Enriching the User Interface for Next Generation IoT Design

APRIL 2018

SECURE CONNECTIONS FOR A SMARTER WORLD

PUBLIC
IoT SMART REVOLUTION
Expand your senses into an immersive world

FROM INTERFACE TO RELATIONSHIP
Enriched User Experience

UNDERSTANDING & CORRECT RESPONSE
Smart Design, High Performance

A NEW LEVEL OF CONNECTION IS HERE
High Speed Connectivity
<table>
<thead>
<tr>
<th>Video Streaming</th>
<th>Voice</th>
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<tr>
<td>• By 2018 IP video will represent 79% percent of all global traffic (source: Cisco)</td>
<td>• 25-30% of ALL internet searches today are initiated by voice commands, and this number is growing rapidly (source: Google)</td>
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<tr>
<td>• Cord cutting momentum shifts markets from traditional STB to OTT (over-the-top IP based video on demand)</td>
<td>• Industry partnerships with major players such as Google, Amazon, Apple Homekit drive consumer adoption.</td>
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<td>• 4K and HDR driving need for updated equipment – Amazon, Google Chromecast, Roku, and MSOs drive volume – Key specs are video quality and low power.</td>
<td>• Developer reference platforms to speed time-to-market.</td>
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<th>Audio Streaming &amp; Immersive Audio</th>
<th>Smart Home</th>
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<td>• With TV Panels are getting slimmer, audio is being separated into separate sound bars.</td>
<td>• Surge of IOT and voice control are revolutionizing the smart home. Machine learning and Artificial Intelligence (AI) to drive this market even higher.</td>
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<td>• Also, DSP migration to ARM driving system architecture change for immersive audio.</td>
<td>• Major ecosystems to drive all the growth.</td>
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<td>• Fast migration of Bluetooth speakers to Networked Wifi Speakers with the advent of voice control (always connected, always ready to answer).</td>
<td>• Many home appliances are adding voice or other smart controls</td>
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i.MX 8M Industrial Target Applications
HMI, Voice and Vision for Harsh Environments

Imaging and Scanning
- Portable platforms need faster response and battery life that exceeds a work shift (12 hours)
- Sensor module targets are now below 10 cubic millimeters
- Durable products operate more than 10 years in an unconditioned environment (-40C to +85C ambient)

Human Machine Interface (HMI)
- Industrial workers expect to use rich graphics and video on higher resolution displays, similar to their personal devices
- Time is money – the HMI must respond accurately, and in milliseconds, to voice, touch screen and gesture inputs
- Efficient development leverages scalable performance and reusable software across multiple product platforms

Building Automation
- Mobile and stationary machines want full access to cloud-based knowledge
- This demands increasingly faster and more reliable wired and wireless connectivity
- Security is at the forefront, to protect human privacy and commercial assets

Machine Vision
- Machines “see” through multiple camera and sensor inputs
- Developers prefer to migrate away from DSPs and ASICs to leverage well-supported GPU and ARM technology
- Software tools and reference designs enable advanced math processors (GPU, ARM NEON) for faster image processing
Embedded Design Requirements

• Scalability for Maximum Platform Reuse
  - Pin compatibility and software portability
  - Integration: CPU (single/dual/quad, asymmetric), GPU, IO
  - Software: Linux, Android, Windows-embedded, RTOS

• Trusted Supplier
  - Product longevity: Minimum 10 to 15 years
  - Security and safety: Hardware acceleration, software
  - Reliability: Zero-defect methodology, ULA and low SER FIT
  - Quality: Automotive AEC-Q100, Industrial/Consumer JEDEC

• Enablement for Ease of Use
  - Industry-leading partners and support community
  - Manufacturability: 0.65 to 0.8mm options, fewer PCB layers
  - System solutions: SoC, sensors, memory, PMIC, connectivity, standard products, software
The i.MX 8M is a Game Changer, and we are just getting started!

- **Enriched User Experiences**
  - Video quality up to 4K UltraHD resolution and HDR
  - High Performance 3D Graphics Acceleration
  - Dual displays and camera inputs
  - Highest levels of pro audio fidelity
  - Voice Solutions

- **Performance and Versatility**
  - Up to four 1.5 GHz Cortex-A53 processors
  - Cortex-M4 for real time requirements
  - Flexible, high speed, low power memory options
  - Configuration less than 3 watts.

- **High-Speed Interfaces**
  - Interconnected Devices (smarter edge devices)
  - Newest high-speed interfaces for flexible connectivity
  - High System Data through-put
Smart IoT Building Blocks

High Speed Interfaces

Smart Performance

Advanced User Interface

LPDDR4, DDR4 or DDR3L

Audio DACs

HDMI 2.0a

MIPI DSI

S/PDIF

HDMI

MIPI CSI

4xCortex-A53 @1.5GHz

VPU + GPU + Audio Interf. + Cam.

i.MX 8M

Up to 3200MTS x16 or x32

PCIe or SDIO

GbE PHY

SD Card

USB TypeC USB 3.0

GBE PHY

SD Card

USB TypeC USB 3.0
Delivering performance, functionality, and stunning design to embedded products
State of the industry
Why Storyboard & NXP?
Scalability

Software Renderer

2D Optimized

QSPI

G2D

Hardware Layers

Multi-Core

Wayland

OpenGL

3D GPU
Multimedia
Demo Image

» www.cranksoftware.com/demo_image
Why is Storyboard Different?
Product teams today
Serialized workflow that leads to product delays or shipping with suboptimal UI
Parallel workflow streamlines work between roles

- Design Iteration
- Development
How does Storyboard help?
The designer’s assets are pulled directly into Storyboard and ready to apply movement and behavior.
3D For Embedded

- Fully accelerated OpenGL ES graphics pipeline
- Combine and animate 3D models within 2D UI elements
- Built in 3D screen transitions
- Support for custom shaders
● Screen record for easy animation creation
● Custom rate editor to allow designers full control
● Frame by frame playback to make sure the sublity of the animation is not lost
Design Iteration

Photoshop Import

Photoshop Re-Import
Demo
MAKING IT ALL EASY
How to learn more

Try a 30-day evaluation of Storyboard
» www.cranksoftware.com/storyboard_suite_eval

Download Storyboard Demo Images
» www.cranksoftware.com/demo_image

Crank Software YouTube channel
» www.youtube.com/cranksoftware
Enablement: i.MX 8MQuad Evaluation Kit (EVK)

Part Number: MCIMX8M-EVK

Overview
- NXP i.MX 8MQuad Application Processor
  - 4 x Cortex-A53 @ 1.5GHz
  - 1x Cortex-M4 @ 266MHz
- i.MX 8MDual and 8MQuadLite emulation

Power Management
- NXP PF4210 PMIC

Memory
- 4 GB LPDDR4 memory, x32
- 16 GB eMMC 5.0
- 32 MB SPI Flash
- MicroSD connector

Display / Camera Connectors
- HDMI 2.0a Type-A connector
- mini-SAS MIPI-DSI connectors
- Camera MIPI-CSI through mini-SAS connector

Wireless
- WiFi 802.11 a/b/g/n/ac MIMO 2x2
- BlueTooth 4.1 / EDR
- Onboard chip antenna

Audio
- Audio DAC 24-bit 192kHz Stereo
- headphone 3.5mm jack
- Audio Interfaces board expansion connector

Connectivity
- 10/100/1000 Ethernet port
- USB 3.0 Type C connector
- USB 3.0 Type A connector
- PCIe M.2 Interface

Debug
- JTAG connector
- Serial to USB connector

OS Support
- Linux, Android and FreeRTOS
- BSPs from NXP
- Others: 3rd parties

Tools Support
- Lauterbach
- ARM (DS-5)

Accessories
- MINISASTOCSI
- MX8-DSI-OLED1
- IMX-MIPI-HDMI
i.MX 8M Evaluation Kit Accessory Boards

Evaluation Kit
i.MX 8M Applications Processor
MCIMX8M-EVK

MIPI to HDMI
miniSAS Convertor
IMX-MIPI-HDMI

MIPI miniSAS
OLED Display
MX8-DSI-OLED1

OV5640 MIPI CSI board
miniSAS based
MINISASTOCSI

Available to order: www.nxp.com/imx8mquadevk
i.MX 8M – More Information

www.nxp.com/imx8m

Product Summary:
- Fact Sheet

Product Documentation:
- Datasheet
- Reference Manual
- Errata

Application Note:
- Power Consumption
- Product Life Time

community.nxp.com

NXP i.MX Community

www.nxp.com/imx8mquadevk

Evaluation Kit Summary:
- EVK Fact Sheet

EVK Documentation:
- Quick Start Guide
- EVK Hardware User’s Guide

Hardware Design:
- Hardware Developer’s Guide
- EVK Design Files
- BSDL Files
- IBIS Model

System on a Module
- Partners SOMs

Board Support Package:
- Software and Development Tools
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