CEC Continuing Education Center

DesignNews

How to Select the Right Microcontrollers for an Application

DAY 4 : Microcontroller Selection Use Cases

Sponsored by

Digi-Key ELECTRONICS

BENINGO EMBEDDED GROUP

informa markets

Webinar Logistics

- Turn on your system sound to hear the streaming presentation.
- If you have technical problems, click “Help” or submit a question asking for assistance.
- Participate in ‘Group Chat’ by maximizing the chat widget in your dock.
- Submit questions for the lecturer using the Q&A widget. They will follow-up after the lecture portion concludes.

Course Sessions

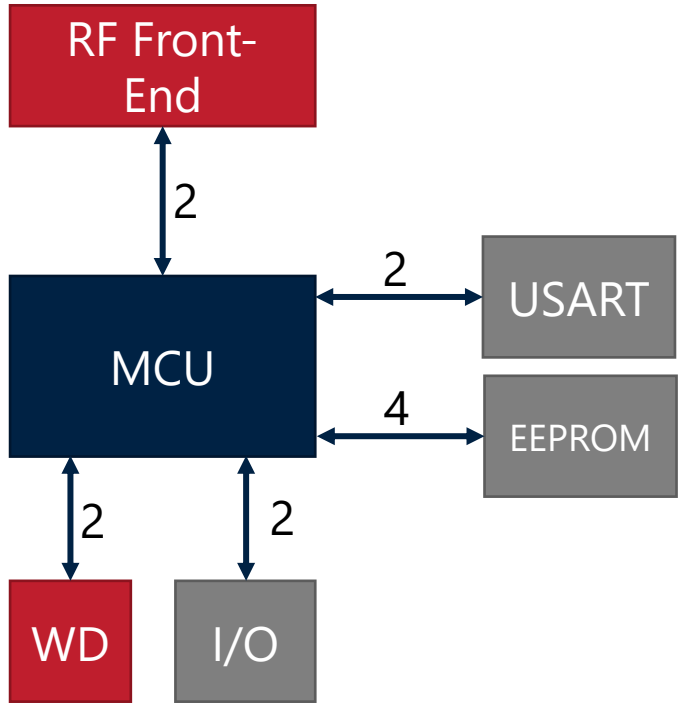
- The Microcontroller Industry Today
- MCU Selection Criteria
- The Modern MCU Selection Process
- **Microcontroller Selection Use Cases**
- Microcontroller Selection Best Practices

1 Real-time Communication MCU Selection

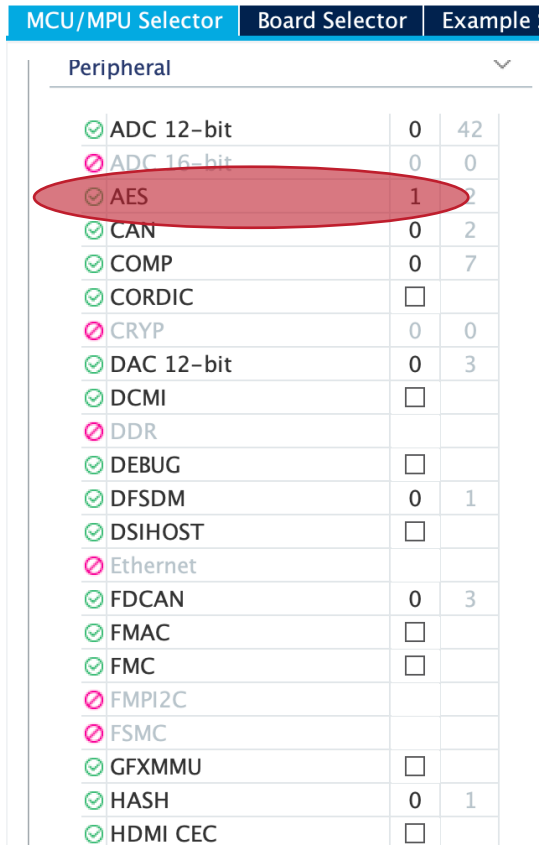
Example Project Requirements

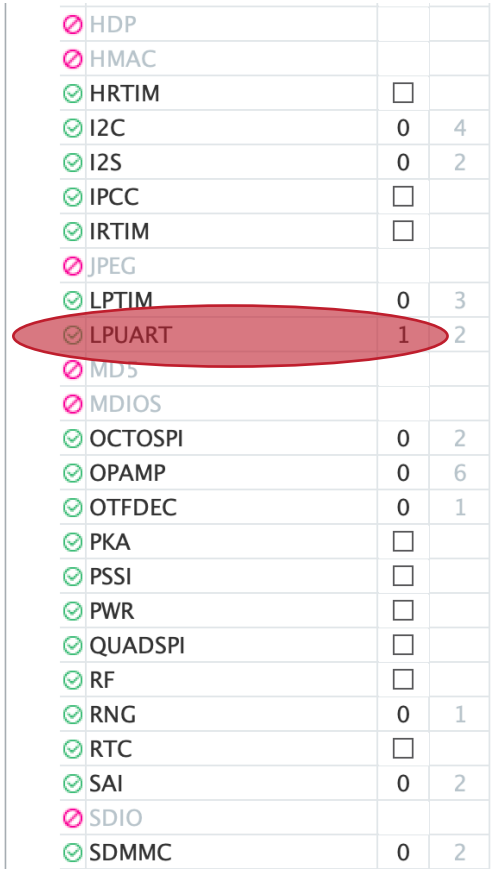
Key Requirements

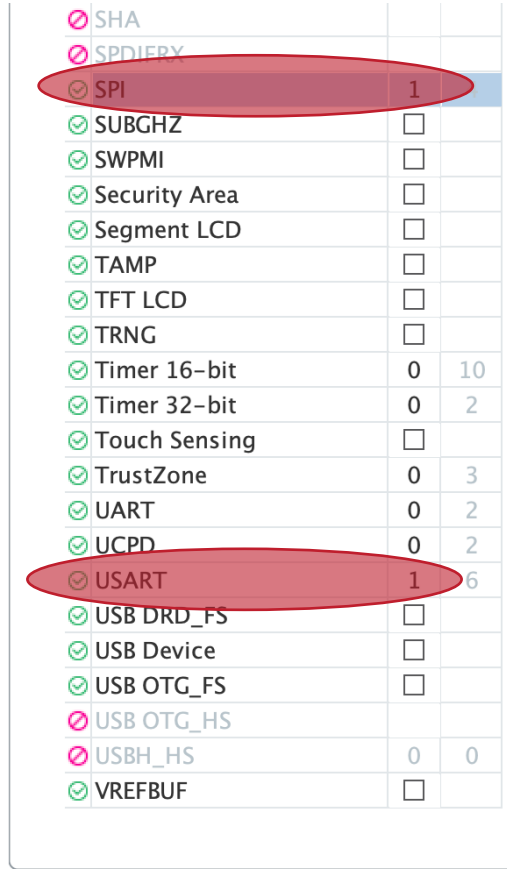
- Low Power
- Low Volume
- 12 I/O (minimum)
- Encryption
- Cost not a major concern



Options in STM32CubeMx







Options in STM32CubeMx

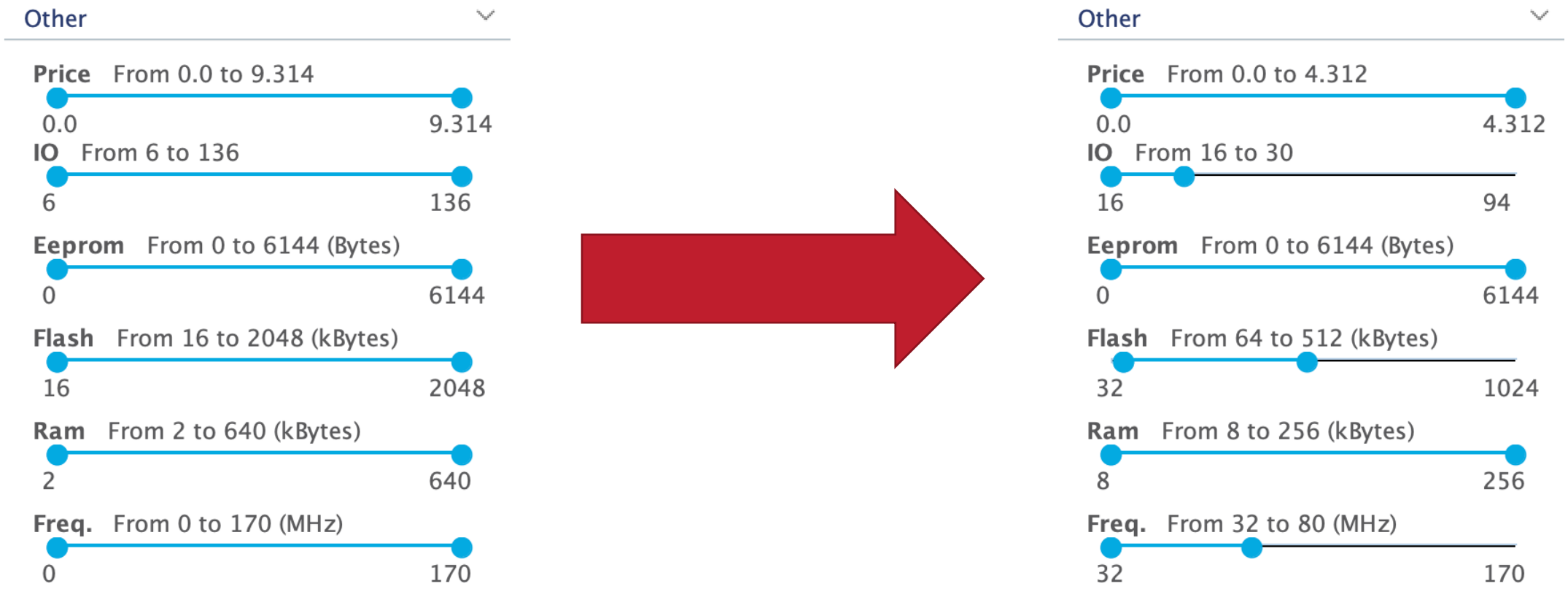
MCUs/MPUs List: 265 items

Display similar items

Export

*	Part No	Reference	Marketing St...	Unit Price for 10kU...	Board	Package	Flash	RAM	IO	Freq.
☆	STM32G041C6	STM32...	Active	1.26		LQFP48	32 kBytes	8 kBytes	44	64 MHz
☆		STM32...	NA	NA		UFQFPN...	32 kBytes	8 kBytes	44	64 MHz
☆	STM32G041C8	STM32...	Active	1.293		LQFP48	64 kBytes	8 kBytes	44	64 MHz
☆		STM32...	Active	1.293		UFQFPN...	64 kBytes	8 kBytes	44	64 MHz
☆	STM32G041F6	STM32...	Active	1.036		TSSOP20	32 kBytes	8 kBytes	18	64 MHz
☆	STM32G041F8	STM32...	Active	1.09		TSSOP20	64 kBytes	8 kBytes	18	64 MHz
☆	STM32G041G6	STM32...	Active	1.08		UFQFPN...	32 kBytes	8 kBytes	26	64 MHz
☆	STM32G041G8	STM32...	Active	1.137		UFQFPN...	64 kBytes	8 kBytes	26	64 MHz
☆	STM32G041J6	STM32...	Active	0.816		SO8N	32 kBytes	8 kBytes	6	64 MHz
☆	STM32G041K6	STM32...	Active	1.124		LQFP32	32 kBytes	8 kBytes	30	64 MHz
☆		STM32...	NA	NA		UFQFPN...	32 kBytes	8 kBytes	30	64 MHz

Options in STM32CubeMx



Options in STM32CubeMx

MCUs/MPUs List: 51 items Display similar items Export

*	Part No	Reference	Marketing St...	Unit Price for 10kU...	Board	Package	Flash	RAM	IO	Freq.
☆	STM32G041F8	STM32...	Active	1.09		TSSOP20	64 kBytes	8 kBytes	18	64 MHz
☆	STM32G041G8	STM32...	Active	1.137		UFQFPN...	64 kBytes	8 kBytes	26	64 MHz
☆	STM32G041K8	STM32...	Active	1.152		LQFP32	64 kBytes	8 kBytes	30	64 MHz
☆		STM32...	Active	1.152		UFQFPN...	64 kBytes	8 kBytes	30	64 MHz
☆	STM32G041Y8	STM32...	Active	1.09		WLCSP18	64 kBytes	8 kBytes	16	64 MHz
☆	STM32G061F8	STM32...	Active	1.148		TSSOP20	64 kBytes	18 kBytes	18	64 MHz
☆		STM32...	Active	1.148		WLCSP20	64 kBytes	18 kBytes	18	64 MHz
☆	STM32G061G8	STM32...	Active	1.176		UFQFPN...	64 kBytes	18 kBytes	26	64 MHz
☆	STM32G061K8	STM32...	Active	1.204		LQFP32	64 kBytes	18 kBytes	30	64 MHz
☆		STM32...	Active	1.204		UFQFPN...	64 kBytes	18 kBytes	30	64 MHz
☆	STM32G081EB	STM32...	Active	1.621		WLCSP25	128 kByt...	36 kBytes	23	64 MHz
☆	STM32G081GB	STM32...	Active	1.605		UFQFPN...	128 kByt...	36 kBytes	26	64 MHz
☆		STM32...	NA	NA		UFQFPN...	128 kByt...	36 kBytes	26	64 MHz
☆	STM32G081KB	STM32...	Active	1.621		LQFP32	128 kByt...	36 kBytes	30	64 MHz
☆		STM32...	NA	NA		LQFP32	128 kByt...	36 kBytes	30	64 MHz
☆		STM32...	Active	1.621		UFQFPN...	128 kByt...	36 kBytes	30	64 MHz
☆		STM32...	NA	NA		UFQFPN...	128 kByt...	36 kBytes	30	64 MHz

Cross Check

Mfr Part #	Quantity Available	Price	Series	Package	Product Status	Core Processor	Core Size	Speed	Connectivity	Peripherals	Number of I/O	Program Memory Size
 **STM32G031F8P6** IC MCU 32BIT 64KB FLASH 20TSSOP *STMicroelectronics*	30 In Stock	1 : $3.54000 Tube	STM32G0	Tube	Active	ARM® Cortex®-M0+	32-Bit Single-Core	64MHz	I²C, IrDA, LINbus, SPI, UART/USART	Brown-out Detect/Reset, DMA, I²S, POR, PWM, WDT	18	64KB (64K x 8)
 **STM32G041J6M6** IC MCU 32BIT 32KB FLASH 8SO *STMicroelectronics*	30 In Stock	1 : $3.04000 Tube	STM32G0	Tube	Active	ARM® Cortex®-M0+	32-Bit Single-Core	64MHz	I²C, IrDA, LINbus, SPI, UART/USART	Brown-out Detect/Reset, DMA, I²S, POR, PWM, WDT	6	32KB (32K x 8)
 **STM32G031J6M6** IC MCU 32BIT 32KB FLASH 8SO *STMicroelectronics*	100 In Stock	1 : $2.52000 Tube	STM32G0	Tube	Active	ARM® Cortex®-M0+	32-Bit Single-Core	64MHz	I²C, IrDA, LINbus, SPI, UART/USART	Brown-out Detect/Reset, DMA, I²S, POR, PWM, WDT	6	32KB (32K x 8)
Photo Not Available **STM32G050K8T6** MAINSTREAM VALUE LINE, ARM CORTE *STMicroelectronics*	10 In Stock	1 : $2.69000 Tray	STM32G0	Tray	Active	ARM® Cortex®-M0+	32-Bit Single-Core	64MHz	I²C, IrDA, LINbus, SPI, UART/USART	Brown-out Detect/Reset, DMA, I²S, POR, PWM, WDT	-	64KB (64K x 8)
 **STM32G0B1CEU6** MAINSTREAM ARM CORTEX-M0+ 32-BIT *STMicroelectronics*	10 In Stock	1 : $7.18000 Tray	STM32G0	Tray	Active	ARM® Cortex®-M0+	32-Bit Single-Core	64MHz	CANbus, HDMI-CEC, I²C, IrDA, LINbus, SPI, UART/USART, USB	Brown-out Detect/Reset, DMA, I²S, POR, PWM, WDT	42	512KB (512K x 8)

What is the most challenging part of MCU selection?

- Cost
- Availability
- Peripheral set
- Memory options
- Other

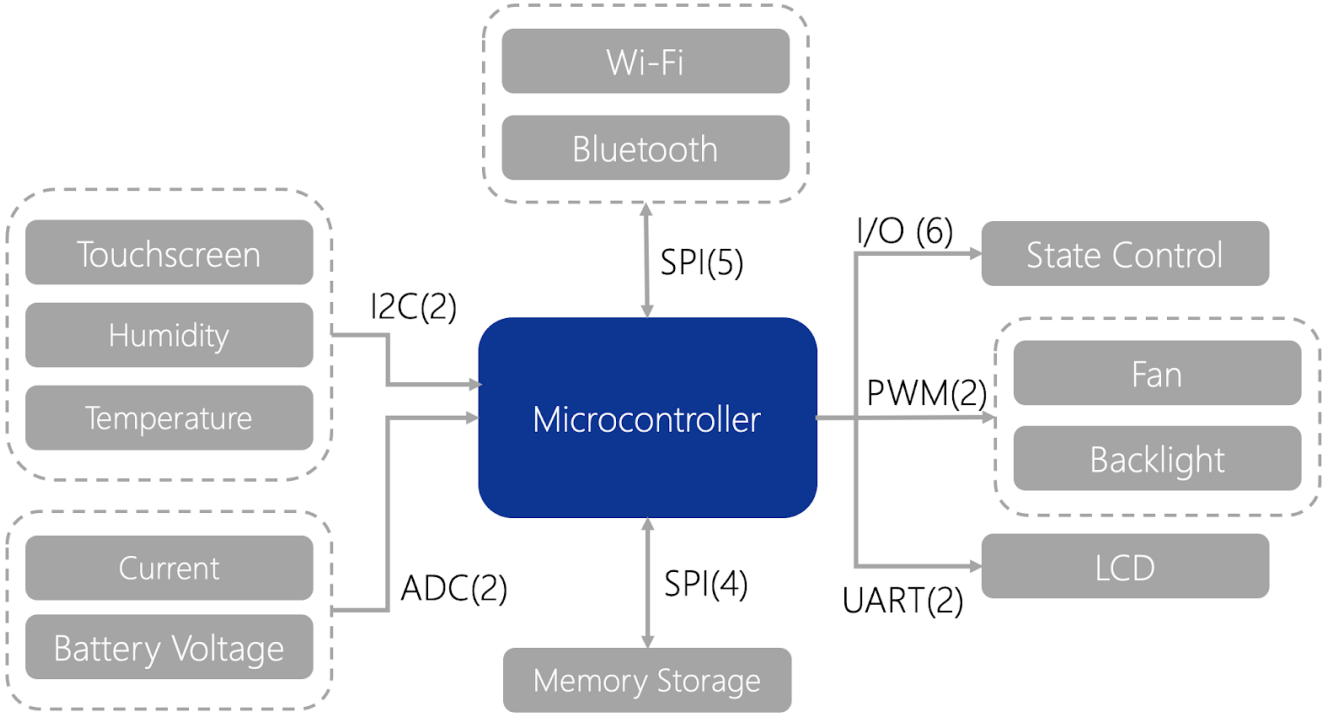
2

IoT Sensor Node MCU Selection

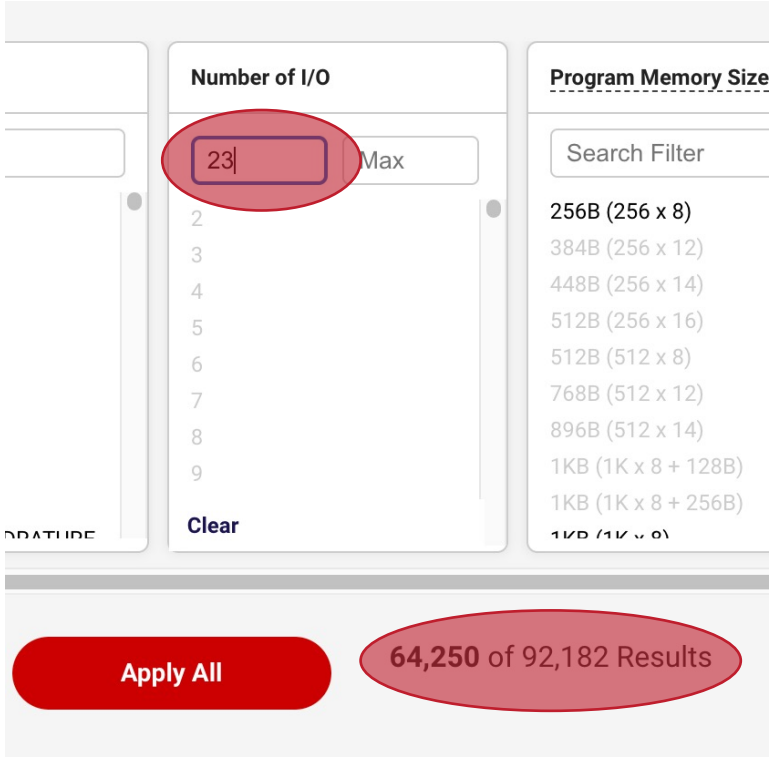
Example Project Requirements

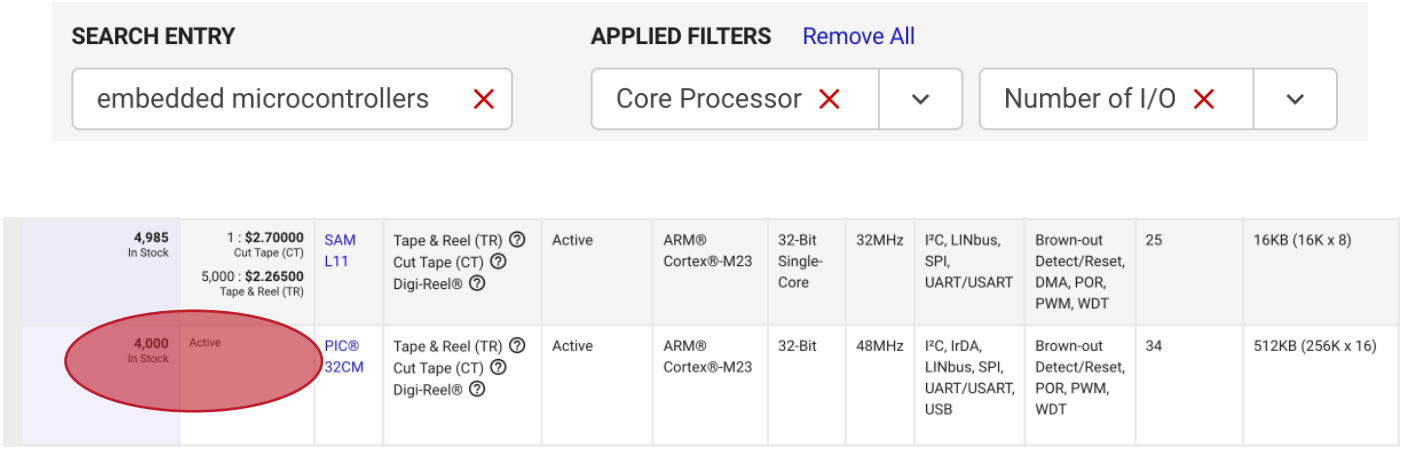
Key Requirements

- Low Power
- High volume
- 23 I/O (minimum)
- Off loaded connectivity stack
- Cost constrained



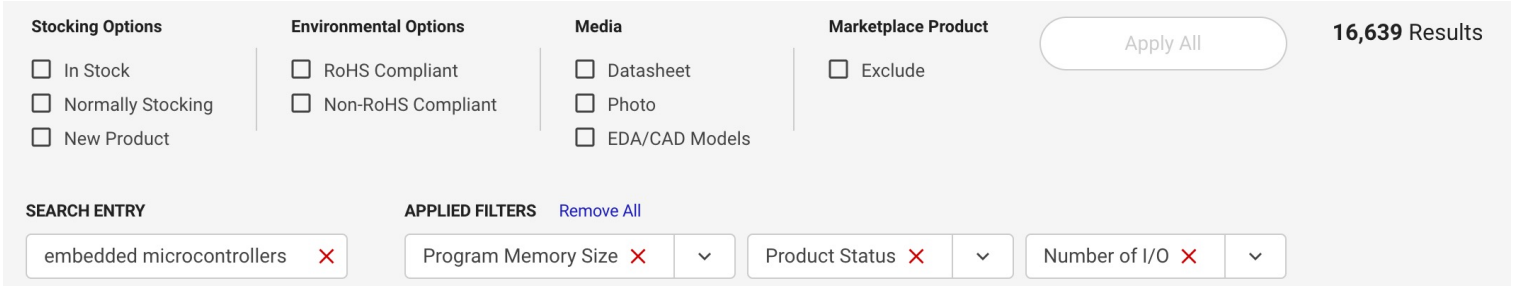
Preliminary Search





Availability and Memory Size Issues

Continue Research



24,956 Marketplace	97 : $3.12000 Bulk	SAM G51	Bulk	Active	ARM® Cortex®-M4	32-Bit Single-Core	48MHz
22,175 Marketplace	26 : $11.86000 Bulk	MCF5222x	Bulk	Active	Coldfire V2	32-Bit Single-Core	80MHz

7,460 Marketplace	53 : $5.67000 Bulk	SAM4L	Bulk	Active	ARM® Cortex®-M4	32-Bit Single-Core	48MHz
7,328 Marketplace	28 : $11.04000 Bulk	R8C/Lx/38B	Bulk	Active	R8C	16-Bit	20MHz
7,282 In Stock	1 : $7.10000 Tray	PIC® XLP™ 24F	Tray	Active	PIC	16-Bit	32MHz

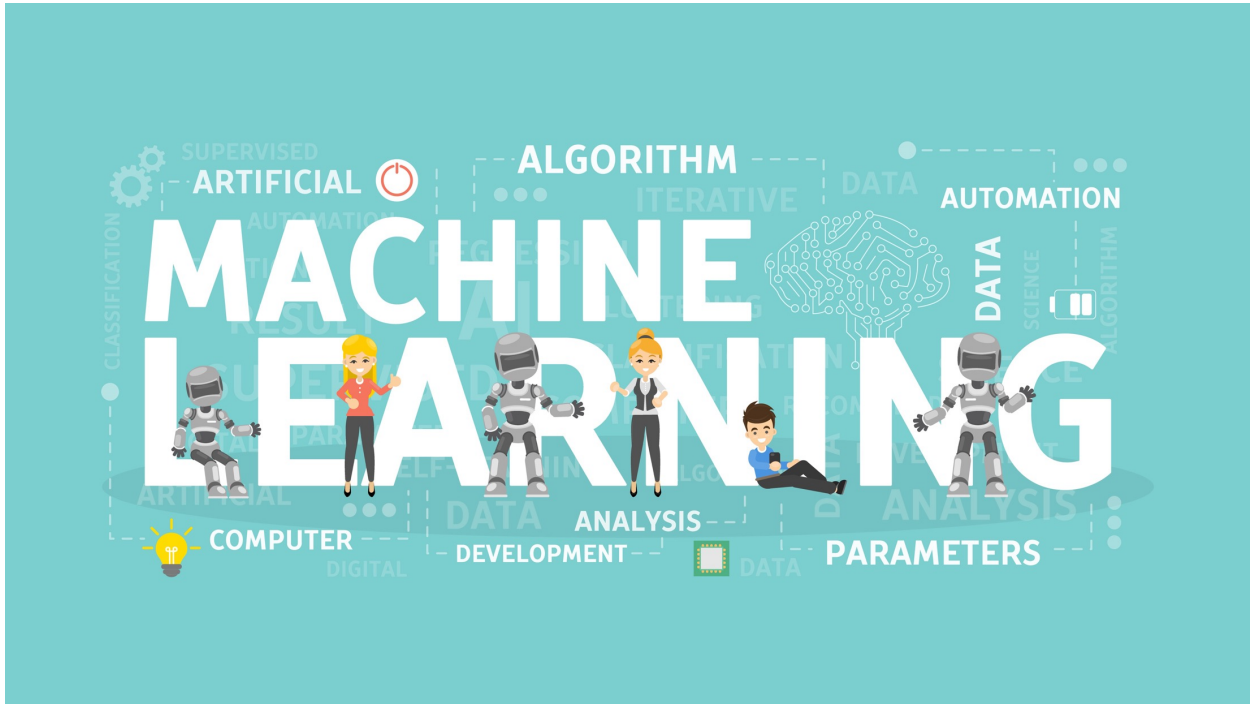
3

Machine Learning Device Microcontroller Selection

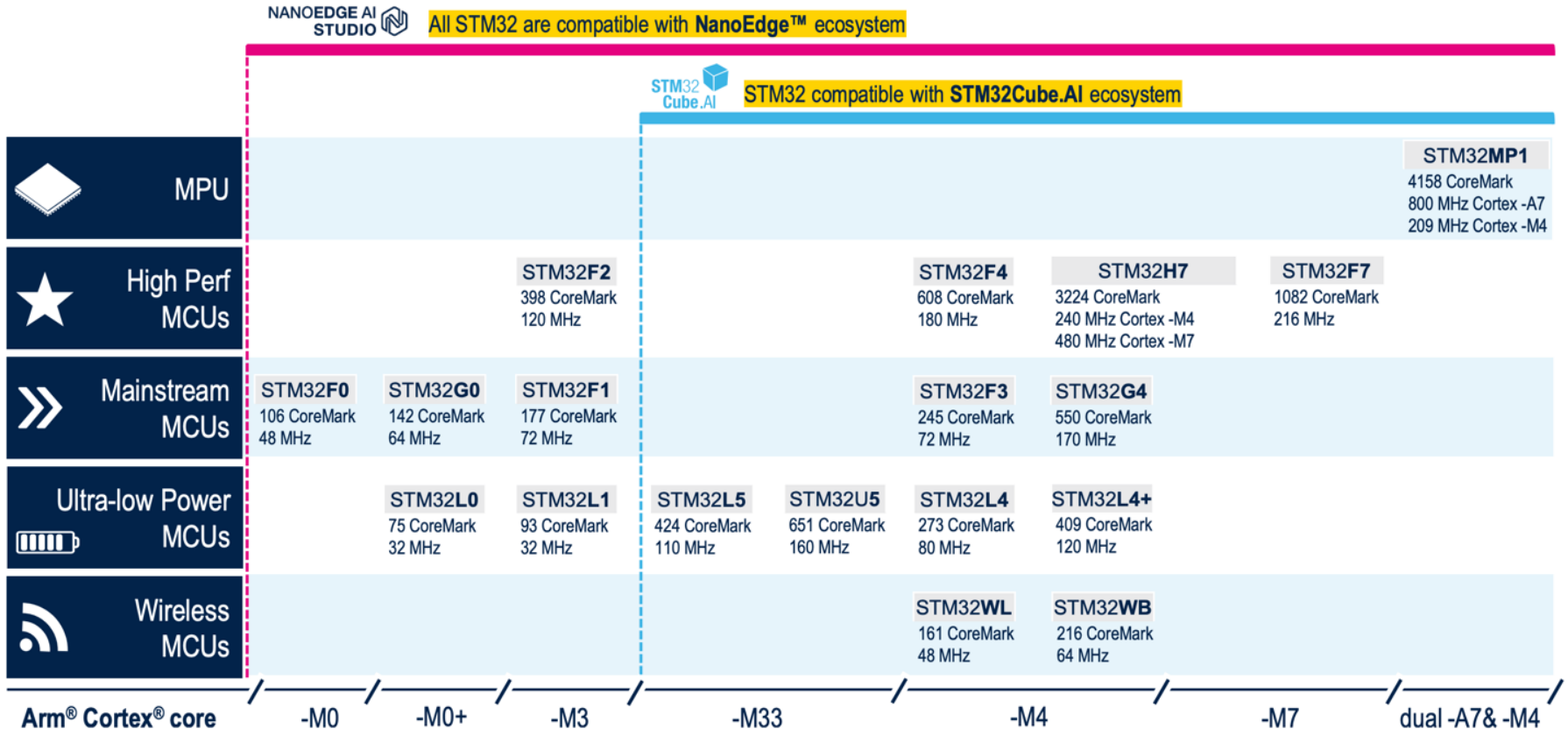
Example Project Requirements

Key Requirements

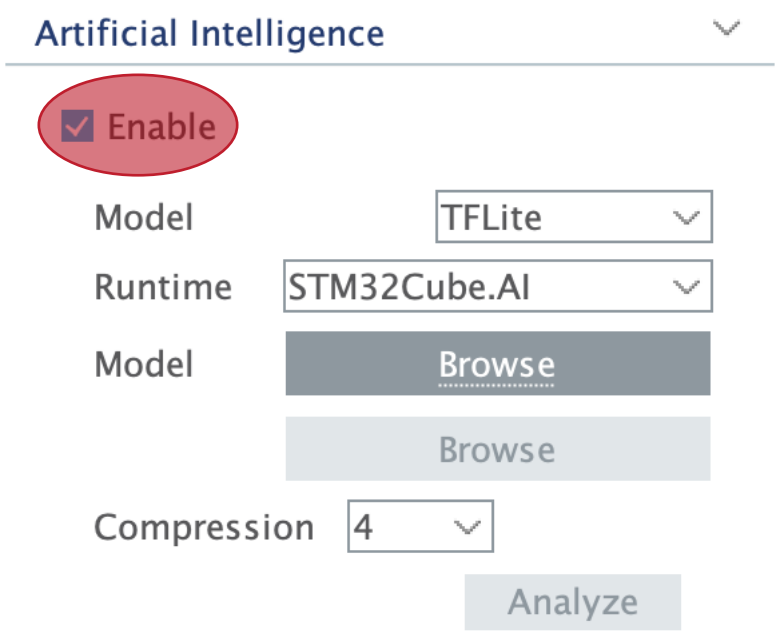
- Mid Power
- Low volume
- 30 I/O (minimum)
- Must run gesture recognition
- Cost not a concern

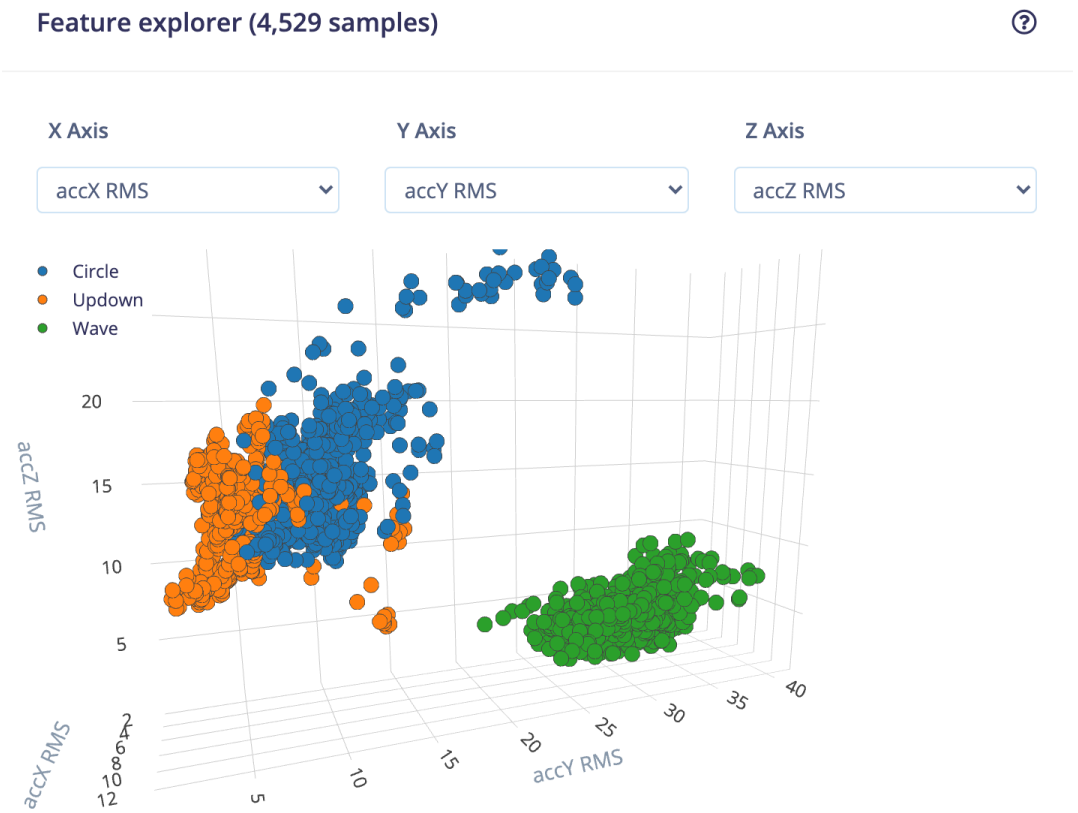


Examine the Marketing Materials



STM32CubeMX MCU Selector





Identifying Potential Parts

MCUs/MPUs List: 166 items Display similar items Export

*	Part No	Reference	Marketing Status	Unit Price for 10kU (US$)	Board	Package	Flash	RAM	IO	Freq.
☆	STM32H723VE	STM32H723VE...	Active	5.429		TFBGA100	512 kBytes	564 kBytes	82	550 MHz
☆		STM32H723VETx	Active	5.429		LQFP100	512 kBytes	564 kBytes	82	550 MHz
☆	STM32H723VG	STM32H723VG...	Active	5.815		TFBGA100	1024 kBytes	564 kBytes	82	550 MHz
☆		STM32H723VG...	Active	5.815		LQFP100	1024 kBytes	564 kBytes	82	550 MHz
☆	STM32H723ZE	STM32H723ZEIx	Active	5.815		UFBGA144	512 kBytes	564 kBytes	114	550 MHz
☆		STM32H723ZETx	Active	5.815		LQFP144	512 kBytes	564 kBytes	114	550 MHz
☆	STM32H723ZG	STM32H723ZGIx	Active	6.201		UFBGA144	1024 kBytes	564 kBytes	114	550 MHz
☆		STM32H723ZG...	Active	6.201	NUCLEO-H723ZG	LQFP144	1024 kBytes	564 kBytes	114	550 MHz
☆	STM32H725AE	STM32H725AEIx	Active	6.124		UFBGA169	512 kBytes	564 kBytes	125	550 MHz
☆	STM32H725AG	STM32H725AGIx	Active	6.511		UFBGA169	1024 kBytes	564 kBytes	125	550 MHz
☆	STM32H725IE	STM32H725IEKx	Active	6.33		UFBGA176	512 kBytes	564 kBytes	132	550 MHz
☆		STM32H725IETx	Active	6.33		LQFP176	512 kBytes	564 kBytes	121	550 MHz
☆	STM32H725IG	STM32H725IGKx	Active	6.717		UFBGA176	1024 kBytes	564 kBytes	132	550 MHz
☆		STM32H725IGTx	Active	6.717		LQFP176	1024 kBytes	564 kBytes	121	550 MHz
☆	STM32H725RE	STM32H725REVx	Active	5.326		VFQFPN68	512 kBytes	564 kBytes	46	550 MHz
☆	STM32H725RG	STM32H725RG...	Active	5.712		VFQFPN68	1024 kBytes	564 kBytes	46	550 MHz
☆	STM32H725VE	STM32H725VE...	Active	5.429		TFBGA100	512 kBytes	564 kBytes	77	550 MHz
☆		STM32H725VETx	Active	5.429		LQFP100	512 kBytes	564 kBytes	69	550 MHz
☆	STM32H725VG	STM32H725VG...	Active	5.558		TFBGA100	1024 kBytes	564 kBytes	77	550 MHz
☆		STM32H725VG...	Active	5.558		LQFP100	1024 kBytes	564 kBytes	69	550 MHz
☆		STM32H725VG...	Active	5.558		WLCSP115	1024 kBytes	564 kBytes	67	550 MHz
☆	STM32H725ZE	STM32H725ZETx	Active	5.944		LQFP144	512 kBytes	564 kBytes	99	550 MHz
☆	STM32H725ZG	STM32H725ZG...	Active	6.459		LQFP144	1024 kBytes	564 kBytes	99	550 MHz

What tools do you use to find microcontrollers?
- Digikey Website
- Vendor Tools
- Google Search
- Other

4 Going Further

Thank you for attending

Please consider the resources below:

- www.beningo.com
  - Blog, White Papers, Courses
  - Embedded Bytes Newsletter
    - http://bit.ly/1BAHYXm
  - Embedded Software Design
    - https://bit.ly/3PZCtNO

From www.beningo.com under

- Blog > CEC – How to Select the Right Microcontroller for an Application

CEC Continuing Education Center

DesignNews

Thank You

Sponsored by

Digi-Key ELECTRONICS

BENINGO EMBEDDED GROUP

informa markets