OrCAM Vision Assistance System

- Could benefit 300M+ people!
- More chances for human-machine corporation
  - External skeleton equipment will benefit 20% population in the world!
McKinsey: Artificial Intelligence Could Change the World in Next Decade

Estimated potential economic impact of technologies from sized applications in 2025, including consumer surplus

$ trillion, annual

<table>
<thead>
<tr>
<th>Technology</th>
<th>Range of sized potential economic impacts</th>
<th>Impact from other potential applications (not sized)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Internet</td>
<td>3.7–10.8</td>
<td></td>
</tr>
<tr>
<td>Automation of knowledge work</td>
<td>5.2–6.7</td>
<td></td>
</tr>
<tr>
<td>Internet of Things</td>
<td>2.7–6.2</td>
<td></td>
</tr>
<tr>
<td>Cloud technology</td>
<td>1.7–6.2</td>
<td></td>
</tr>
<tr>
<td>Advanced robotics</td>
<td>1.7–4.5</td>
<td></td>
</tr>
<tr>
<td>Autonomous and near-autonomous vehicles</td>
<td>0.2–1.9</td>
<td></td>
</tr>
</tbody>
</table>

Notes on sizing:
- These estimates of economic impact are not comprehensive.

Src: Mckinsey Global Institute: <Destructive Technologies: Advances that will transform life, business, and global economy>, May 2013
What difference ARM brings

✅ Stunning new applications
   Machine vision/Computer Vision
   Augmented/Virtual Reality
   Automotive ADAS
   Facial and Gesture Recognition

✅ Much more bigger market
   1000x current IPC market size
**IoT Challenges**

**Billions of Connected Devices**
with more space-constrained applications requiring more processing power

**Wearables Market Growing Fast**
about 35% over the next five years reaching **148M units** shipped in 2019

**Securing the Internet of Things is a Must**
with so many devices connected to the Internet at once, companies face challenges in **type, scale and complexity** of technologies

Source: Business Insider Intelligence (Wearables Report)
SCM-i.MX 6D is Smaller than a Dime

The world’s smallest single chip system

17x14x1.7 mm
i.MX 6D Single Chip System Module

**Hardware Solution**

**Key Features:**
- i.MX 6Dual Apps Processor
- PF0100 (PMIC)
- 16 MByte SPI NOR Flash
- 109 discrete Components
- Enabled for 1GByte LPDDR2

**Software Solution**

**Key Features:**
- Proven Board Support Package (BSP)
- Android Enabled
- Linux Enabled

**Freescale Support**

**Key Features:**
- Development Board
- Freescale Software Services

**Ecosystem:**
- Arrow Electronics for Supply Chain
- Eco- partners for PoP Assembly
- SW & HW Companies for Design Services
# SCM-i.MX 6D Features and Benefits

<table>
<thead>
<tr>
<th>Features</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solution with majority of components integrated inside module</td>
<td>Get to market <strong>25% faster</strong> than the average development time and <strong>reduce</strong> design time</td>
</tr>
<tr>
<td><strong>Unprecedented</strong> ultra-small form factor (17x14x1.7 mm)</td>
<td>Gives <strong>&gt;50% reduction</strong> over current discrete solutions</td>
</tr>
<tr>
<td>Software and firmware available and <strong>fully optimized</strong> for the SCM-i.MX 6D</td>
<td><strong>Reduces</strong> validation effort and software design time</td>
</tr>
<tr>
<td>LPDDR2 <strong>memory-enabled</strong> and <strong>power management integrated</strong></td>
<td><strong>Reduces</strong> design complexity of integrating and certifying DDR memory and power management into customer design</td>
</tr>
<tr>
<td><strong>Freescale + partners + ecosystem</strong> provide embedded component sourcing, SW/HW customization and support</td>
<td><strong>Reduce</strong> customer’s supply chain complexity and <strong>improve</strong> time to market</td>
</tr>
</tbody>
</table>
Applications

**IoT/Generic Hub**
- Higher power
- High graphic applications
- Power management

**Portable**
- Linux Support – Apps Processor and Memory
- Connectivity – WiFi and BLE/802.15.4

**Wearable**
- Low power
- Ultra-small form factor
- Lower cost
- Sensors
- Connectivity (BLE)

**Autonomous Sensing**
- Low power
- Low standby
- Connectivity
- Small integrated systems

**Auto**
- Integrated systems
- In-dash
# ARM SOM Standard Overview

<table>
<thead>
<tr>
<th></th>
<th>QSEVEN</th>
<th>ULP-COM/SMARC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard Owner</strong></td>
<td>SGeT</td>
<td>SGeT</td>
</tr>
<tr>
<td><strong>Members</strong></td>
<td>20+</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Interface</strong></td>
<td>PCI-E, SATA, USB2.0, Giga Ethernet, SDIO, etc.</td>
<td>Parallel RGB/LVDS/HDMI, SATA, USB2.0, camera interface, multiple SPI, multiple SDIO, serial ports, etc.</td>
</tr>
<tr>
<td><strong>Form factor</strong></td>
<td>70 mm x 70 mm, 230 Pin, MXM, 0.5 mm pitch</td>
<td>82 mm x 50 mm and 82 mm x 80 mm, 314 Pin, MXM3.0, 0.5 mm pitch</td>
</tr>
</tbody>
</table>
| **ARM processors**   | FSL i.MX6S/D/Q **No.1 supplier in SMARC standard products!**
                       | TI Sitara, OMAP, Nvidia Tegra 3 | FSL i.MX6S/D/Q, **No.1 supplier in SMARC standard products!**
                       | TI Sitara | |
| **i.MX6 Vendors**    | Advantech, AAEON, Congatec, iWave, kancotec, DFI, Engicam, F & S, MSC, SECO | Advantech, Kontron, Adlink, GreenBase, Avalue, Axiomtek, iBASE, TES |

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**Note:** For more detailed information, please refer to the official ARM SOM Standard documents.
i.MX 6: 品质成就地位

- 通过AEC-Q100标准：满足汽车电子苛刻要求
- 承诺长达15年的供货周期
- 产品缺陷率低于1PPM
- 不掉电连续工作10年无故障
i.MX 6 提供卓越的安全特性

满足SHE/HSM规范：为汽车电子提供高安全环境

保护用户的知识产权不被盗版

保证软件完整性，不被恶意篡改
i.MX 6 提供卓越的安全性能

i.MX 6 提供非常完善的安全特性来保证用户的知识产权和设备运行可靠性。其中包括：
1. Trustzone 可信执行环境；
2. 高可靠性启动 (HAB)；
3. 硬件加密引擎 (CAAM) 以及随机数生成器 (RNG)；
4. 安全存储区 (Secure RAM)。
i.MX 6 Series: Supreme Scalability and Flexibility
Leverage One Design Into Diverse Product Portfolio

Scalable series of **Nine** ARM-based SoC Families

Pin-to-pin Compatible
Software Compatible

Expanded series for performance, power efficiency and lower BOM
i.MX 6QuadPlus | i.MX 6DualPlus  

Advantages

**Extreme Graphics Performance**
- Quad/Dual Core Cortex-A9 Cores
  - Graphics performance increase by 60%
  - Pin to Pin Compatibility
  - Leading edge 3D and 2D graphics, as well as high-definition video

**DDR Performance Increase**
- Redefined AXI Bus Switch Structure
  - DRAM Improvement performance of systems by dramatically increasing the memory bandwidth utilization of over 90%

**Display Improvements**
- Addition of new pre-fetch and resolve (PRE) modules to the existing IPU block on the all Plus processors
- Addition of two new 128 Kbyte OCRAM blocks and for performance increase to add to the existing 256kb for a total of 512kb OCRAM

**i.MX 6DQPlus Secure Solutions**
- TrustZone architecture and High Assurance Boot (HAB) enablement
- e-commerce, digital rights management
- Information encryption, secure boot and secure software downloads.

Optimized data flow to reduce memory access Driver compatibility with all i.MX 6 Series
i.MX 6SoloX Advantages

- **Heterogeneous architecture with smart system power**
  - Single Cortex-A9 paired with a Cortex-M4

  Enables concurrent execution of multiple software environments to provide high performance with real time responsiveness, allowing for smart system power.

- **Optimized Power**
  - Maintain a system aware and power efficient state with complete shut down of the Cortex-A9 core, with the Cortex-M4 still active and performing low-level system monitoring tasks.

- **Optimized integration for design flexibility**
  - Dual Gb Ethernet with hardware AVB support for fast reliable communication
  - PCIe for high-speed connectivity (e.g. Wi-Fi)
  - 2D and 3D hardware graphics acceleration for performance optimized UI
  - Memory controller supports low-power LPDDR2 and cost-effective DDR3/DDR3L

- **Secure solutions for optimized performance efficiency**
  - On-chip resource domain controller providing a centralized programming model to configure isolation and sharing of system resources.
  - Advanced security supporting high assurance (secure) boot, cryptographic cipher engines and random number generator.
i.MX 6UltraLite: Introduction

Low Power and High Performance
ARM Cortex-A7 @ 528 MHz (Neon engine, FPU)

Advanced Security
TRNG, Crypto Engine (AES/TDES/SHA/RSA with DPA), HAB, Tamper Monitor, Secure Boot, OTF DRAM Encryption

Connectivity
Optimized for industrial and IoT applications

Longevity, Quality and Maturity
On the longevity program (15 years) Automotive qualification
Same mature Linux BSP as other i.MX 6 devices

i.MX 6UL
The most power-efficient and attractively priced i.MX 6 device
i.MX 6UltraLite Advantages

- Lowest cost and smallest i.MX 6 member
- ARM Cortex-A7 @ 528 MHz
  - The 14x14 289 MAPBGA with 0.8mm pitch for simple and low cost PCB design.
  - The 9x9 289 MAPBGA with 0.5mm pitch for space constrained applications.

- Most Power efficient Applications Processor
  - Integrated power management module that reduces the complexity of external power supply and simplifies power sequencing.
  - “It provides up to 20% more single thread performance than the Cortex-A5 and provides similar performance to mainstream Cortex-A9 based smartphones in 2012 while consuming less power.”

- Connectivity optimized for Industrial and IoT applications
  - 2x high-speed USB on-the-go with PHY
  - Multiple expansion card ports (high-speed)
  - 2x 12-bit ADC modules (up to 10 input channels)
  - 2x smart card interfaces compatible with EMV Standard v4.3 and a variety of other popular interfaces
  - 2x CAN ports

- Advanced Security
  - Hardware-enabled security features that enable secure e-commerce, digital rights management (DRM), information encryption, On-The-Fly DRAM encryption, secure boot and secure software downloads

- freescale
i.MX 7: Burn for Low Power and Security

- IoT solutions
- Smart home controls
- Wearables
- e-Readers
- Building automation
- Point-of-Sale
- Enterprise scanners and printers
- Patient monitoring
Industry’s most power efficient general purpose
GHz-class applications processors

Ultimate Power Performance
- Power management designed to consume minimal power in both active and low power modes
  - 15.7 DMIPS/mW core efficiency translating to 3x improvement vs. i.MX 6 series
  - 100 uW/MHz for Cortex-A7 and 70 uW/MHz for Cortex-M4
  - Industry leading Low Power State Retention mode, with one third the power consumed (250 uW) vs. i.MX 6 series

Industry’s 1st General Purpose MPU with ARM Cortex-A7 and Cortex-M4
- Single-chip solution with heterogeneous multicore processing (HMP) architecture, enabling rich operating systems while providing real-time responsiveness
- Performance on demand for burst, high-performance needs

Advanced Security
- HW-enabled security features targeted for POS and IoT privacy through encryption, secure boot, tamper resistance, and protection from side channel attacks
i.MX 7 Series Overview

i.MX 7Solo
- Single ARM® Cortex®-A7 up to 800 MHz
- Cortex-M4 up to 266 MHz
- 512KB L2 cache
- 16/32-bit DDR3/DDR3L and LPDDR2/3 at 533 MHz
- Single Gigabit Ethernet (AVB)
- Full security with tamper resist

i.MX 7Dual
- Dual ARM® Cortex®-A7 up to 1.0 GHz
- Cortex-M4 up to 266 MHz
- 512 KB L2 cache
- 16/32-bit DDR3/DDR3L and LPDDR2/3 at 533 MHz
- Dual Gigabit Ethernet (AVB)
- Full security with tamper resist
- EPD controller
- PCIe (x1 lane)

Pin-to-pin and power compatible
Software compatible

Consumer
Extended Consumer
i.MX应用处理器 核心价值

• 可扩展性
  - CPU (单/双/四核，非对称)，GPU，IO
  - 软件：Linux，Android，QNX，Windows Embedded，RTOS
  - 业界领先的生态合作体系和合作伙伴关系

• 高集成度
  - 汽车/工业/消费电子外设集
  - 可满足市场要求的封装
  - 认可资格：AEC-Q100，JEDEC工业和消费

• 可高度信任
  - 长期供货计划：汽车、医疗和工业市场的指定产品至少10-15年
  - 供应平稳，易获得
  - 高质量、可靠、零缺陷方法
  - 安全

• 强大的生态系统
  - 工程师社区，创新，支持
  - 设计信息文档，分销渠道
  - 系统解决方案：SoC，传感器，PMIC，物联网通信，SBC
IoT: Greater Connectivity across all verticals
QorIQ: Key Drivers for IoT

Greater Connectivity
50B connected nodes
Exponential growth in global traffic

Secure Data
Diverse Data Sources
Optimized Networks
Security, Security, Security

Multicore
Use of virtualization technologies
High reliability and Safety
Consolidation of Services

Addition of Arm ISA

Exponential growth in global traffic

Use of virtualization technologies
High reliability and Safety
Consolidation of Services
Layerscape LS1021 Overview

**Highly Efficient**
- Delivers 6,000 CoreMark® in under 3 W (Typical)
- QUICC Engine for protocol offload

**High Reliability**
- ECC protection on L1/L2 and all SRAM
- Secure Boot, Trust Architecture and TrustZone

**Unmatched Integration**
- DDR4, LCD controller, USB 3.0 wPHY, SD/MMC, CAN and SATA 3

**CPU Core**
- Dual Arm A7 Cores

**High Reliability**
- ECC protection

**Ease of Use**
- Services, Arm and CW tools

**Robust Ecosystem**
- Linux SDK, 5 EBS form factors, 3rd party SW for TTM

Extending our customer reach
Freescale’s Roadway of Innovation
Making the World a Smarter Place