ICT Secondary School – F.3 Arduino Basics

To develop a burglar alarm using Arduino – Chapter 1: PIR sensor

1. Which of the following objects can be detected by a PIR sensor?

   I. Human beings

   II. Dogs

   III. Toy cars

   IV. A basketball

A. (I) only

B. (II) & (III) only

C. (III) & (IV) only

D. (I) & (II) only

2. Which of the followings about PIR sensors is/are correct?

   I. A PIR sensor can tell the exact distance between the sensor and the object

   II. A PIR sensor does not require an individual +5V input for power supply

   III. A PIR sensor does not require to be grounded

   IV. The sensitivity of PIR sensors are fixed

A. (I) & (II) only

B. (III) & (IV) only

C. (I), (III) & (IV) only

D. None of the above

3. For declaring a variable storing the pin number used to connect the PIR sensor to Arduino MEGA 2560, which of the following statement is **NOT** correct?

   I. const int PIRSensor = 22;

   II. String PIRSensor = “22”;

   III. const int PIRSensor == 22;

   IV. int PIRSensor = 22;

A. (III) only

B. (I) & (II) only

C. (IV) only

D. (II) & (III) only

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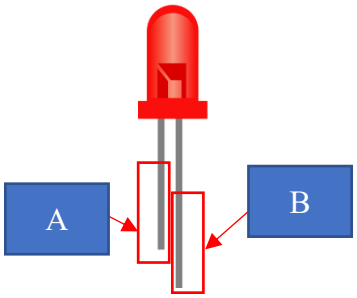
To develop a burglar alarm using Arduino – Chapter 2: LED units

1. Consider the following diagram:



Which of the following is correct?

I. B should be connected to GND socket on Arduino mainboard

II. Even A is not connected to anything, the LED unit can still emit lights

III. If B is not connected to anything, the LED unit will not emit lights

IV. The connection of A and B to Arduino mainboard are interchangeable

A. (I) only

B. (II) only

C. (II) & (III) only

D. (III) & (IV) only

2. Which of the following statements for initializing a LED unit is/are correct?

I. pinMode(ledPin, OUTPUT);

II. pinMode(OUTPUT, ledPin);

III. pinMode(23, OUTPUT);

IV. pinMode(23, INPUT);

A. (II) only

B. (I) & (IV) only

C. (I) & (III) only

D. (III) & (IV) only

3. Which of the following lighting effects cannot be done on a 2-pin LED unit?

A. Making it to blink continuously

B. Changing its brightness

C. Change its color randomly for every 10 seconds

D. Making it to light up constantly

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To develop a burglar alarm using Arduino – Chapter 3: Ultrasonic sensor

1. Which of the following is/are the major consideration(s) of adding an ultrasonic sensor in a burglar alarm system?
   I. An ultrasonic sensor can detect human beings, whereas a PIR sensor cannot
   II. The object detection range of an ultrasound sensor is larger than that of a PIR sensor
   III. An ultrasonic sensor can tell the exact distance of an object
   IV. An ultrasonic sensor can detect objects behind a wall

A. (I) only
B. (II) only
C. (III) only
D. (III) & (IV) only

2. Which of the followings about ultrasonic sensors is/are correct?
   I. The sound wave transmitted by an ultrasonic sensor can be heard by humans
   II. Power supply can be handled by its TRIG pin, no +5V connection is needed
   III. Its TRIG pin and ECHO pin are interchangeable
   IV. The sensitivity of ultrasonic sensors cannot be adjusted

A. (I) & (II) only
B. (III) & (IV) only
C. (IV) only
D. (II) & (IV) only

3. For initializing an ultrasonic sensor, which of the following statement is correct?
   I. pinMode(trigPin, INPUT); pinMode(echoPin, OUTPUT)
   II. pinMode(trigPin, OUTPUT); pinMode(echoPin, INPUT)
   III. pinMode(26, OUTPUT); pinMode(28, INPUT)
   IV. pinMode(trigPin, OUTPUT); pinMode(echoPin, OUTPUT)

A. (I) & (II) only
B. (II) & (III) only
C. (III) & (IV) only
D. (II), (III) & (IV) only

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To develop a burglar alarm using Arduino – Chapter 4: Active buzzer

1. Which of the followings about active buzzer is/are correct?

   I. An active buzzer can emit sound at multiple pitch

   II. Pulse value of active buzzer is 1000hz

   III. The sound level of an active buzzer cannot be adjusted

   IV. An active buzzer can only be used to emit constant sound

A. (I) only

B. (II) & (III) only

C. (IV) only

D. None of the above

2. Which of the following statement(s) is/are correct?

   I. An object at 1km away can trigger an ultrasound sensor, and make the active buzzer to emit sound

   II. A toy car at 10cm away can trigger an PIR sensor, and make the active buzzer to emit sound

   III. There is a switch for users to manually turn off the active buzzer

   IV. An active buzzer can be programmed to emit sound and stop emitting sound interchangeably for every second

A. (I) & (II) only

B. (III) & (IV) only

C. (IV) only

D. (II) & (IV) only

3. Which of the following description about the combined use of LEDs and active buzzers is/are correct?

   I. An ultrasonic sensor cannot be used to trigger LEDs and buzzers at the same time

   II. When we have already implemented multiple LEDs, no ultrasonic sensors should further be installed to protect the Arduino mainboard from over-currenting

   III. One LED can only be paired with one ultrasound sensor for triggering alerts

A. (I) only

B. (II) & (III) only

C. None of the above

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To develop a burglar alarm using Arduino – Chapter 5: Passive buzzer

1. Which of the followings about passive buzzer is/are incorrect?

   I. A passive buzzer can play a sound non-stop, while active buzzer cannot

   II. The sound range (in hz.) of active buzzer is wider than passive buzzer

   III. The sound level of a passive buzzer is fixed

   IV. A passive buzzer can be used to play a simple melody

A. (I) only

B. (II) & (IV) only

C. (I), (II) & (III) only

D. All of the above

2. Which of the following statement(s) is/are correct?

   I. The GND pin of a passive buzzer has the same length as its digital pin

   II. The connection of GND pin and digital pin of a passive buzzer are interchangeable

   III. A 220ohm resistor can be added to reduce the maximum volume of passive buzzers

   IV. Active buzzer and passive buzzer cannot be implemented together on Arduino

A. (I) only

B. (III) only

C. (I) & (III) only

D. (II), (III) & (IV) only

3. Look at the following program segment:

```
void intrusionSiren(int pin){
    for (int x=200; x<1600; x++){
        tone (pin, x, 10);
    }
}
```

What is the purpose of the segment?

A. To make the passive buzzer to emit sound for 1400 times

B. To make the passive buzzer to emit sound for 1400ms

C. To make the passive buzzer to emit sound with increasing tone from 200hz to 1600hz

D. To make the passive buzzer to emit sound with decreasing tone from 1600hz to 200hz

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To develop a burglar alarm using Arduino – Chapter 6: SW420 vibration sensor

1. A SW420 vibration can _____.

   I. Detect door bumping

   II. Detect destroy of door lock

   III. Detect motions

   IV. Detect breaking of door grass

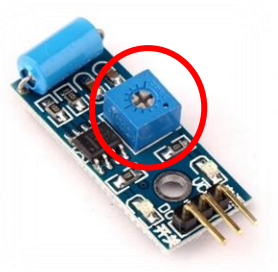
A. (II) only

B. (I) & (II) only

C. (III) & (IV) only

D. (I), (II) & (IV) only

2. Look at the following diagram:



The switch circled in RED cannot be used to:

A. Increase the vibration detection rate

B. Decrease the vibration detection rate

C. Pause the sensor from operation

D. Adjust the accuracy of the sensor

3. Which of the following is the possible readings from a SW420 in serial monitor?

   I. "`Vibration detected`"

   II. -10

   III. 10120

   IV. 0

A. (I) & (II) only

B. (II) & (IV) only

C. (III) & (IV) only

D. (I), (III) & (IV) only

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To develop a burglar alarm using Arduino – Chapter 7: I2C 1602a LCD (I)

1. Which of the following text can be displayed on a I2C 1602a LCD?

   I. 教育大學

   II. ^__^

   III. **aRduInO**

   IV. /--\../--\

A. (I) & (II) only

B. (II) & (III) only

C. (II), (III) & (IV) only

D. All of the above

2. For making the I2C LCD to successfully display text, you must _____.

   I. Prepare at least 4 jumper cables

   II. Prepare at least 5 jumper cables

   III. Ensure the Arduino mainboard is connected to a computer for data transmission

   IV. Ensure a 220ohm resistor is used in between.

A. (I) only

B. (I) & (III) only

C. (II) & (IV) only

D. None of the above

3. Inspect the picture below:

For displaying the text “hello, world!”, which of the cursor setting is correct?

A. lcd.setCursor(1, 0)

B. lcd.setCursor(0, 1)

C. lcd.setCursor(0, 0)

D. lcd.setCursor(1, 1)

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To develop a burglar alarm using Arduino – Chapter 8: I2C 1602a LCD (II)

1. Amy, one of the programmers of ICT burglar alarm. She wanted to show the real-time readings (*i.e. distance information*) from the ultrasound sensor on a 1602a LCD. For example, **"12cm"** will be displayed if an object is detected within 12cm from the sensor. However, when testing the system, she will sometimes discover texts like **"12cmm"**, **"64cmm"** and **"85cmm"** on the LCD display. Which of the following commands may help her to address to the issue?

   I. lcd.clear();

   II. lcd.setCursor();

   III. lcd.backlight();

   IV. lcd.init ();

A. (I) only

B. (I) & (IV) only

C. (I), (II) & (IV) only

D. None of the above

2. Look at the program segment below:

```
lcd.setCursor(0,0)
void loop{
   lcd.print("Arduino"); lcd.print("1");
   lcd.clear(); lcd.print("1111111111111111");
}
```

The last piece of text that will be displayed on the LCD is:

   I. Arduino

   II. Arduino1

   III. 1111111111111111

   IV. Cannot be determined

A. (I) only

B. (IV) only

C. Either (I) or (III)

D. No text will be displayed

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To develop a burglar alarm using Arduino – Chapter 9: RC522 RFID module (I)

1. Which of the following blocks on an EEPROM of a RFID card is read-only?

   I. (15, 0)

   II. (0, 0)

   III. (0, 15)

   IV. (15, 15)

A. (I) only

B. (II) only

C. (II) & (IV) only

D. (I) & (III) only

2. Amy complains the RFID reader she implemented on Arduino cannot read RFID cards, which of the following may be the possible cause(s)?

   I. She placed her RFID card too far from the sensor

   II. The RFID card she is using has no UID in its EEPROM

   III. The type of the RFID card she is using is unsupported by the RFID reader

   IV. She has accidentally wipe the UID of her RFID card during development

A. (I) only

B. (I) & (II) only

C. (I) & (III) only

D. (I), (III) & (IV) only

3. Which of the following pins of a RFID reader is/are not compulsory to be connected to Arduino?

   I. RESET pin

   II. GND pin

   III. SDA pin

   IV. MISO pin

A. (I) only

B. (II) only

C. (III) only

D. (I) & (IV) only

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To develop a burglar alarm using Arduino – Chapter 10: RC522 RFID module (II)

1. If you are going to implement a RFID module, so that you can reset a burglar alarm using a registered RFID card, which of the following may not necessarily to pay attention to?
   I. The handling of unregistered RFID card
   II. The event(s) that should happen after a registered RFID card is tapped
   III. The delay of the RFID reader reading a RFID card

A. (I) only
B. (II) only
C. (I) & (II) only
D. All of the above

2. Which of the following about the use of RFID card is/are not possible?
   I. Using a RFID card to trigger multiple LEDs to blink
   II. After a button is pressed, display the UID of any detected RFID card on a LCD display
   III. After a button is pressed, wipe the UID of any detected RFID cards
   IV. Using a RFID card to trigger a method to clear the text on a LCD display

A. (II) only
B. (I) & (II) only
C. (III) & (IV) only
D. (I), (II) & (IV) only

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To develop a burglar alarm using Arduino – Chapter 11: RC522 RFID module (III)

1. Sam wants to utilize an ultrasound sensor, so that any objects inside the <=100 detection range will cause the buzzer to sound. However, he discovers sometimes the buzzer will not sound even object distance <=100 cm is detected. Which may be the possible cause?

A. He forgets to program the sensor to temporarily stop running after dedicated object is detected
B. There is loud noise around the ultrasound sensor
C. No RFID card is registered beforehand
D. There is another device utilizing ultrasound sensor nearby

2. Consider there is a flag, named **A**, for storing the Boolean value of the object detection status. Which of the following descriptions are correct?
   I. If object detected → **A** = FALSE
   II. If object detected → **A** = TRUE
   III. If **A** = TRUE → stop sensors from running temporarily
   IV. If **A** ≠ TRUE → make buzzer to sound

A. (I) & (III) only
B. (II) & (III) only
C. (III) & (IV) only
D. (II), (III) & (IV) only

3. Puchi complains that even when he has reset the burglar alarm system using a registered RFID card, the buzzer then sounds again right after he reset the system. He then claimed either the RFID reader or the RFID card is defective. Do you agree with his claim? Justify your answer.