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
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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