ultra-Low-Power
Mainstream
High Performance

STM32 L0
STM32 L1
STM32 L4
STM32 F0
STM32 F1
STM32 F3
STM32 F4
STM32 F7

100 DMIPS
425
400
375
325
300
275
250
225
200
175
150
125
100
75
50
25

26
33
38
61
90
120
180
200

273 CoreMark
398 CoreMark
608 CoreMark
1000 CoreMark

225 DMIPS
33 DMIPS
400 DMIPS
428 DMIPS

MHz
Analog & Sensors for Smart Things

- Solutions for smartphone touch screen control and power supply
- Charging solutions for wireless charging and fast charging
- Broad range of general purpose and specialized analog solutions

- Industry Leading range of MEMS Motion Sensors from 3 to 9-axis solution including OIS
- Portfolio of actuation technologies powering innovative partner solutions
- Best-in-class pressure sensors

- AMOLED Display Power
- Touch Screen controller
- General Purpose Analog
- Wireless Charging
- Fast Charging Solutions
- Specialized Analog

- Power Conversion
- Sensors & Actuators
- Connectivity & Communication
- Motor Control & Actuation
- Analog & Signal Conditioning

- Sensors & Actuators
- Analog
- Motion MEMS
- MEMS Actuators
- Environmental Sensors
Lowering the Barriers for IoT “MVP” Developers
To accelerate Time To Market

Partnership with third parties - Form factor devices and customization

Modular Blocks
Prototyping

Form Factor
Field testing

Optimized Design
Volume Production

Easy porting of developed software to final Product

HW/SW optimization and support for production
Thank You