

OVERVIEW OF COMPUTERS

PROJECT

SMART STICK FOR THE VISUALLY CHALLENGED

TEAM (Lab Batch-B)

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SMART STICK FOR THE VISUALLY CHALLENGED

PURPOSE / NEED

Visually impaired persons have difficulty to interact with and feel their environment. They have little contact with surroundings thus physical movement is a challenge for visually impaired persons. We know that visually impaired people are dependent on other human beings or some animals like trained dogs or a wooden stick for their movement indoor or outdoor.

Blind stick is a unique and effective tool designed for visually challenged people for improved and easy navigation.



SOLUTION

We propose an innovative blind stick that allows visually challenged people to navigate with ease using advanced technology.

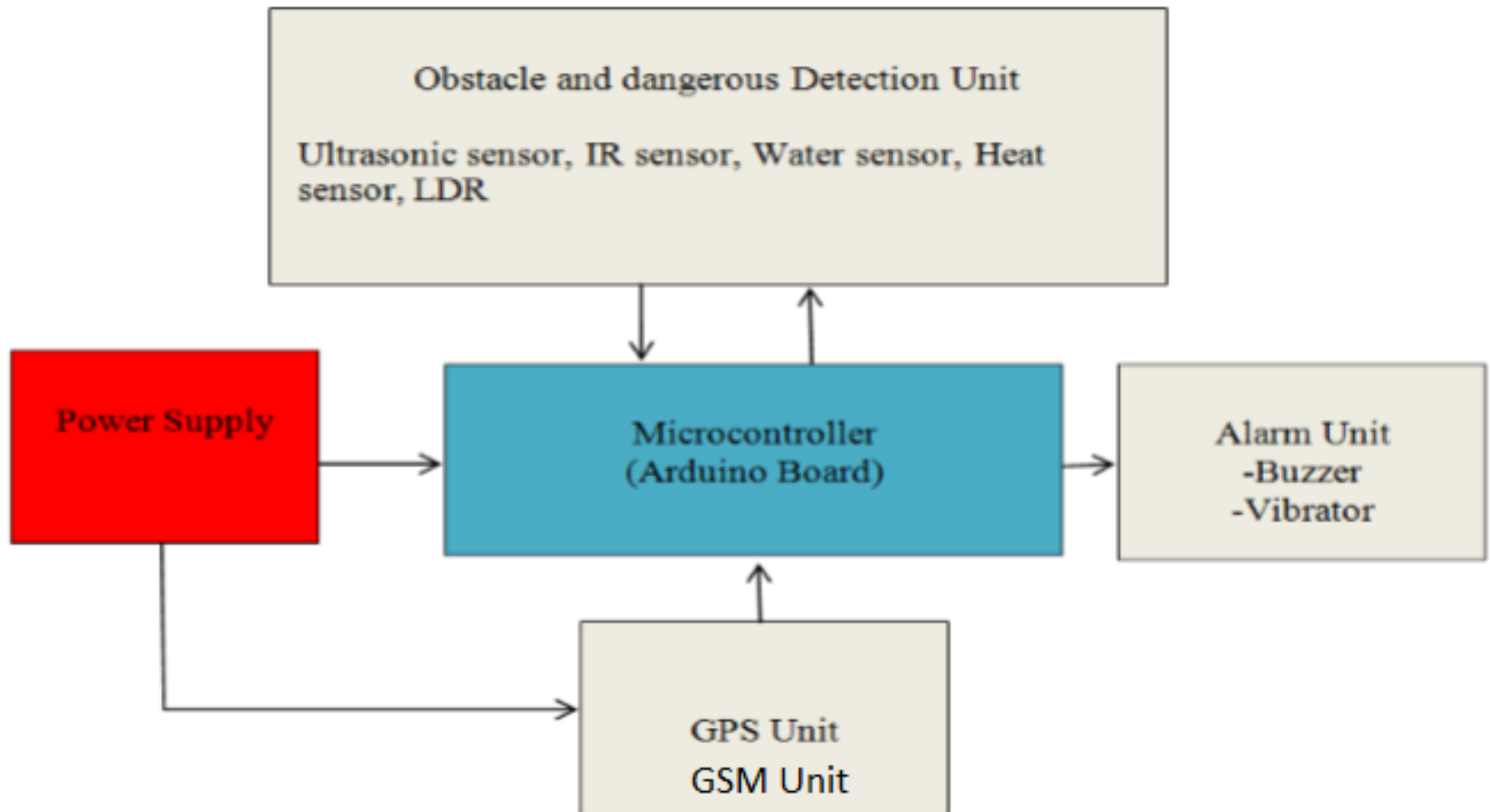
The system is designed with artificial vision and alarm unit. It consists of five sensors: ultrasonic sensor, IR sensor, water sensor, fire sensor, and light (LDR) sensor, microcontroller (Arduino Uno R3) to receive the sensor signals and process them to short pulses to the Arduino pins where buzzers, vibrator and voice alarms are connected.

GPS navigation can be used to guide the blind for new places and unfamiliar places. The blind man uses an earphone to listen to the navigation directions that are coming from the GPS and buzzer alarm to warn by sound.

We introduce the features of safety by using GSM Module which will help the guardian of the blind subject to trace the location as they will receive the SMS of the location on their phone if their subject is lost somewhere or is in some panic situation.



BLOCK DIAGRAM



Proposed System Design of the Smart Stick

HARDWARE DESCRIPTION

Arduino Uno R3 (MICROCONTROLLER)

The Arduino Uno R3 is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. Arduino can control the environment by receiving input signals (Digital/Analog) and can effects its surroundings by controlling lights, relays and other devices. The microcontroller on the board is programmed using Arduino software.



SENSORS

(1) Ultrasonic Sensor: An ultrasonic sensor is an instrument that measures the distance to an object using **ultrasonic sound waves**. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that **relay** back information about an object's **proximity**. pending on the distance of the obstacle from the person four zones are formed: far zone, near zone, close zone and danger zone. If the detected object is at 4 meter or more then it comes under far (safe) zone. If the object is found at 2 meter or more then it comes under near zone, if the object is found at 1 meter or more then it comes under close zone, and if the object is detected at less than 1 meter then it comes under danger zone. A voice instruction along with vibrating alert and a buzzer voice will be send to user at every zone to alarm him and let people around that blind person to help him.



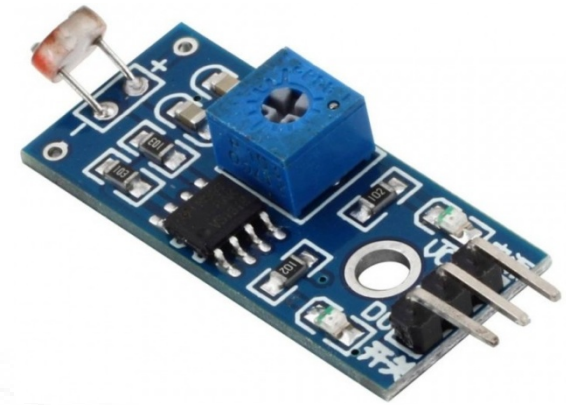
A blue PCB module featuring a 555 timer IC, two LEDs (one clear, one black), a potentiometer, and various passive components. It has a 3-pin header at the bottom labeled 'OUT GND VCC' and 'M4-4'.



Funduino

LM35DZ TO-92
PINOUT DIAGRAM

(5) LDR sensor: Light Dependent Resistor, changes its resistances due to change of the light intensity. During night, LDR will have high resistance and no current pass through it but through a LED connected parallel to it which illuminates and acts as a Flashlight, which can be easily noticed by others. It alerts people about the presence of blind person to let him to pass the way.



Alarm unit

The person is informed through a vibrator and a beep sound of buzzer. It consists of two parts:

(1) Buzzer- A transducer (converts electrical energy into mechanical energy) that typically operates A buzzer is in the lower portion of the audible frequency range of 20 Hz to 20 kHz. This is accomplished by converting an electric, oscillating signal in the audible range, into mechanical energy, in the form of audible waves. Buzzer is used in this research to warn the blind person against obstacle by generating sound proportional to distance from obstacle .



(2) Vibrator- A vibrator motor is included to enhance the overall feedback for the person who receives the warning against obstacles closeness in different formats of vibrations.



GPS Unit

The global position of the user is obtained using GPS, and their current position and guidance to their destination will be given to the user by voice.

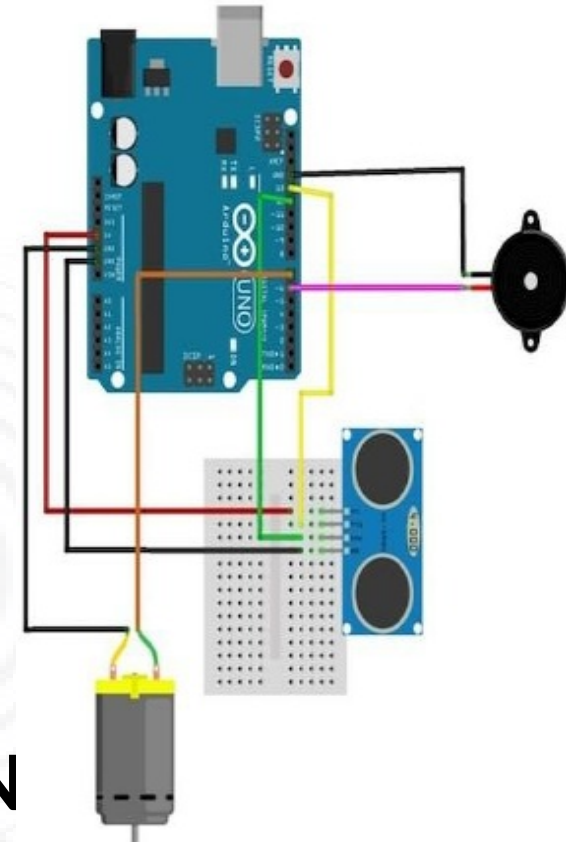
GSM Unit

It will help the guardian of the blind Subject to trace the location as they will receive the SMS of the location on their phone if their subject is lost somewhere or is in some panic situation. Its based on time division multiple access(TDMA) system.

SOFTWARE DESCRIPTION

Arduino uno board IC is programmed with Language C and used for the interfacing of various sensors and GPS , GSM module. It is done using an Arduino IDE. The **Arduino** integrated development environment (**IDE**) is a cross-platform application (for Windows, macOS, Linux) that is written in the **programming** language Java. It is used to write and upload **programs** to **Arduino** board.

Arduino Connections



CONCLUSION

With the proposed architecture, if constructed with at most accuracy, the blind people will be able to move from one place to another without other's help, which leads to increase autonomy for the blind. The developed smart stick that is incorporated with multiple sensors , GPS unit , and GSM unit will help in navigating the way while walking and keep alarming the person if any sign of danger or inconvenience is detected.

CHALLENGES

This proposed Smart stick is expensive .
Durability may be an issue.

FEASIBILITY

The hardware specifications or requirement of this project is not complicated and it has a minimal software requirement.

REFERENCES

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THANK YOU