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Design and Development of Spectech - Innovative Practices Report

S. Sanjay[1], S. Ragul[2], V. Bhuvanesh[3], P. Mohanane[4]

[1,2,3,4]Student, B.Tech, Robotics and Automation, Department of Robotics And Automation, Pondicherry University

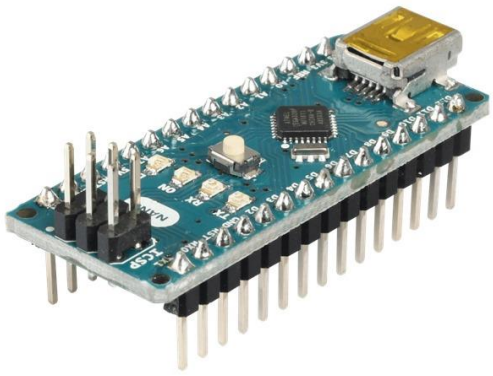
ABSTRACT

The Smart Glasses project is an assistive device to help users find misplaced glasses. Equipped with an Arduino Nano, microphone, IR sensor, LED, and buzzer, it detects a clap sound to activate the LED and buzzer, making the glasses easy to locate. The IR sensor detects when the glasses are being worn, preventing unnecessary alerts. Compact and user-friendly, the Smart Glasses offer a practical solution for those who frequently misplace their glasses.

COMPONENTS REQUIRED

1. Arduino Nano
2. Buzzer
3. LED
4. Microphone
5. IR Sensor
6. Spec
7. Small Battery

1. Arduino Nano



The Arduino Nano is a compact microcontroller board based on the ATmega328P. It's designed for prototyping and small projects, featuring 14 digital input/output pins, 6 analog inputs, a USB connection for programming, and a small form factor that makes it ideal for breadboarding and embedding in projects. Its versatility and ease of use make it popular among hobbyists and educators for creating interactive electronics and IoT applications.

2. Buzzer

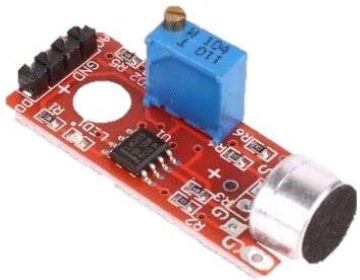
A buzzer is an electronic component that produces sound when an electrical signal is applied.

- **Active buzzers** have a built-in oscillator and produce sound when powered, usually at a specific frequency.
- **3.7 V Supply**

3. LED

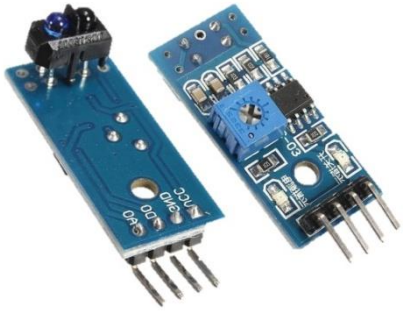
An LED (Light Emitting Diode) is a semiconductor device that emits light when an electric current passes through it. LEDs are energy-efficient, long-lasting, and available in various colors, depending on the materials used in their construction. They are widely used in displays, indicators, lighting, and decorative applications due to their low power consumption and durability. LEDs also have a fast response time, making them ideal for applications requiring quick illumination.

4. Microphone



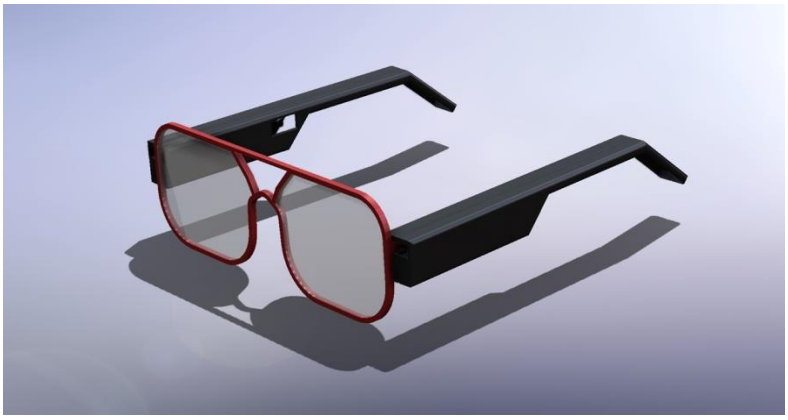
A microphone is an audio input device that converts sound waves into electrical signals. It captures sound through a diaphragm that vibrates in response to sound waves, generating a corresponding electrical signal. There are various types of microphones, including dynamic, condenser, and ribbon microphones, each suited for different applications such as recording, broadcasting, and live performances. Microphones are essential in communication systems, music production, and various electronic devices for capturing audio.

5. IR Sensor



An IR (Infrared) sensor detects infrared radiation, typically emitted by objects, and converts it into an electrical signal.

6. Spectacles



"Spec glasses," short for spectacles or prescription glasses, are eyewear designed to correct vision impairments. They feature lenses tailored to the individual's optical prescription, addressing issues like nearsightedness, farsightedness, and astigmatism. Spec glasses can also provide protection from UV light and digital screens, and they come in various styles and materials to suit different preferences and needs.

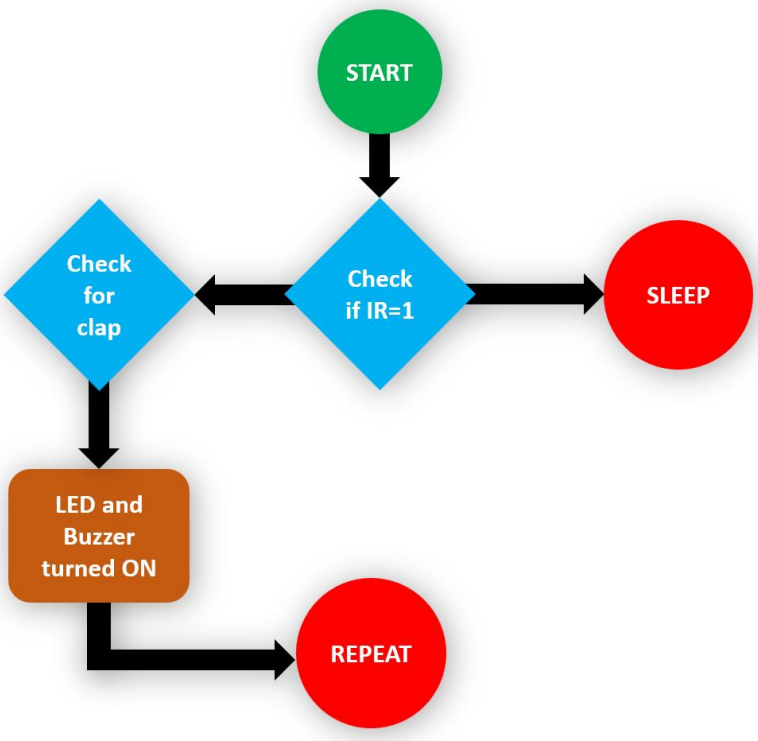
7. Small Battery

Li – po rechargeable Battrey , 3.7 v 450 mah battery capacity.

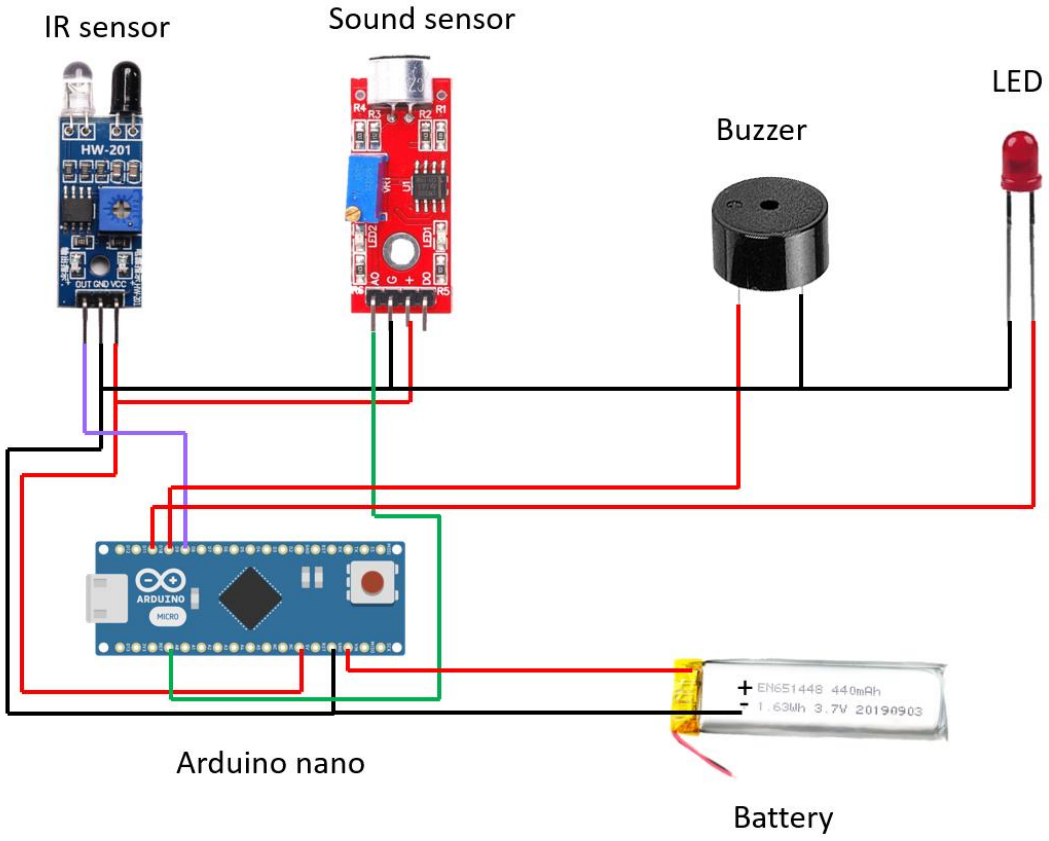
A 450 mAhLiPo (Lithium Polymer) rechargeable battery is a compact power source commonly used in devices like drones, RC cars, and portable electronics. The "450 mAh" indicates its capacity, meaning it can supply 450 milliamps of current for one hour before needing a recharge. LiPo batteries are known for their lightweight, high energy density, and ability to deliver high discharge rates, making them ideal

for applications where size and weight are critical. However, they require careful handling and charging to ensure safety and longevity.

FLOW CHART



CIRCUIT DIAGRAM



WORKING PRINCIPLE

1. **Power Supply**
   A compact battery powers the Arduino Nano and connected components, providing portability and supporting all system operations.
2. **Clap Detection**
   The microphone module listens for a clap sound. When a clap is detected, it sends a signal to the Arduino Nano for processing.
3. **Verify Wearing Status**
   The IR sensor detects if the glasses are being worn by sensing proximity. If the glasses are on the user, the IR sensor signals the Arduino to keep the system in standby mode.
4. **Make Sound or Not**
   If the clap is detected and the glasses are not being worn, the Arduino activates the LED and buzzer, producing a visual and audible alert to help locate the glasses.
5. **Standby Mode**
   When the IR sensor indicates the glasses are being worn, the system stays in standby, ignoring any clap sounds to prevent unnecessary alerts.
   This setup ensures alerts are only triggered when the glasses are misplaced and not being worn..

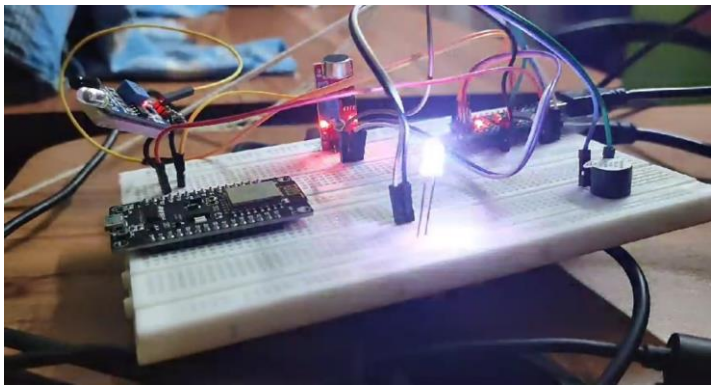
ARDUINO CODE

```
constintsensorPin = A0;        // Microphone connected to A0
constintledPin = 10;           // LED connected to pin 10
```

```
constint buzzer = 9;            // Buzzer connected to pin 9
constintirPin = 8;              // IR sensor connected to pin 8
constint threshold = 300;       // Threshold value for clap detection
constintledDuration = 2000;     // Duration to keep the LED and buzzer on in milliseconds
constintdebounceDelay = 200;    // Debounce delay in milliseconds

intclapCount = 0;               // Count of detected claps
unsigned long lastClapTime = 0;   // Last time a clap was detected
bool ledState = false;          // State of the LED and buzzer
unsigned long ledTurnedOnTime = 0; // When the LED and buzzer were last turned on

void setup() {
Serial.begin(9600);             // Initialize serial communication
pinMode(ledPin, OUTPUT);        // Set LED pin as output
pinMode(buzzer, OUTPUT);        // Set buzzer pin as output
pinMode(irPin, INPUT);          // Set IR sensor pin as input
digitalWrite(ledPin, LOW);      // Initialize LED to off
digitalWrite(buzzer, LOW);      // Initialize buzzer to off
}

void loop() {
intsensorValue = analogRead(sensorPin); // Read microphone input
intirValue = digitalRead(irPin);        // Read IR sensor output
// Check if sound level exceeds threshold, debounce time has passed, and IR sensor output is high
if (irValue == 1 &&sensorValue> threshold &&millis() - lastClapTime>debounceDelay) {
clapCount++; // Increment clap count
lastClapTime = millis(); // Update last clap time

Serial.print("Clap detected! Count: ");
Serial.println(clapCount); // Print the clap count

// Check if two claps have been detected
if (clapCount == 2) {
ledState = true; // Set LED and buzzer state to on
digitalWrite(ledPin, HIGH); // Turn LED ON
digitalWrite(buzzer, HIGH); // Turn buzzer ON
ledTurnedOnTime = millis(); // Record the time LED and buzzer were turned on
Serial.println("LED and Buzzer are ON");
clapCount = 0; // Reset clap count
}
}

// Check if the LED and buzzer should be turned off after the specified duration
```

```
if (ledState&& (millis() - ledTurnedOnTime>= ledDuration)) {
ledState = false; // Reset LED and buzzer state
digitalWrite(ledPin, LOW); // Turn LED OFF
digitalWrite(buzzer, LOW); // Turn buzzer OFF
Serial.println("LED and Buzzer are OFF");
}
// Reset clap count if IR sensor output goes low (prevents LED and buzzer from activating)
if (irValue == 0) {
clapCount = 0;
}
}
```

OUTPUT



APPLICATION

1. **Assistive Tool for the Elderly**
   The glasses provide a practical solution for elderly individuals who may frequently misplace their glasses, offering an easy way to locate them through clap detection.
2. **Aid for People with Memory Impairment**
   The project can assist individuals with memory-related conditions, helping them locate their glasses without needing to remember where they last placed them.
3. **Everyday Convenience**
   For anyone prone to misplacing their glasses, the Smart Glasses offer quick retrieval, saving time and reducing frustration.
4. **Enhanced User Accessibility**
   This project demonstrates a potential path for integrating other sensory detection technologies into wearable items, enhancing user convenience and accessibility.
5. **Prototype for Wearable IoT Devices**
   With additional connectivity, these glasses could serve as a basis for IoT wearables, opening doors for more advanced, connected assistive devices that provide real-time notifications and tracking.

CONCLUSION

The Smart Glasses project effectively addresses the issue of misplaced glasses by integrating an Arduino Nano, microphone, IR sensor, LED, and buzzer. With clap detection and wearing status verification, it provides timely alerts only when necessary, enhancing user convenience. This project showcases the

potential of wearable technology and assistive devices to improve daily life and demonstrates the importance of intuitive design in enhancing user experience.