ISD9160

Accountability
Innovation
Teamwork

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ISD9160 Applications

➢ High resolution audio ADC with wide range ALC, the ISD9160 is ideal for many consumer and industrial applications

Human Machine Interface

Voice Recognition, Lighting control, Home appliance, Automotive, Control Panel (Capacitive sensing + audio)
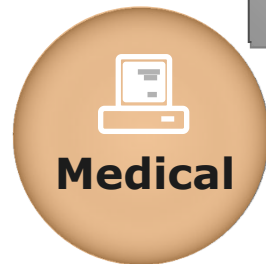
Industrial

Audio Monitor

Wireless Audio

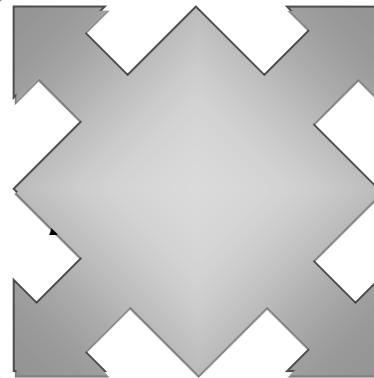**Audio Baby/ Elderly/ Disabled monitor, Walky-Talky**

Medical Aids

Talking **Glucose meter, Oxi-meter, AED, Blood pressure, Stethoscope**

Medical

Security

Home Security

Burglary/Glass breaking detection

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ISD9160 Audio SoC

➢ What is it
 – Cortex M0 based audio processor running up to 50MHz, can be served as general purpose controller, optimized for low BOM cost and low power audio applications

➢ Benefits
 – Best-in-class voice/audio quality, Σ-Δ ADC 92dB SNR, 1-Watt DPWM, ALC, Gain boost
 – Cost Effective
   • Highly integrated system that minimizes external components
   • eBOM saving: X'tal, DC-DC, audio PA, LDO_OUT, Capacitive sensor controller
 – Design Flexibility and Ease of Use
   • Support Keil^{TM} MDK C-language, no learning curve

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ISD9160 Advantages

Cost Effective

Minimized external components for eBOM saving: X'tal, DC-DC, audio PA, LDO_OUT, Cap sensor ctrl

ISD9160

Best Quality

Record/playback, Σ-Δ ADC >90dB, 1-Watt DPWM, ALC, Gain boost, Deep power-down

Easy of Use

Support C program, using existing Keil MDK -- no learning curve
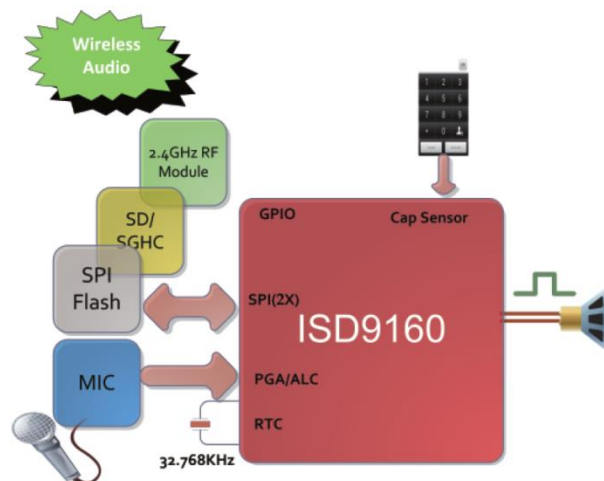
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Smart TV Remote Control

- **Application Requirement**
  - Voice Activation/Recognition
  - Skype, Air Mouse
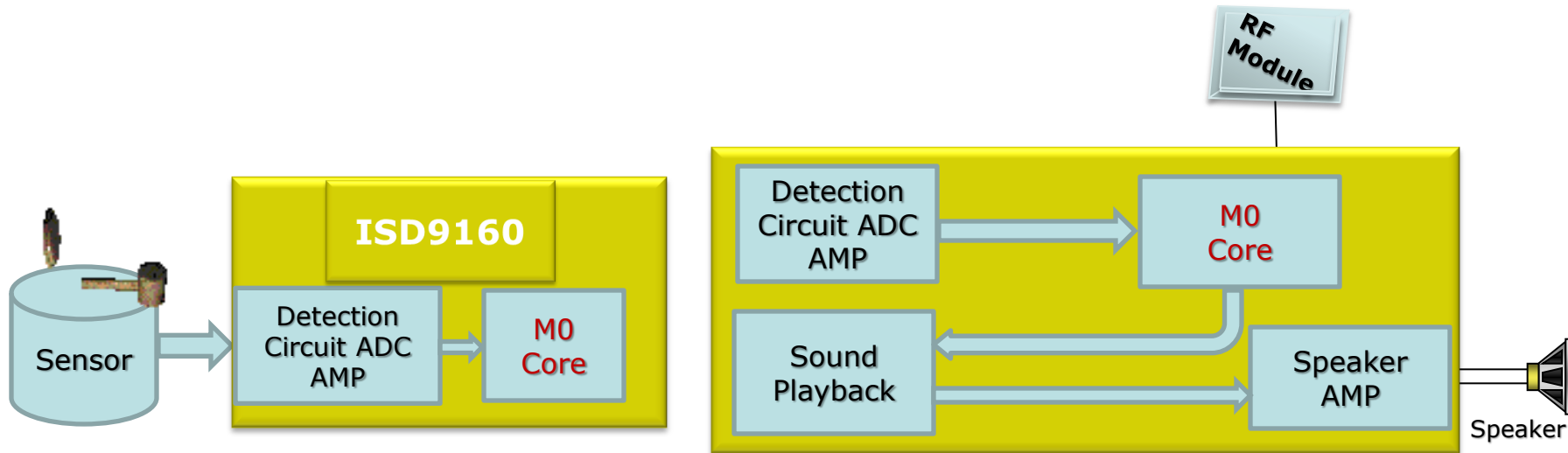 - Low power consumption
  - Competitive BOM cost

- **Why ISD9160**
  - Excellent quality ADC (92dB SNR) microphone input for taking voice commands
  - Less than 1uA Deep Power Down mode
  - ARM Cortex-M0 and Audio in single Chip with integrated 1 watt PWM speaker driver, 24 GPIO, Capacitive Touch Inputs
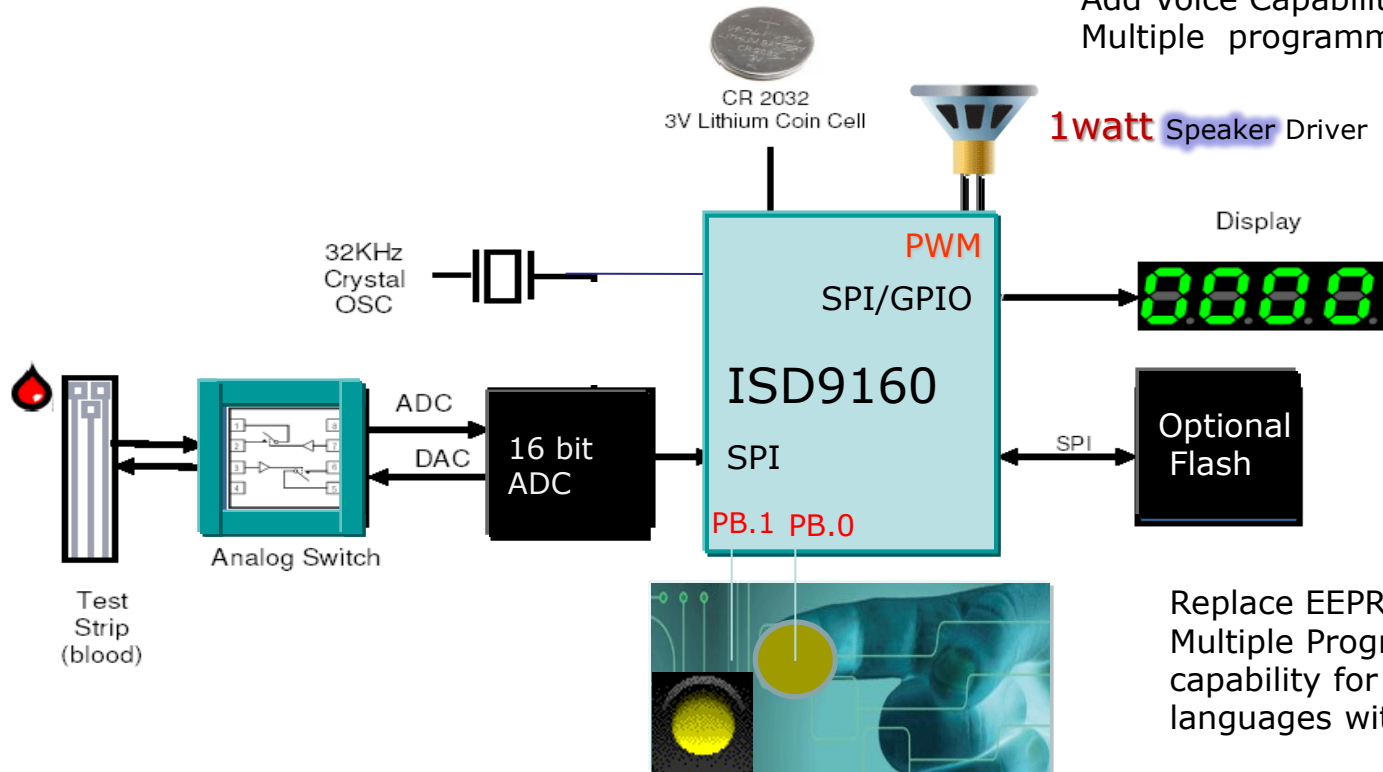

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Home Security - Burglary/Glass Breaking Detection with Audio Feedback

RF Module

ISD9160

Sensor → Detection Circuit ADC AMP → M0 Core

Detection Circuit ADC AMP → M0 Core

Sound Playback → Speaker AMP → Speaker

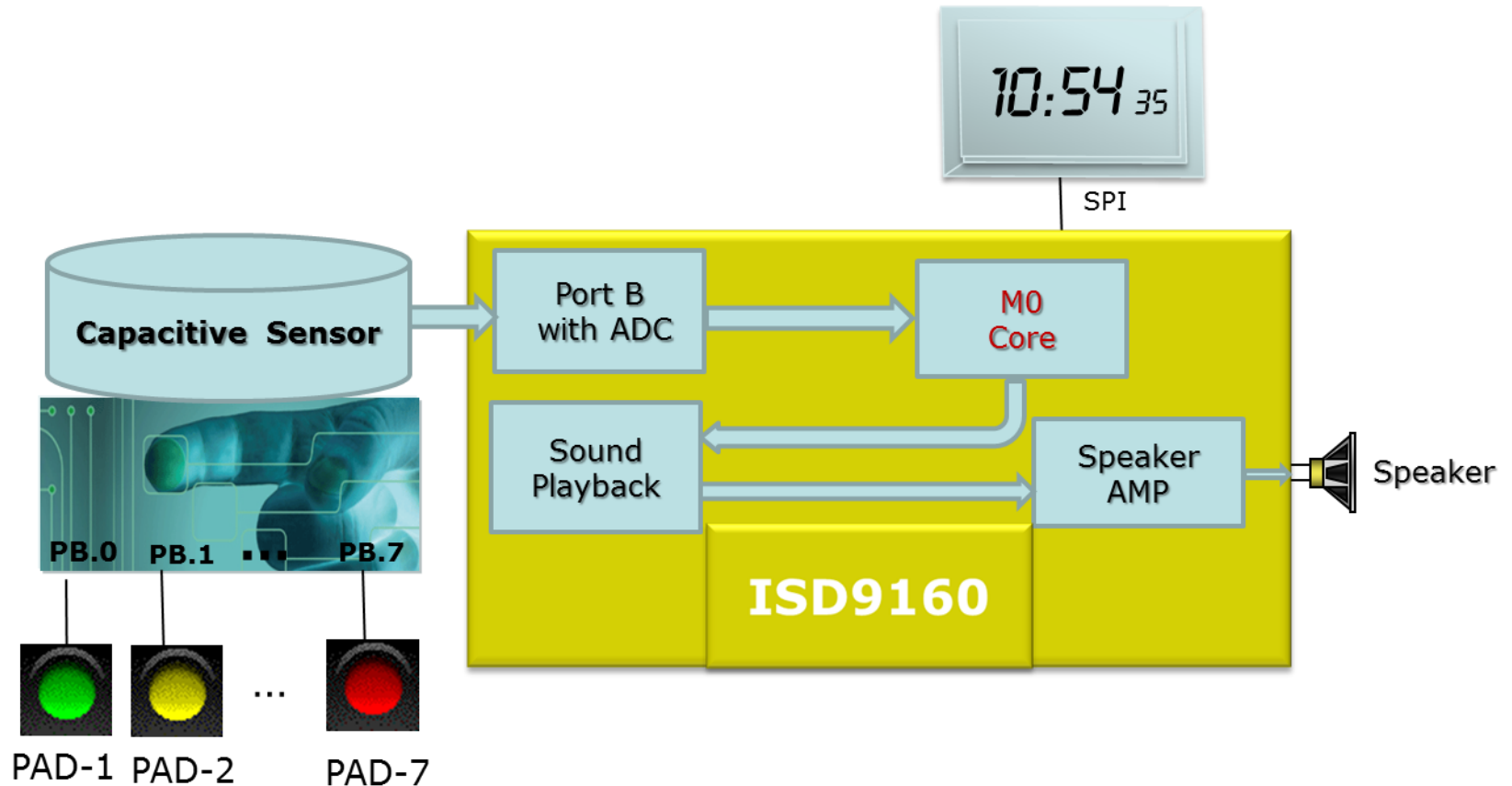➢ Home security - Burglary/glass breaking detection: MIC and high quality ADC together with algorithm for detection

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Talking Glucose Meter with Capacitive Touch Sensing

Add Voice Capability with ISD9160
Multiple programming Device

CR 2032
3V Lithium Coin Cell

1watt Speaker Driver

32KHz
Crystal
OSC

PWM

SPI/GPIO

ISD9160

SPI

PB.1 PB.0

ADC

DAC

16 bit
ADC

Analog Switch

Test
Strip
(blood)

Display

Optional
Flash

SPI

Replace EEPROM and add
Multiple Programming
capability for different
languages with ISD9160

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Control Panel - Capacitive Touch Sensing with Audio Feedback

10:54 35

SPI

Capacitive Sensor

Port B with ADC

M0 Core

Sound Playback

Speaker AMP

Speaker

ISD9160

PB.0   PB.1   ...   PB.7

...

PAD-1   PAD-2   PAD-7

- Applications:
  - Panel controller with capacitive touch buttons
  - Home appliances

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Wireless Audio

- Built-in ALC, Gain boost, CRC-16, S/W PLL: Ideally fit for wireless audio transmission
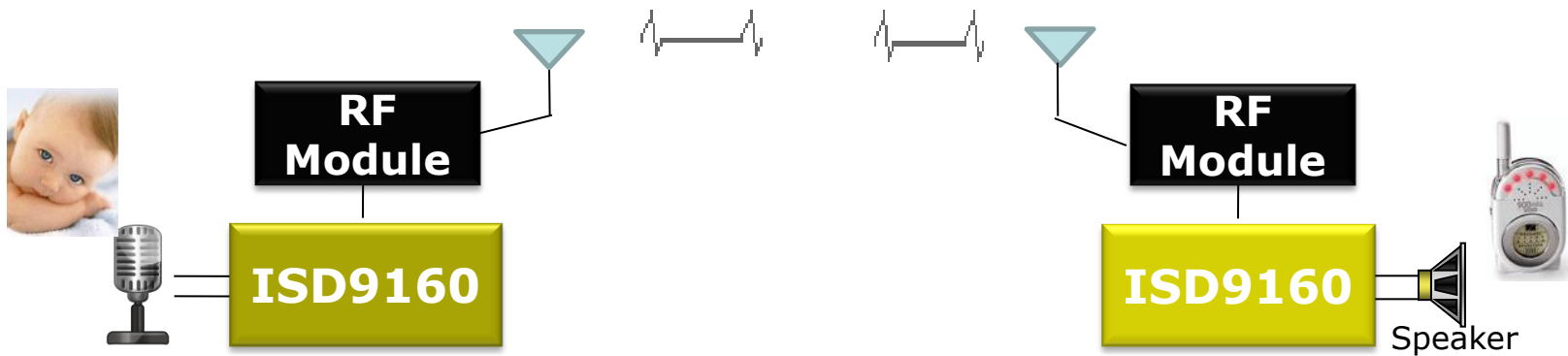
- Applications:
  - Baby/Elderly/Disable monitor
  - Wireless microphone
  - Wireless speaker
  - Walky-Talky

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HMI - Voice Recognition

- Voice Recognition can be applied to many applications to simplify the HMI

- Applications:
  - Lighting control: Lights on, Dimmer, Brighter, Lights off
  - Home Appliances: Coffee machine "Espresso", "Cappuccino", "Latte"
  - Remote controllers:
    - Channels surfing: Discovery, ESPN, CNN, NHK, …
    - Webs surfing: Google, Yahoo, YouTube, …

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HMI - Voice Recognition

- Speaker-independent Phoneme-based Recognition
- **> 95% accuracy** @ Adapted Language Model
- **Noise Suppression** to Adapt Environment Situation
- Adaptive **False Trigger Elimination**
- Flexible Dynamic Range up to **5-meter**
- Multiple languages supported
  - English, Italian, French, German, Spanish, Portuguese, Russian, Japanese, Chinese – **no NRE** but royalty %
- Easy of use - no learning curve @ Voice Sensor SDK
- Benefits:
  - **> 95%** Accuracy @ 10 Command Sets
  - **< 100msec** Fast Responding Time
  - Less than **6KByte** RAM
  - Low Power Consumption
  - Windows UI SDK
  - **Free of NRE** for Available Languages

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ISD9160 Voice Sensor SDK

ISD9160 installation package contents

➢Documents:
  ➢In addition to datasheet and design guide, there are also user guides of peripheral drivers & libraries, and sample code reference manuals of drivers and libraries.

➢Nuvoton Platform:
  ➢Sample codes of peripheral drivers and libraries.

➢Libraries:
  ➢SpiFlash and Siren7 Enc/Dec
  ➢ADPCM library
  ➢Record & Playback
  ➢Libraries of capacitive sensing
  ➢SD Card and FAT
  ➢VPE9160

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ISD9160 Software Tools

Software	Function
Nu-link ICP Tool	In circuit programming via the new link interface
ISD9160 VPE	Voice prompt editor
Keil™ MDK	Code development

ICP tool with capability of programming the external serial flash. The tool checks flash JEDEC ID and gives a warning message if file is oversized

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Software Tools

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ISD9160 Tools

	IS9160
ISD-ES9160	**ISD9160 Evaluation board with USB interface**
ISD-DEMO9160	**ISD9160 Demo board use with Nu-Link USB dongle**
ISD-ES_ICP	**USB dongle for ISD-DEMO9160**

Low Cost USB Programmer Kit

ISD-DEMO9160

ISD-ES_ICP

Demonstration board. Connects directly to the ISD-ES_ICP_USB programmer for custom programming of on board ISD9160 IC. The Demo Contains all necessary signals to be used as prototype board in customer's application Sytem..

The ISD-ES9160_USB is a complete evaluation system for custom programming on board IC

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