



ATMega 2560 Microcontroller

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What is it



ATmega2560 is a microcontroller usually found on Arduino Mega 2560, which is in everyone's tool kit.

How does a microcontroller work?

A microcontroller is the brain of the device, much like a mini computer. A microcontroller, like any computer, has 2 types of memory storage:

Storage: long-term storage -> this memory can retain information without being connected to a power source.

RAM: temporary storage -> memory used while instructions are being executed. This memory is only maintained when connected to a power source.

It also has several supporting elements:

Analog to Digital Converter (ADC): as the name suggests, this circuit converts analog signals to digital signals. This enables the processor at the center of the chip to communicate with analog devices, like sensors

Digital to Analog Converter(DAC): the inverse of the DAC, this allows the processor to communicate digital inputs as outgoing analog signals.

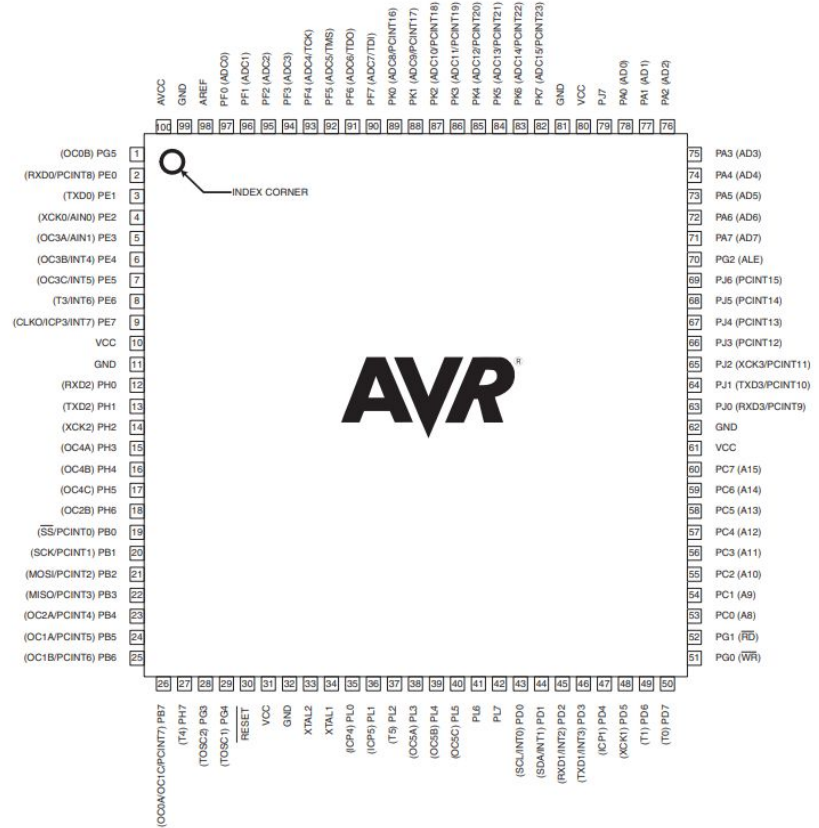
System Bus: A wire that connects all of the components together.

Serial Port: an I/O port that allows the microcontroller to communicate with external components. Like a USB port, if you will.

specs

- Memory size: 256kB
- Executes 16 million instructions per second
- Operates between 4.5V to 5.5V
- 86 GPIO lines
- 100 pinouts
- 16 channels 10-bit ADC converter
- Temperature range: -40°C to 85°C
- Data retention: 20 years at 85°C/ 100 years at 25°C

Figure 1-1. TQFP-pinout ATmega640/1280/2560



Memory

- 256 KB of self-programmable flash memory

 - 10,000 write/erase cycles

- 4 KB of EEPROM (electrically erasable programmable read-only memory)

 - 100,000 write/erase cycles

- 8 KB of SRAM

How does it Compare to other Microcontrollers

- ATMega line, ATMega 1280, ATMega 640
 - More flash memory, 256kb, versus 128kb and 64kb.
- Low power consumption
- 8-bit microcontroller, much simpler than 32-64 bit
 - Easier to use, can't be used for more complex projects
- Vs. Arduino Uno
 - More memory, more in/output pins, more memory, more expensive
- Vs. Raspberry Pi
 - Slower, less memory, cheaper, simpler to use

What Can We do With it?

It can be used to collect data through rudimentary sensors:

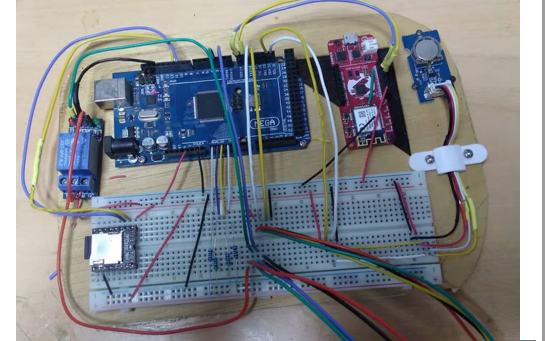
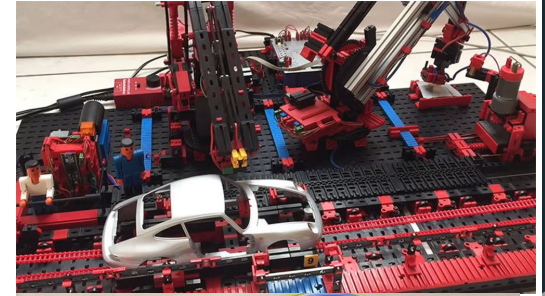
- Accelerometer
- Keypad
- Speakers
- Humidity, Pressure, and Altitude Sensor
- A real-time clock

With regards to our experiments:

- If your experiments do not require too much computing power, then it can be done with the ATmega 2560.
 - Something that'll crash the Arduino is storing every measurement taken into the ATmega 2560 chip without externally uploading it elsewhere. (Memory is 256 KB of Software Flash, 8 KB of RAM)

What things have other people done with it?

- Store instructions to display Pressure, Humidity and Altitude on LCD's.
- Pinball Machine: You could make money at a casino... (don't try this at home)
- Become the new version of Tesla... just Lego size
- Ensure that doctors avoid a lawsuit by helping them ensure the right medication and dosage are being filled in prescriptions
- Crash your Arduino



References

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