WORKSHOP COURSE

Computer System Engineering Department

Sukkur Institute of Business Administration University

Smart Stick for Blind People

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Certificate

It is certified that I **Abdul Rehman** a student of **BE-I** has carried out the necessary work of **WORKSHOP** as per course of studies prevailed at the Computer System Engineering Department, Sukkur Institute of Business Administration for **FALL-2022.**

Date: _____ Instructor's Signature

ACKNOWLEDGMENTS

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Finally, I would like to thank everyone who, directly or indirectly, contributed to the successful completion of this project.

ABSTRACT

This project focuses on creating a **Smart Stick for the Blind**, a modern mobility aid designed to support the daily lives of visually impaired individuals. The main aim is to build a device that empowers blind people to move around safely and independently.

The stick will be able to detect common obstacles like **walls, doors, furniture, stairs**, and more. When an obstacle is detected, the device will alert the user through vibrations, sounds, or voice feedback — helping them make quick, safe decisions while walking.

The development will take place in **three key phases**:

Phase 1: Development
This includes building both the hardware (sensors, microcontroller, etc.) and software (obstacle detection, voice guidance) components of the device.

Phase 2: Testing
The smart stick will be tested in various controlled environments to ensure it works accurately and reliably.

Phase 3: Real-world Implementation
The device will be used in real-world scenarios to assess its effectiveness in daily use and make any necessary improvements.

The ultimate goal is to create a tool that makes everyday life safer and more manageable for blind individuals. By reducing the risk of injury and enhancing their ability to move freely, this project hopes to make a **positive and lasting impact** on the lives of those who need it most.

Chapter I

Introduction

Smart Stick for the Blind is a thoughtful and innovative tool designed to make life easier for people with visual impairments. It helps users move around more confidently by detecting obstacles in their path. The stick features sensors in both the handle and the tip, allowing it to sense objects nearby. When something is in the way, the handle gently vibrates to warn the user.

What makes it even more helpful is that the tip of the stick can be used to feel the shape and surface of the object, so the user can decide how best to move around it. There's also a built-in light indicator that flashes when something is close — a handy feature for those who may have some remaining vision or for others around the user to be aware.

This smart stick is lightweight, easy to carry, and designed with comfort in mind. It's affordable and simple to use, making it accessible for many people. Most importantly, it offers a stronger sense of safety and independence, helping users navigate their surroundings with greater ease and confidence.

Motivation:

Smart sticks for the blind are more than just walking aids — they're tools that can truly transform lives. By helping visually impaired individuals navigate their surroundings safely and confidently, these devices support a greater sense of independence and freedom.

Equipped with advanced sensors and smart technology, these sticks can detect obstacles and objects in the user's path. Once something is detected, the stick alerts the user — not just letting them know there's something ahead, but also providing helpful details like how far away the object is and sometimes even what kind of object it might be.

With this information at their fingertips, users can move around more easily, make informed decisions, and explore their world with much more confidence. It's a simple but powerful way to give people the freedom to live more independently, with dignity and assurance in every step they take.

Methodology:

Objective:

The primary goal of this project is to design and develop a **Smart Stick** that assists visually impaired individuals in identifying obstacles in their path. The device aims to enhance mobility, safety, and independence by using smart technology to detect potential hazards and alert the user in real-time.

Scope:

This project focuses on building a **Smart Stick** equipped with practical and user-friendly features such as:

- **Voice-based navigation** to guide the user through their surroundings,
- **Obstacle detection and avoidance** using sensors,
- **Real-time navigation assistance** to help users move confidently and safely.

The smart stick is designed to be lightweight, affordable, and easy to use, making it a valuable everyday tool for visually impaired people.

Chapter II

Requirements

• Requirements: for this project are:

1: Arduino (1)

2: Ultra sonic sensor (1)

3: LED (1)

4: Buzzer (1)

5: Stick (1)

6: Button (1)

7: Battery (9 V) (1)

8: Jumper wires

9: USB cable

1: Arduino

Arduino is an open-source electronics platform based on easy-to-use hardware and software. It is intended for anyone making interactive projects. Arduino boards are able to read inputs - such as light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE) based on Processing.

2: Ultra sonic sensor

An ultrasonic sensor is a device that measures distance by sending out ultrasonic sound waves and measuring the amount of time it takes for them to bounce back. It is often used in robotics, automation, and other similar applications. The sensor works by emitting a sound wave at a specific frequency, then measuring the time it takes for the sound wave to be reflected back to the source. This information can then be used to calculate the distance from the source to the object.

The ultra-sonic sensor measured distance by using this formula

Distance = (Time x Speed of Sound (in air)) / 2 where, Time = Time taken by the ultrasonic pulse to travel from the sensor to the object and back Speed of Sound (in air) = 343 m/s

3: LED

LED stands for Light Emitting Diode. It is a type of semiconductor device that emits visible light when an electric current passes through it. LEDs are used in a wide range of applications, including lighting, indicators, and displays.

4: Buzzer

A buzzer is an electric device that makes a buzzing sound. It is commonly used in alarm systems, doorbells, and other signalling applications. Buzzers are often used to indicate the completion of a task or process, or to alert an operator to a problem or issue.

5: Stick

A walking stick is a common item used by elderly people to help them walk more easily and safely. It is usually made of wood or metal and has a handle and a curved top.

6: Button

An electric button is a type of switch that is used to control electrical devices. It is usually a push-button type switch with two or more terminals that can be used to turn on or off the power to a device when pressed. Electric buttons are commonly used to control lights, machinery, and other electronic devices.

7: Battery

The battery is the most important part of any electronic device. It is responsible for powering the device and keeping it running.

8: Jumper wires

Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering.

9: USB cable

A USB cable is a cable used to connect devices to a computer or other USB-enabled device

CHAPTER III:

CONNECTION WITH COMPONENTS

Connection table

Arduino UNO	**Ultrasonic Sensor**
(+5V)	VCC
GND	GND
Pin 9	Trig Pin
Pin 10	Echo Pin
Arduino UNO	**Buzzer**
Pin 11	Positive Terminal
GND	Negative Terminal
Arduino UNO	**LED**
Pin 13	Anode Pin
GND	Cathode Pin

- Please make the connections according to the given **Smart blind stick circuit diagram**.
- Attach the 5-volts and GND pins of the Arduino to the VCC and GND pins of the ultrasonic sensor.
- Connect the TRIG and ECHO pins of the ultrasonic sensor with the digital-9 and digital-10 pins of the Arduino.
- Join the positive and negative wire of the buzzer with the digital-5 and GND pins of the Arduino.
- Attach the positive leg of the LED with the digital-13 pin of the Arduino and the negative leg of the LED with the GND pin of.
- Power the Arduino board using DC batteries

Chapter IV

Code for the Project

Software Requirements

1: Arduino

NOTE: You have to upload the given code to the Arduino.

```
// defines pins numbers
const int trigPin = 9;
const int echoPin = 10;
const int buzzer = 11;
const int ledPin = 13;

// defines variables
long duration;
int distance;
int safetyDistance;



void setup() {
pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output
pinMode(echoPin, INPUT); // Sets the echoPin as an Input
pinMode(buzzer, OUTPUT);
pinMode(ledPin, OUTPUT);
```

```
Serial.begin(9600); // Starts the serial communication
}



void loop() {
// Clears the trigPin
digitalWrite(trigPin, LOW);
delayMicroseconds(2);

// Sets the trigPin on HIGH state for 10 micro seconds
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);

// Reads the echoPin, returns the sound wave travel time in microseconds
duration = pulseIn(echoPin, HIGH);

// Calculating the distance
distance= duration*0.034/2;

safetyDistance = distance;
if (safetyDistance <= 5){
  digitalWrite(buzzer, HIGH);
```

```
  digitalWrite(ledPin, HIGH);
}
else{
  digitalWrite(buzzer, LOW);
  digitalWrite(ledPin, LOW);
}
```

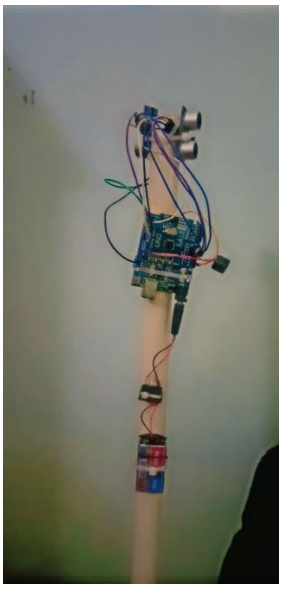
Chapter V

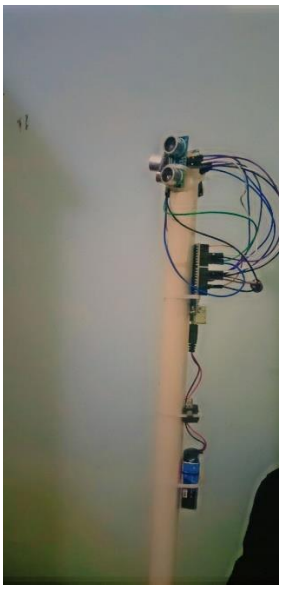
Algorithm

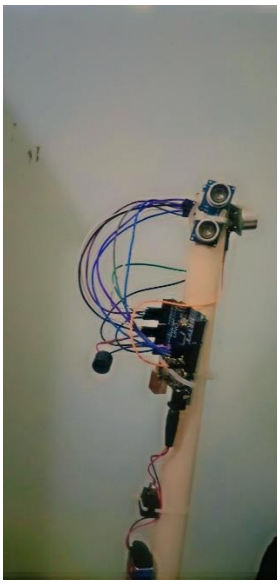
1. Start
2. Initialize sensors in the blind stick
3. Set the range of detection for the sensors
4. Collect data from the sensors
5. Process the data obtained from the sensors
6. Analyse the data and determine the obstacles in the path
7. Generate instructions for the user based on the obstacles detected
8. Send the instructions to the user in an audible or visual form
9. End

Chapter VI

PICTURE OF PROJECT





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CHAPTER VII:

Recommendations & Conclusion

Purpose

The purpose of the **Smart Blind Stick Project** is to develop a practical and reliable device that assists blind and visually impaired individuals in navigating their surroundings with greater ease and safety. By using a combination of sensors — such as **ultrasonic sensors** — the smart stick can detect nearby obstacles and alert the user in real-time. This helps reduce the risk of collisions and provides a sense of confidence and independence while moving around.

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Conclusion

The **Smart Blind Stick Project** has proven to be a meaningful step forward in supporting individuals with visual impairments. By offering a simple, user-friendly, and affordable solution, this project has helped empower blind and visually impaired people to move about with **greater confidence, independence, and ease**.

It has reduced the feelings of isolation, anxiety, and dependence that many visually impaired individuals often face by allowing them to navigate their surroundings more safely and accurately. The technology acts as a bridge — connecting users more confidently to their environment, services, and daily activities.

Beyond the device itself, this project has also played a valuable role in raising **awareness** about the everyday challenges faced by those with vision loss. It shines a light on the importance of inclusive innovation and encourages further efforts to build a more accessible world. Ultimately, this project has not only improved mobility but also contributed to **enhancing the overall quality of life** for its users.

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