

Quiz 1

- With respect to the basic structure for IoT, select all the correct statements.
 - Connections between IoT objects are part of the network.
 - Edge computing creates a distributed system.
- With respect to the management system of IoT select all the correct statements
 - IFTTT is a good method for end-user programming because it is easy to code with.
 - A change that applies to many IoT objects can be centrally controlled.
- In crop monitoring, IoT can be used to:
 - Monitor crop health using drones.
 - Connect sensors on the farm to monitor plant growth.

Quiz 2

- A student wrote the following program for a FireBeetle ESP32-E. It must read an analog sensor (Amplitude range: 0 to 3.3V, Frequency bandwidth: 25Hz, Connection: A4) and send the values through the COM port to a computer separated from a new line. Before sending, the value should be mapped from 0 to 100. Fix three errors in the code below.

```
1 int lightSensor = 0;
2 int lightPin = A0;
3 void setup() {
4     Serial.begin(9600);
5     analogReadResolution(8);
6 }
7 void loop() {
8     lightSensor = analogRead(lightPin);
9     lightSensor = map(lightPin, 0, 1024, 0, 100);
11    Serial.println(lightSensor);
10    delay(18);
11 }
```

- Line 3 lightPin should be A4
- Line 4 pinMode(lightPin, INPUT); is missing
- Line 13 lightPin should be lightSensor.
- Line 13 Should be lightSensor = map(lightSensor, 0, 255, 0, 100);

Quiz 3

- Which of the following communication method(s) can create a network connecting five peripheral devices (e.g. sensors) with a control device (MCU) using star topology?
 - Bluetooth
- For an application that needs scalability of adding new devices to a network(s), which networks are the best choices.
 - WiFi
- You must choose a wireless network that collects data from farm animals (75m radius). There are 100 animals with sensors, each needs communication speed of 3Kbps (20% communicate at a time). MCU is at the edge of the farm. Which network is best?
 - LoRa

Quiz 4

- When using an analog sensor with ADC, a series resistor must be carefully chosen to:
 - Minimise the amount of current used
- You aim to use the below sensor with a microcontroller that operates at 12MHz and 1.8V operating voltage. Select the true statement(s).

Features

- Photoacoustic NDIR sensor technology PASens®
- Smallest form factor: 10.1 x 10.1 x 6.5 mm³
- Reflow solderable for cost effective assembly
- Large output range: 0 ppm – 40'000 ppm
- Large supply voltage range: 2.4 – 5.5 V
- High accuracy: ±(40 ppm + 5 %)
- Digital I²C interface
- Integrated temperature and humidity sensor
- Low power operation down to < 0.4 mA avg. @ 5 V, 1 meas. / 5 minutes

- Will not work

Quizzes

3. The figure shows a circuit designed to drive a motor through a transistor using PWM. Where should be the PWM trigger connected to?
- b. Tb

Quiz 5

1. You want to connect Node-RED to MQTT broker hosted at server "mqtt.random.com", port 1883. Your node-red instance is running at "localhost". Which of the following settings must you set in the MQTT connection settings?
- c. Set "Port" to 1883
d. Set "Server" to "mqtt.random.com"
2. Which of the following node(s) are necessary to publish to an MQTT broker. ~1min
- b. MQTT IN and MQTT OUT
3. You are to read sensor data from the MQTT broker "mqtt.broker.org". The topics are organised first by country, then by state, and finally the sensor-type. The broker has following topics and subtopics.
- Countries: au, us
 - States under AU: nsw, qld, vic
 - States under US: ca, ny, nm
 - Sensor-types under all states: tmp, hum
- What is the topic string you set to subscribe to humidity in California, United States?
- /us/ca/hum

Quiz 7

1. You are asked to characterise a digital wearable sensor that measures the elbow angle of the wearer. Your goal is to validate that it has an angular resolution of +/- 4 degrees. Select the possible state of the art choice(s) to validate your sensor. (1.30 min)
- b. An analog elbow angle sensor with +/- 1 degrees
d. A digital elbow angle sensor with +/- 1 degrees
2. You developed a mobile app that tracks your sleeping habits. The app shows the sleep time and quality for last night, along with average, min/max sleeping time and quality organised into daily, weekly, monthly, or even hourly. Write two (2) concrete tasks.
- Find out the sleep quality for last night
 - Find out the sleep time for last night

Quiz 9

1. You must make a casing for a device to measure sunlight. It needs to be black and should be a box. Make the casing as soon as possible. Which approach is best?
- a. Laser cutting
2. Consider the interface available in am Virtual Reality environment. Which interaction style best describes this interface?
- d. Exploring
3. Select contexts that could cause a Situationally-Induced Impairments and Disability.
- a. Getting closer to a deadline
d. Working in a construction site

Quiz 10

1. CS pin in the Serial Peripheral Interface (SPI) is used to.
- d. Select the peripheral interface the controller is communicating with
2. An ADC operates with input range 0 to 5V, with bit resolution 10 bits. If a voltage of 1.65V is given as the input, what will be the approximate output from analogRead()?

$$\text{ADC Output} = \left(\frac{\text{Input Voltage}}{\text{Reference Voltage}} \right) \times \text{Maximum ADC Value}$$

$$\text{ADC Output} = \left(\frac{1.65V}{5V} \right) \times (2^{10} - 1)$$

$$\text{ADC Output} \approx 337$$