

IoT Midterm Test (202201)

Week 6

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* Required

In rudimentary form, an IoT platform is just enabling connectivity of "things" through IP network. But a true end-to-end IoT platform consists of several architectural components. Which of the following components are those? *

- ☒ Analytics
- ☒ External API interfaces
- ☒ Processing and action coordination
- ☐ Transistors
- ☐ Virtualization
- ☐ Human
- ☒ Database
- ☒ Data visualization
- ☐ Operating system

Connectivity & Normalization
Database
Action and processing management
Device management
Analytics
Visualization
External interfaces
Additional tools



What are the advantages of I2C compared to UART and SPI? *

- ☐ Requires more communication lines than UART and SPI
- ☒ Operate at slower maximum speed in standard and fast modes than UART and SPI
- ☒ Multiple masters and slaves with only 2 lines, whereas SPI requires more than 2 lines for more than 2 slaves.
- ☒ Capable of supporting multiple masters and slaves, whereas UART only supports one-to-one communication
- ☐ Communicate at faster speed than SPI
- ☐ Requires additional resistors on the SDA and SCL lines, whereas they are not required by UART and SPI

What are the consequences if an IoT system has poor security in place? *

- ☒ Intruders can easily take control of the IoT system over the Internet
- ☐ IoT system is safe from intruders
- ☐ Only owner of the system able to access and control
- ☒ Intruders can steal information from the IoT system
- ☐ No problem will arise



Wearable fitness IoT device has Bluetooth connectivity but has no capability to directly access to the Internet to transmit data to its cloud service provider. *
Explain how to solve this.

- ☐ Hijack neighbor's WiFi
- ☒ Create a gateway to convey the data to the cloud through Device-to-Gateway communication pattern
- ☐ Use a backdoor
- ☐ Use Device-to-cloud communication pattern
- ☐ Use Device-to-device communication pattern to convey the data to another device which is incapable of connecting to the cloud
- ☐ Not possible
- ☐ Use Back-end data sharing communication pattern

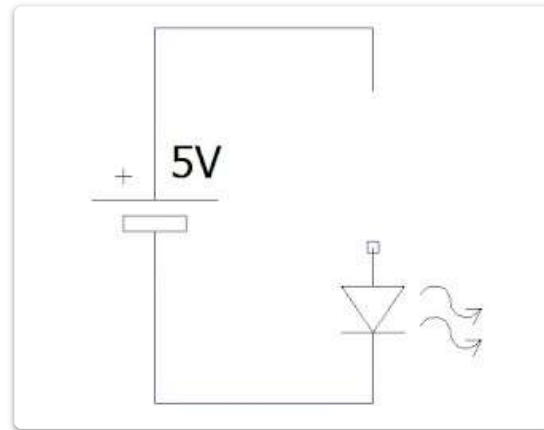


Which of the following IoT systems are "smart"? *

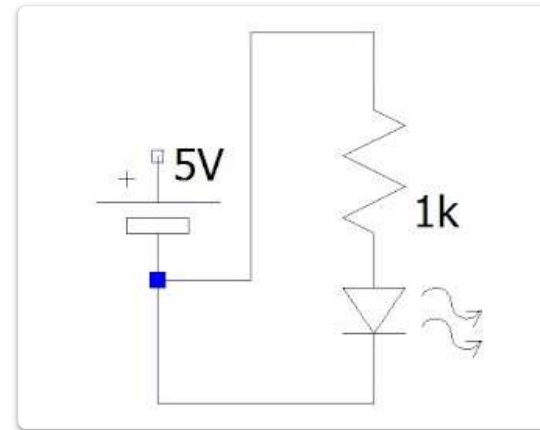
- ☐ Smart IoT CCTV which sends video stream to a computer monitor through an IP network
- ☒ A home automation system that has facial recognition (through IoT camera) unlocks the door (through IoT door lock) when its AI system recognizes the residents of the house approaching the door from outside
- ☒ Smart tag that constantly sends temperature of perishable produce in a transportation through Bluetooth-to-smartphone and then smartphone's cellular-to-cloud (using the device-to-gateway communication strategy pattern). The real-time temperature is made viewable to the customer through a web browser or a smartphone app. The driver will be alerted through the smartphone to take immediate action if the temperature rises beyond the threshold.
- ☐ Remote control through Internet to turn on/off IoT air-conditioners at home by humans from anywhere
- ☒ Lighting system which automatically turns on/off according to ambient light intensity and the presence of human beings and report its power usage and its health status to the cloud
- ☒ Sensor that monitors the stock in a retailer shelf and generate a low stock alert signal to the backend system to request for replenishment.
- ☐ A IoT temperature sensor that constantly updates a room temperature to the cloud
- ☐ A wall switch which sends wireless signal to turn on/off a home light bulb



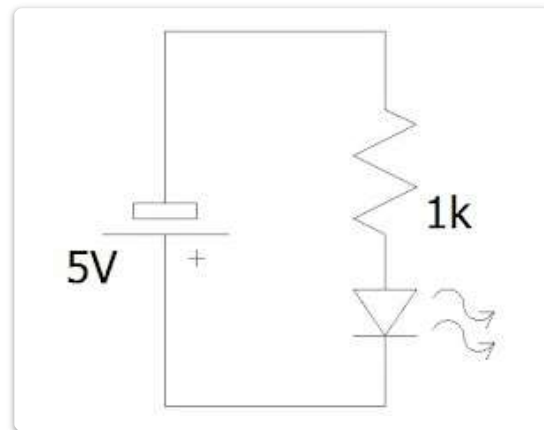
Which of the following circuit construction is correct? *



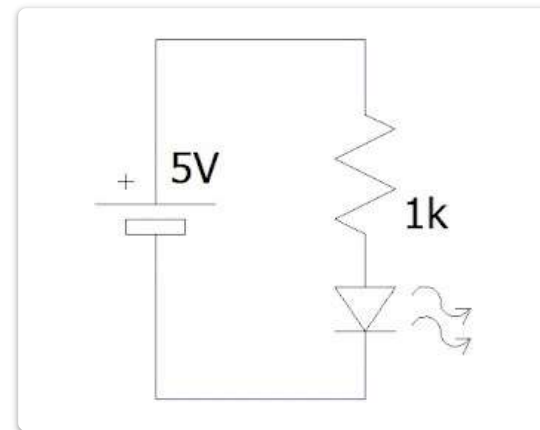
☐ Option 3



☐ Option 5

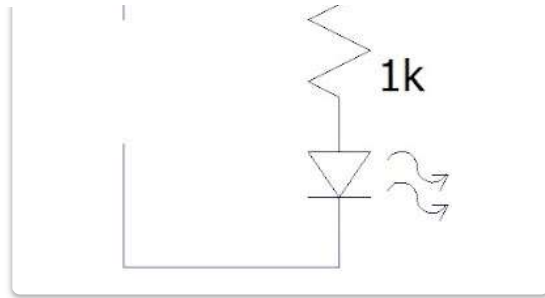


☐ Option 2

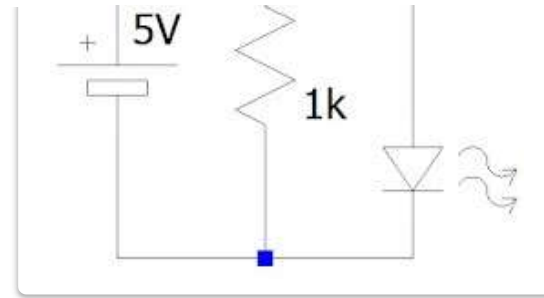


☒ Option 1





☐ Option 6



☐ Option 4



The following code reads the temperature and humidity from a DHT sensor. If the temperature is greater than 50°C, it sounds the buzzer. Else, the buzzer is off. If the humidity is less than 0% to 40%, then the LED is turn on with the intensity scale between 1023 to 0. Which of the following is the correct code for lines 12 - 17? *

```
1 from time import *
2 from grovepi import *
3 import traceback
4
5 dhtsensor = 7
6 buzzer = 4
7 led = 3
8
9 while True:
10     try:
11         [temp, humidity] = dht(dhtsensor, 0)
12         if(?):
13             ???
14         else:
15             ???
16         if(?)
17             ???|
18     except KeyboardInterrupt:
19         digitalWrite(buzzer, 0)
20         analogWrite(led, 0)
21     except Exception:
22         traceback.print_exc()
```



```

if(temp > 50):
    digitalWrite(buzzer, 0)
else:
    digitalWrite(buzzer, 0)
if(humidity < 40)
    analogWrite(led, 0)

```

☐ Option 3

```

if(temp > 50):
    digitalWrite(buzzer, 1)
else:
    digitalWrite(buzzer, 0)
if(humidity < 40)
    analogWrite(led, (40-humidity)*1023//40)

```

☒ Option 1

```

if(temp < 50):
    digitalWrite(buzzer, 0)
else:
    digitalWrite(buzzer, 0)
if(humidity > 40)
    analogWrite(led, humidity*1023//40)

```

☐ Option 4

```

if(temp > 50):
    digitalWrite(buzzer, 1)
else:
    digitalWrite(buzzer, 1)
if(humidity < 40)
    analogWrite(led, 40)

```

☐ Option 2



What are the factors that fuel the IoT growth year-by-year? *

- ☒ Availability and ever decreasing cost of electronics sensors, actuators, and processors
- ☒ Availability of many free, stable, and well-supported IoT development platforms like Arduino, Mbed, and Particle Photon, which ease and expedite the development process and stimulate growth
- ☒ Standardization of IoT communication protocols to allow homogenous system to encourage better interoperability and speeding up development of ecosystems for wider adoptions
- ☒ Transition from IPv4 to IPv6 with larger pool of addresses
- ☒ Ever increasing processing speed and decreasing power consumption allows solving complex problems possible
- ☐ None of the above



What is the difference between UART and USART? *

- ☐ USART can have multiple master, where as UART can only have one master
- ☐ UART has clock line, whereas USART has no clock line
- ☐ All the given answers are true
- ☐ USART has higher transfer speed than UART
- ☒ USART has clock line, whereas UART has no clock line
- ☐ There is no difference between UART and USART



A good IoT solution to a traditional process should: *

- ☒ Reduce the cost and complexity of the process by cutting down the steps without sacrificing the outcome and the quality
- ☒ Increase productivity by aiding humans on carrying out the process
- ☐ Work non-stop 24/7
- ☒ Improve efficiency of the process in terms of speed and time
- ☐ Add more work to keep human workers busy
- ☒ Offer predictive maintenance through continuous condition monitoring to cut downtime and increase uptime by permitting early scheduled repair before a sudden catastrophic failure happens
- ☒ Reduce human intervention since it is able to react and respond in a smart way
- ☐ Report about lazy human workers



One of the architectural components of a true end-to-end IoT platform is the Device Management. What is a Device Management in that context? *

- ☐ A mechanism to wash, rinse, and dry the devices at specific time configurable by users
- ☐ A calendar system that keeps the dates of when the devices need to be updated
- ☐ A software to remind and instruct humans to maintain and update the devices to the latest versions
- ☐ A cloud service that cleans up the mess done by the devices once detected by the sensors
- ☐ A management system that tells the devices to notify humans that they need to be serviced
- ☒ Backend tools in the cloud to monitor device status and to automatically deploy the latest software update to the devices



Imagine a smart fridge with an embedded processor controls the ON/OFF of the refrigerator's compressor (motor) to maintain the cool temperature at a preset temperature, among other tasks. Why the I/O pin cannot be connected to the 240V AC compressor directly to drive and control it, but instead requires an indirect control, like a Relay, to do the job? *

- ☐ The compressor uses HTTPS secured protocol to communicate, which the processor is not capable of
- ☐ The compressor only communicates with the Relay
- ☒ The processor runs at a different voltage and it is DC voltage, which is not compatible with voltage used by the compressor
- ☐ The compressor is smart enough
- ☒ The processor I/O pin has very low current and does not have enough power to drive a heavy duty compressor even if the latter is running at the same voltage as the processor
- ☐ The processor is too slow

Processor want to control compressor (motor), why do we required to use relay to drive and control it?



Which of the followings are the fundamental aspects that a device must possess *
to be classified as an IoT device?

- ☐ Able to generate noise and light
- ☒ Able to communicate with other elements in the system
- ☐ Having a unique color
- ☒ Having a unique ID
- ☐ Able to move around
- ☒ Able to process and perform at least some basic decision making



IoT devices are generally small and widely distributed. When IoT developers design such IoT devices, there are many constraints that have to be considered. Which of the following are the relevant IoT constraints? *

- ☒ Communication bandwidth
- ☐ Work hours
- ☒ Processing speed
- ☒ Cost
- ☒ Memory size
- ☒ Energy
- ☐ Man-power
- ☐ Funding



Data communication standards and protocols

What are the common communication protocols readily available for use in IoT ^{*} devices?

- ☒ SPI
- ☒ USART
- ☐ Buzzer
- ☐ LED
- ☒ I2C
- ☐ Relay
- ☐ TV



Study the rating printed on the cover of the Relay. Which of the following is the best number of light bulbs that the Relay can drive without being overloaded if each light is consuming 15W at 250VAC.

P V $I = ?$



$$P = VI$$
$$15 = 250 (I)$$
$$I = 0.06A$$

$$I_{\max}/I_{\text{bulb}} = 5/0.06 = 83.33$$

- ☐ 15
- ☐ 30
- ☐ 8
- ☒ 65
- ☐ >120
- ☐ 20

Control voltage aka coil voltage refers to the voltage required to energize the coil



Which of the following are true about UART? *

- ☒ One data frame consists of a start bit, 8 bit of data, and a stop bit
- ☐ The protocol mandates that the transmitter first sends a 7-bit slave address, follows by an ACK bit, then follows by one or more data bytes
- ☐ Stop bit signal is from high-to-low
- ☐ There is a clock line to synchronize the communication
- ☒ Start bit signal is from high-to-low
- ☒ Stop bit signal is from low-to-high

Which of the following are considered as IoT devices? *

- ☒ Apple Smartwatch
- ☒ Raspberry Pi
- ☐ Conventional Aircond
- ☒ Smartphone
- ☐ Home landline telephone
- ☒ ESP32
- ☐ Nokia 3310
- ☐ TV remote control

Sensor
Actuator/Indicator
Embedded device/controller
Smart devices



Which of the following wireless communications can be used by IoT devices? *

☐ Firebase

☐ Firewire

☐ USB

☒ LoRa

☒ SigFox

☒ WiFi

☐ Ethernet

☒ Bluetooth



There are several communication patterns described in RFC7452 (Architectural * Considerations in Smart Object Networking). What are they?

- ☒ Device-to-cloud communication pattern
- ☒ Device-to-gateway communication pattern
- ☒ Back-end data sharing pattern
- ☒ Device-to-device communication pattern
- ☐ Proxy pattern
- ☐ Observer pattern
- ☐ Factory pattern

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