**IT203 – APPLICATION DEVELOPMENT AND EMERGING TECHNOLOGIES**

**FINAL PROJECT / REQUIREMENT**

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| **Project Title:** | Intelligent Mobility Stick / Smart Blind stick for deaf-blind person | | | | | |
| **Project Member/s:** | Kristine Angel Tadeo  Yvenn Torres  Viel Castañeda  Cristine Joy Tuscano  Princhel Joy Oca | | | | | |
| **Project Purpose/Description:** | There are many obstacles that blind people must overcome in their daily lives, one of which is having to navigate the streets and places where there are many vehicles and other obstacles that could obstruct their path or even hurt them. With this issue in mind, we designed a project that uses an ultrasonic sensor to detect obstacles in front of it.  This project is an attempt to develop an aid or a tool for visually impaired or even deaf-blind individuals. This will be an interactive technology with a major focus on assisting the blind in easily and safely navigating public spaces. The purpose of the smart blind stick is to allow the blind person better understand the direction he is traveling in.  Presented here is a smart stick built with an Arduino Uno. With the electronics integrated within the stick, it became a smart stick. This intelligent mobility stick will definitely help them to prevent injuries. This device sends an alarm to alert the user to the following risk, such as when they approach a stairway or set of steps where they could fall. *(Another purpose of the proposed smart stick is with the function of Global Positioning System (GPS), we can track the user’s whereabouts, this enables their friends, authorities, or family to track down a user in case of an emergency or when they suffer an accident while alone and away from home or in case of being lost.)*  Through this smart stick, visually impaired people could have a higher rate of self-dependency. They will have so much assistance because this mobility stick gives priority to safety and comfort. We hope we could improve or raise disability through technological Innovation. | | | | | |
| **Project Sketch:** | | | | | | |
| **Project Component/s:** (*Insert as many rows as needed.)* | | | | | | |
| **Component Name:** | | | **Components Image:** | | **Component Description/Specification:** | |
| 1. Arduino Uno R3 | | |  | | Microcontroller - ATmega328P / programmable open-source microcontroller board. | |
| 1. Ultrasonic Sensors | | |  | | Determines the distance of an object. | |
| 1. Buzzer | | |  | | Audio signaling device / produces sound when an electric current is passed through it. | |
| 1. Vibration Motor | | |  | | A DC motor in a compact size that is used to inform the users by vibrating on receiving signals. | |
| 1. Battery | | |  | | An extra power source / supplies power to the Arduino board. | |
| 1. Battery connector to Jack | | |  | | One end is snap for the battery, and another end is for the standard DC jack / connects the battery and the Arduino board through the jack. | |
| 1. Jumper Wires | | |  | | Has connector pins on both ends that may be used to connect two points without the use of solder / used for making connections between items on your Arduino board. | |
| 1. Breadboard | | |  | | A rectangular plastic board or a solderless device used to hold electronic components that are wired together to make electrical connections. | |
| 1. Resistors | | |  | | Regulates the flow of electrical current in an electronic circuit. | |
| **Project Schematics** *(Use circuito.io)***:**    Schematics with the main components.  Schematics with GPS and Bluetooth Module | | | | | | |
| **Schematic Description / Flow:** (*Explain Project Schematics)*  The main schematic diagram to build a smart **blind stick using ultrasonic sensor** is shown above.  As we can see an **Arduino Uno R3** is used to control all the sensors. The **Breadboard** is where the components are pushed into its sockets and the **jumper wires** are used to make connections on it and on the Arduino board.  The complete board is powered by a **9V battery** which is regulated and connected to the VIN pin in the Arduino board but in the proposed project, the 9V battery will be connected to the Arduino board’s **barrel jack**.  The **Ultrasonic sensors are connected to the breadboard and with the use of jumper wires, the ultrasonic sensor pins are connected to the board. On the first sensor,** the VCC pin of the sensor is connected to 5V through the breadboard, the Trig pin of the sensor is directly connected to Pin 4 in the Arduino, the Echo pin of the sensor is also directly connected to Pin 3 in the Arduino and lastly, the GND pin of the sensor is connected to GND pin in the Arduino through the breadboard. The same connections are done in the second ultrasonic sensor but the Trig and Echo pins are connected directly on Pin 6 and 7 in the Arduino board.  The output of the board is given by the **Piezo Buzzer**and **Vibration Motor**.  The Buzzer has two pins namely positive and negative. The positive pin is the longer terminal (red wire on a piezo buzzer) and it is powered through 5V whereas the negative pin or the shorter terminal (black wire on a piezo buzzer) is connected to the GND with a transistor and a 1k ohm resistor that will be connected on the Pin 2. While the Vibration Motor requires more power than an Arduino pin can provide, so a transistor is used to switch the motor current on and off. A 1k ohm **resistor** is connected to the output pin to the **transistor** base. The 1k ohm resistor will limit the amount and prevent too much current flowing through the motor, while the **diode** absorbs voltages produced by the motor so it could not damage the transistors. | | | | | | |
| **Project Component Cost:** *(Itemize the components to be used.)* | | | | | | |
| **Component Name:** | | **Quantity** | | **Unit Cost** | | **Total Cost** |
| 1. Arduino Uno R3 | | 1 | | 649 | | 649 |
| 2. Ultrasonic Sensors | | 3 | | 80 | | 240 |
| 3. Buzzer | | 1 | | 65 | | 65 |
| 4. Vibration Motor | | 1 | | 50 | | 50 |
| 5. Battery | | 1 | | 40 | | 40 |
| 6. Battery connector to Jack | | 1 | | 25 | | 25 |
| 7. Jumper Wires | | 20 | | 50 | | 50 |
| 10. Breadboard | | 1 | | 59 | | 59 |
| 11. Acrylic Case - Arduino | | 1 | | 55 | | 55 |
| **Grand Total:** | | | | | | ₱ 1,233 |
| **Project Code** *(Copy and Paste the entire code of your project)***:**  #define echo1 10  #define trig1 11  #define trig2 6  #define echo2 5  #define trig3 4  #define echo3 3  #define motor 13  #define buzzer 12  long duration1,distance1,duration2,distance2,distance3,duration3;  void setup()  { Serial.begin(9600);  pinMode(trig1, OUTPUT);  pinMode(echo1, INPUT);  pinMode(trig2, OUTPUT);  pinMode(echo2, INPUT);  pinMode(trig3, OUTPUT);  pinMode(echo3, INPUT);  pinMode(motor, OUTPUT);  pinMode(buzzer, OUTPUT);  tone(12, OUTPUT);  }  void loop()  {  digitalWrite(trig1, LOW);  delayMicroseconds(500);  digitalWrite(trig1, HIGH);  delayMicroseconds(800);  duration1 = pulseIn(echo1, HIGH);  digitalWrite(trig2, LOW);  delayMicroseconds(500);  digitalWrite(trig2, HIGH);  delayMicroseconds(800);  duration2 = pulseIn(echo2, HIGH);  digitalWrite(trig3, LOW);  delayMicroseconds(500);  digitalWrite(trig3, HIGH);  delayMicroseconds(800);  duration3 = pulseIn(echo3, HIGH);  distance1 = (duration1/2)/29.1;  distance2 = (duration2/2)/29.1;  distance3 = (duration3/2)/29.1;  Serial.print("Distance 1: ");  Serial.print(distance1);  Serial.print(" Distance 2: ");  Serial.print(distance2);  Serial.print(" Distance 3: ");  Serial.println(distance3);  if ( distance1 < 120 || distance2 < 120 || distance3 < 120 )  {  if ( distance1 <= 60 || distance2 <= 60 || distance3 <= 60 )  {  digitalWrite(motor,HIGH);  delay(500);  digitalWrite(motor,LOW);  delay(500);  noTone(12);  }  else if ( distance1 > 60 && distance1 < distance2 && distance1 < distance3 )  {  digitalWrite(buzzer, HIGH);  tone(12, 329, 500);  delay(500);  digitalWrite(buzzer,LOW);  delay(500);  }  else if ( distance2 > 60 && distance2 < distance1 && distance2 < distance3 )  {  digitalWrite(buzzer, HIGH);  tone(12, 329, 500);  delay(500);  digitalWrite(buzzer,LOW);  delay(500);  }  else if ( distance3 > 60 && distance3 < distance2 && distance3 < distance1 )  {  digitalWrite(buzzer, HIGH);  tone(12, 329, 500);  delay(500);  digitalWrite(buzzer,LOW);  delay(500);  }  }  } | | | | | | |
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| **Project Pictures** *(Minimum of 5 images)***:** | | | | | | |