



# Computer Systems and Networks

Overview



# General Area Overview

## Computer Systems

- Number Bases & Boolean/Digital Logic
- Systems Architecture
- Data Representation
- Pipelining
- Physical Interfacing using Single Board Computer systems
- Physical Computing

## Operating Systems

- OS Architecture
- OS Processes and Management
- File Management
- Memory Management
- Scripting/Shell programming
- Virtualisation(also in cloud???)
- Remote Login

## Network

- Internet Protocol Suite
  - Link/Internet/Transport/Application Layer(inc. SSH)
- Physical/Network layer addressing
- Wireless Networks
  - WIFI
  - Bluetooth(BLE)

## Cloud

- Cloud Computing Concepts
- Virtualisation
  - IaaS; PaaS; SaaS; 'X'aaS
- Networking services in the cloud: IP Addressing, DNS, DHCP,(NAT?)
- Cloud-based IoT Services

# Computer Systems Labs

- Lab 0 (in WIT): Introduction to Computer Systems/Setting up a Raspberry Pi
- Lab1: Computer Architecture Exploration –Data Formats and Storage in Computer Systems
- Lab2: Exploring Number Systems
- Lab3: Computer Arithmetic, Logic and Circuits
- Lab4: CPU Exploration
- Lab5: I/O, GPIO and Physical interfacing

# Operating Systems Labs

- Lab 0(in WIT): The Headless Pi (Headless set-up of Linux on Pi)
- Lab 1: Exploration and Configuration of Linux OS via CLI;
- Lab 2: Shell Programming 1;
- Lab 3: Shell Programming 2;
- Lab 4: Shell Programming 3;
- Lab 5: Virtualisation, the OS in the cloud;

# Networks

- Lab 0: Introduction to TCP/IP and IP addressing
- Lab 1: Network Monitoring and Packet Sniffing
- Lab 2: Device Configuration and Troubleshooting
- Lab 3: Application Layer Protocols (HTTP/MQTT/FTP...)
- Lab 4: The Physical Internet/PANs (Bluetooth LE)
- Lab 5: Connecting to an IoT Cloud Platform

# Cloud

- Lab 0: Into to Cloud Platforms (AWS Setup)
- Lab 1: IAAS (AMIs, AMI configuration, Intro to VPN?)
- Lab 2: IoT PAAS (Amazon Web Services 1 – Devices Connectivity and Management)
- Lab 3: IoT PAAS (Amazon Web Services 2 – Rules Engine Implementation/Device Shadows/Security)
- Lab 4: IoT SAAS (Messaging, Storage, Pub-Sub)
- Lab 5: AWS IoT Reference Implementation