



# Science, Engineering, Craft... becoming an IoT practitioner

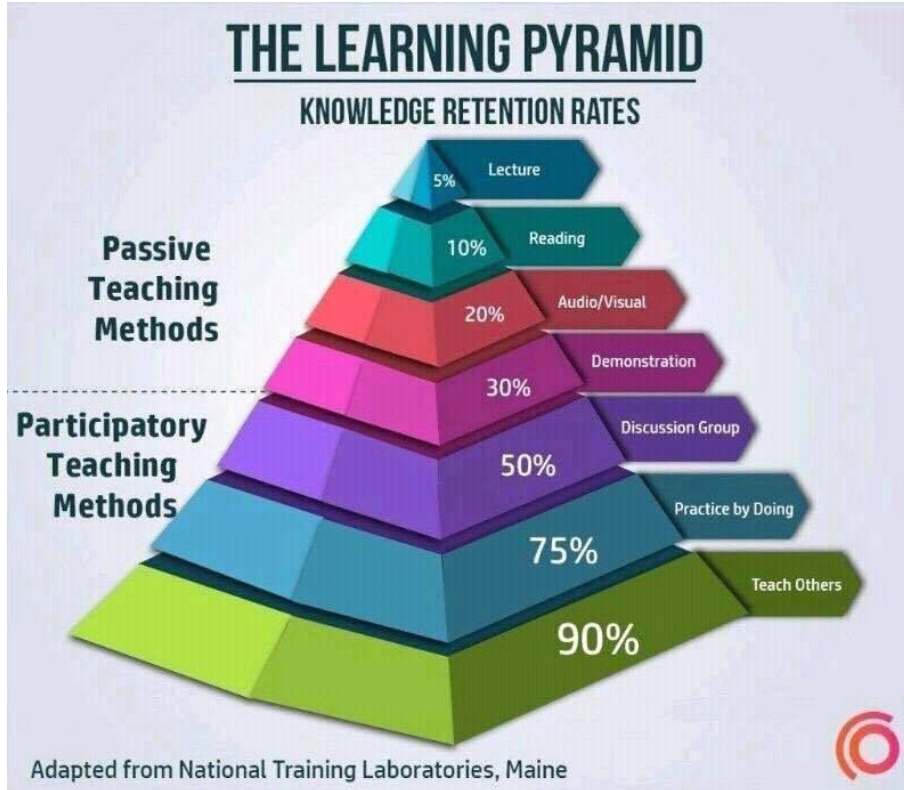
COM3505, Lecture 7 (wk 8)  
Prof Hamish Cunningham





**<<interlude: how to apply for  
parking permits>>**

# Lecture 1 slide 1...



We all know how to listen to a lecture or a set of precise instructions...

...but creating, **doing**, is a challenge — and that's one of the reasons why it sticks.

```

class MarkingScheme {
    static Map marksTable = [
        // id      pts      descr //////////////////////////////////
        // week 1
        '001': [ 1, "email and github sent to cloud" ],
        '002': [ 1, "accept the assignment; create github repo" ],
        '003': [ 1, "setup the Arduino environment" ],
        '004': [ 1, "burn firmware to the ESP32" ],
        '005': [ 1, "practice soldering" ],
        '006': [ 2, "learn about siggen and measurement in DIA 2.02" ],
        // week 2
        '008': [ 1, "solder headers onto ESP32" ],
        '009': [ 1, "Ex01 blinky" ],
        '010': [ 2, "MAC address on serial line; monitor in IDE" ],
        '011': [ 2, "string processing and mem fragmentation" ],
        '012': [ 1, "checkin and push" ],
        // week 3
        '015': [ 1, "breadboard an LED and a switch" ],
        '016': [ 1, "Ex02 blink the external LED" ],
        '017': [ 1, "Ex02 read from the switch" ],
        '018': [ 1, "breadboard two more LEDs" ],
        '019': [ 1, "Ex03 traffic lights; triggered by switch" ],
        '020': [ 1, "Ex04 debugging infrastructure" ],
        '021': [ 1, "Ex05 time slicing" ],
        // week 4
        '022': [ 10, "MOLE quiz 1" ],
        '023': [ 3.5, "Ex06 becoming a wifi access point and web server" ],
        '024': [ 3.5, "Ex07 simple utilities for creating web pages" ],
        // week 5
        '029': [ 2, "Ex08 email & the MAC address of ESP to cloud" ],
        '030': [ 2, "Ex09 joinme" ],
        '031': [ 2, "Ex10 over-the-air update" ],
        '032': [ 1, "Ex11 add captive portal functionality to Ex09" ],
        // week 7 [NO WEEK 6!]
        '036': [ 10, "MOLE quiz 2" ],
        '037': [ 0, "send your project choice list to cloud server" ],
        // week 8
        '043': [ 3.5, "build project hardware" ], // mark depends on proj
        '044': [ 3.5, "write a first version of the project firmware" ],
    ]
}

```

```

// week 9
// week 10
'057': [ 10, "MOLE quiz 3" ],
'058': [ 7, "write 2nd version of project firmware & software" ],
// week 11
...

// week weightings
static Map weekMultipliers = [
    w01: 1,
    w02: 1,
    w03: 1,
    w04: 1,
    w05: 2, // 5 and 6
    w06: 0,
    w07: 0, // project choice
    w08: 2, // 8 and 9
    w09: 0,
    w10: 2, // 10 and 11
    w11: 0,
]

static Map projects = [
    '1': "air quality monitor",
    '2': "campus panic button",
    '3': "RoboThing",
    '4': "WaterElf: sustainable food tech",
    '5': "Peer-to-Peer voting systems",
    '6': "other",
]

static Mark mark(int i){return new Mark(marksTable[sprintf("%03d",i)])}
static Mark mark(String k) { return new Mark(marksTable[ k ]) }
static float weekTotal(String weekId) {
    float tot = 0
    weeks[weekId].each { n -> tot += mark(n).points }
    return tot
}
}

```

## NOTES

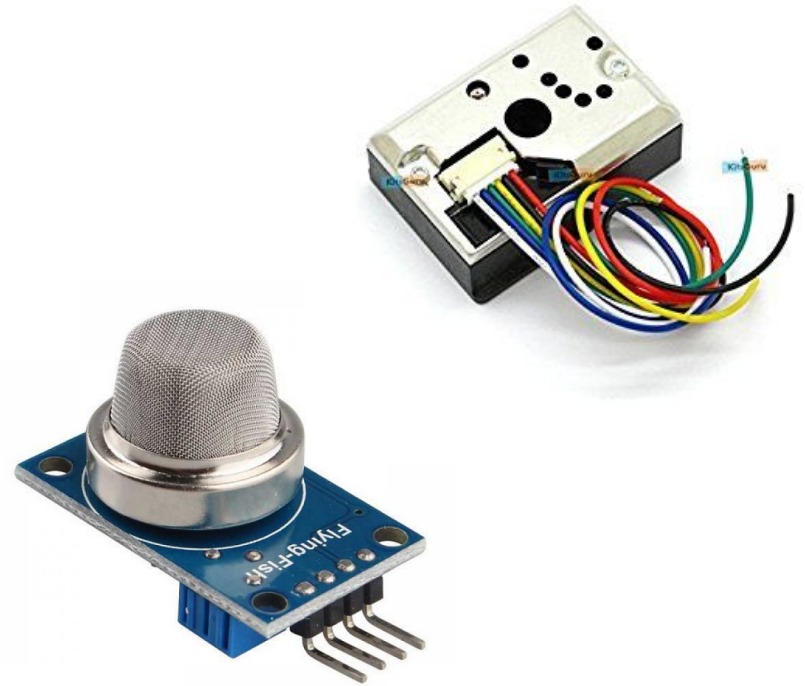
- 30% exams (MOLE quiz)
- 70% coursework
- independent hours: 70
- 10 weeks have assessed coursework assignments, so 7% of marks is available for each of those weeks
- weeks 5-6, 8-9 and 10-11 are in blocks of 2 (and so add up to 14% each)
- we've completed 62%, so 38% left (one quiz, and two 14% chunks)
- course = 10 credits

# Air Quality Project



- This project uses two different analog sensors to measure air quality
- Circuit needs potential dividers and stabilising capacitor (provided)
- One sensor is power hungry — the other not — a challenge for a battery powered project

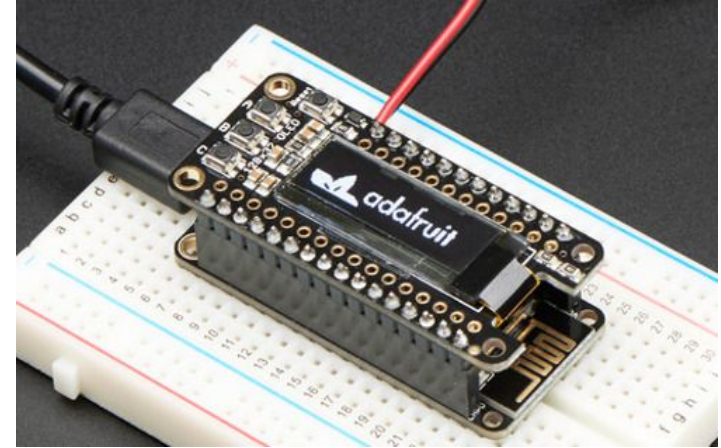
Staff leads: **Mohammed, Diala**



# Panic Button Project



- This project involves a little bit of soldering and more of software
- Use the Google Maps Geolocation API to get an accurate location using WiFi
- An Adafruit library is available for the display



Staff lead: **Hamish**

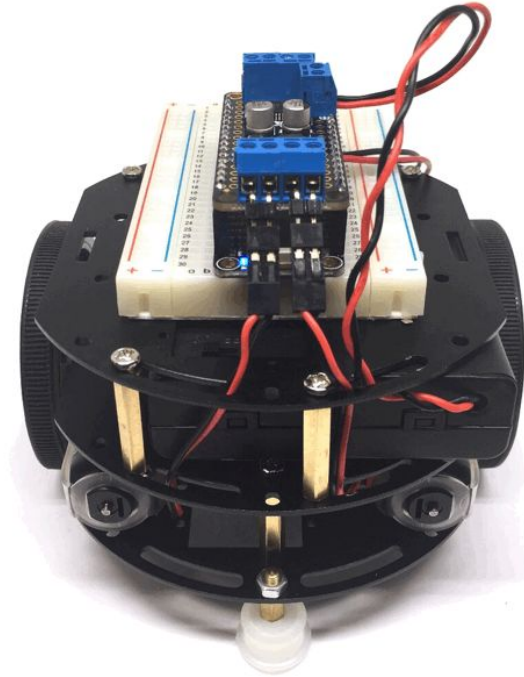


# Robot Car Project



- This project involves some mechanical construction, a little bit of soldering and software..
- Excellent build instructions from Adafruit
- The tutorial for using an ESP8266 is easy to adapt to the ESP32

Staff leads: **Anil, Kennedy**



# WaterElf Project



- This project involves multiple sensors and control of mains sockets
- Live project that has real world deployment
- Migration of existing ESP8266 codebase to ESP32 is our first challenge

Staff lead: **Gareth**

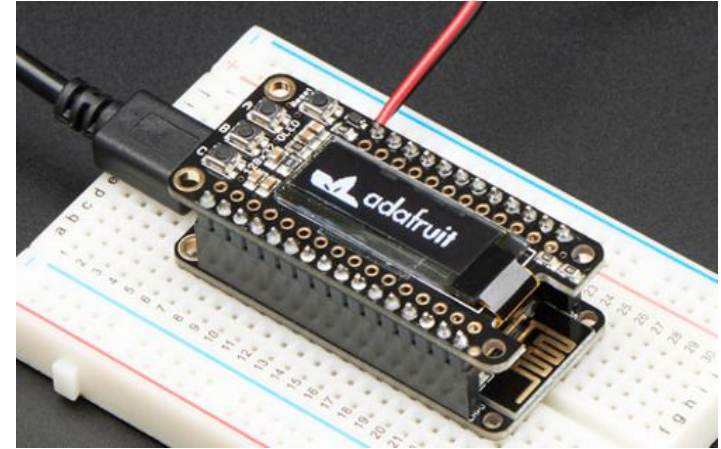




# Voting Button Project



- This project involves a little bit of soldering and more software
- Device needs to display voting instructions — challenge to use a tiny screen effectively
- How do we ensure that everyone gets just one vote, and your vote is cast by you?
- An Adafruit library is available for the display



Staff lead: **Hamish**



# Your **TODO** list for weeks 8 and 9:



The rest of the course:

1. this week and next do the **physical build**, and get started with the **firmware**
2. weeks 10 and 11 **finish the firmware** (and related cloud work where applicable); **quiz 3** is on Fri 1st Dec
3. **show your work**: Tues 5th or (by arrangement) Tues 12th Dec

This week, the usual:

- Update your git repository clone as usual
- Read and digest Notes/Week08.mkd
- Do the reading
- Make sure you understood the lecture, and review the slides if needed

