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Microcontrollers

Microcontrollers are single chip computers that slow, have very little memory, but are cheap and very easy to interface to real world devices. They are present in most electronics these days, from microwave ovens to televisions. They are typically programmed in either C or assembly language, though for this workshop you will not need to program them. We have written a monitor program called [ez-mon](#) that allows the user to send commands from a PC to the microcontroller, either to control devices (lights, motors, etc.) or to read data from devices (temperature sensors, buttons, etc.)

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by some external device. For each digital input there is a bit in the microcontroller's memory that reflects its value.

Analog inputs are more flexible than digital inputs. They can be set to any voltage between 0 and 5 volts by some external device. Typically, an analog input has a byte in the microcontroller's memory that reflects its voltage - 0 volts maps to 0, 2.5 volts maps to 128, and 5 volts maps to 255 (since 255 is the maximum value a byte can take on.)

In this workshop we use the Motorola 6811 microcontroller. The 6811's I/O pins are divided into groups of eight, called ports. There are three ports:

- Port A (8 digital inputs/outputs)
- Port B (8 digital inputs/outputs)
- Port C (8 analog inputs)

Each port has a corresponding byte in the 6811's memory. The digital input and output pins are actually the same pins, and can be programmed to take on either role. Why does Port C correspond to eight bytes instead of one? Because the 8 analog inputs are selectable - at any time, only one analog input can be read, and it is that analog input to which the Port C memory byte corresponds.

These ports can be accessed easily through [ez-mon](#).

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