Microcontroller Basics

UQMARS

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Microcontroller Developement Board options

- Arduino Family
  - Arduino Uno (ATmega328P)
  - Arduino Mega (ATmega2560)
  - Ardiono Nano (ATmega328P)
- Raspberry Pi Family
  - Raspberry Pi Model B
  - Raspberry Pi Zero
  - Raspberry Pi Pico
- Espressif Family
  - ESP8266 Development Boards
  - ESP32 Development Boards

ATmega328P - Can be used for courses such as ENGG1100
(I think it was banned for METR2800 and METR4810?? just the 328P though) STM32 - Used in CSSE3010, ENGG2800
???? (Any others you can think of?)

Basic Microcontroller Programming - Intro to the Arduino IDE

Pretty basic I think we can just provide some sort of resource they can look at in their own time

Simple Blink LED

Equivalent of Hello World! in the embedded world. Teaches how to output to certain PINS.

Button Input to turn on LED

Teaches students how to handle input.

PWM

PWM for things such as motors and SG90 servos.

Advanced Lessons

Wireless Communication

Wireless communication is essential for remotely operated devices/robotics. Although not required, you are usually encouraged to use wireless communication in the ENGG1100 and METR2800 group projects. Alternatively, many groups use a long USB cable to remotely operate their machine - yuck. After this tutorial you will hopefully gain the confidence to blah blah....

How to program Microcontroller with C

Header files

Microcontroller dependent headerfiles, need to emphasise importance of reading documentation properly as each microcontroller can have small variations.

Makefile

Having a makefile is crucial allowing us to use a cross-compiler to compile code onto chip. Documentation may provide a template makefile

Interrupt

Teaches students not to use busy waits as it can chew up a lot of processor cycles for no reason.