SIT314/SIT729 – Week 2 Group Activity  
Technologies for IoT Applications

short line

# Overview

# Now that we have a reasonable understanding of the options for IoT nodes and communications, we should explore what technologies we would use for specific application scenarios.

# Tasks

Consider the following applications and answer the questions about the most appropriate technologies to use.

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| 1. A smart home lighting system. | |
| What properties does your IoT node need? | * Low power consumption. * Real-time control. * Local wireless connectivity. * Sensor (motion, light). |
| What microcontroller would you use? | * ESP32 / ESP8266. * Cheap and common. * Wi-Fi integrated. * Able to handle the signal and communicate with server. |
| What communications standard would you use? | * Wi-Fi. |
| What edge computing infrastructure would you use? | * Local Gateway: * Raspberry Pi. * Home Control Hub |
| Would you use cloud computing? | * Yes & No. |

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| 1. A forest fire monitoring system. | |
| What properties does your IoT node need? | * Low power (on Battery / Solar). * Long-range communication. * Environmental factor sensors. * High durability. |
| What microcontroller would you use? | * STM32 / Arduino MKR WAN 1310. |
| What communications standard would you use? | * LoRa Wan – Long-range communication (up to 10Km) |
| What edge computing infrastructure would you use? | * Local LoRa Gateway. |
| Would you use cloud computing? | * Yes |

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| 1. A smart air-conditioning system for a large building. | |
| What properties does your IoT node need? | * Real-time environmental sensors (temp, CO2, moist). * Manually controllable (Hybrid: Automate + Manually). |
| What microcontroller would you use? | * ESP32 * Wi-Fi integrated |
| What communications standard would you use? | * Wi-Fi – for within floor. * Bluetooth Low Energy (BLE) – for within a small area. * Ethernet – for between floors |
| What edge computing infrastructure would you use? | * Building Management System. |
| Would you use cloud computing? | * Yes. * Analyse power-usage. * Predictive maintenance. |

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| 1. A river monitoring system for the remote Australian outback. | |
| What properties does your IoT node need? | * Solar-powered. * Waterproof. * Long-range communications. * Environmental factor sensors (water level, quality). |
| What microcontroller would you use? | * STM32. * Arduino MKR WAN 1310. * Adafruit Feather M0 + LoRa. |
| What communications standard would you use? | * LoRa WAN. * NB-IoT. |
| What edge computing infrastructure would you use? | * Remote Gateway. * Local LoRa Gateway |
| Would you use cloud computing? | * Yes. * Observe water-level for flood-warning. |

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| 1. A driver-less taxi system for a smart city. | |
| What properties does your IoT node need? | * High-speed processing. * Real-time sensors (camera, GPS). * Reliable & fast networking. |
| What microcontroller would you use? | * Raspberry Pi 5. * Support Cellular 5G |
| What communications standard would you use? | * 5G. |
| What edge computing infrastructure would you use? | * On-board Edge Server – within the vehicle. * Roadside Edge Server. |
| Would you use cloud computing? | * Yes. * Fleet-management. |

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| 1. A system for automatic robotic maintenance on Mars. | |
| What properties does your IoT node need? | * Radiation tolerance and high durability. * Autonomy. * Strong and Reliable Communication. |
| What microcontroller would you use? | * RAD-tolerant MCU. * TI TMS570 |
| What communications standard would you use? | * UHF / VHF. * X-band. * Delay Tolerant Networking (DTN). |
| What edge computing infrastructure would you use? | * Local AI. * Self-Decision-making system. |
| Would you use cloud computing? | * No. * Due to high latency between Earth and Mar. |