
THE SMART CANE. AN IR SENSOR-BASED OBSTACLE AVOIDING CANE FOR VISUALLY CHALLENGED.



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TECHANALOGY

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Abstract

Nearly 12 million people out of India's whole population are blind, making India home to one-third of the world's blind population. And not all of these people get proper aid for their blindness. Hence the need of the hour is to provide a low-cost aid to visually challenged people to make their daily life easier. The "SMART CANE" is a solution to one of the biggest problems for the visually challenged that is, travelling. Almost all visually challenged people depend on a simple cane for travelling or just moving. The use of a cane is difficult and sometimes misleading. Thus, a smart low-cost solution is a SMART CANE. Unlike the normal canes, this uses sensor technology to detect obstacles making it reliable for the desired population.

Introduction.

The SMART CANE is meant to provide a low-cost solution to some of the most basic needs of visually challenged people. Hence a simplistic design fit for daily use was ensured. The design of the cane has not been changed as it remains useful in extending the feature of the project. The Smart Cane uses an Infrared sensor to detect the obstacles on the way. It's better and more efficient than the conventional means as it is not dependent on the human senses. A prototype has been made to test the feasibility of the model and has been discussed later in the report.

Construction of SMART CANE.

The Smart Cane consists of the following essential parts,

1. The Cane.
2. Assisting Wheel.
3. IR sensor.
4. Arduino Nano.
5. Buzzer and an LED.

1. THE CANE.

The Cane can be made of any material depending upon the requirement of the user. In our case, we have used a hollow cane made of PVC to ensure lightweight without compromising the strength. The cane makes the main body of the model and also works as a housing for the whole circuitry to stay.

The Arduino Nano is placed with a 9V battery as a power source and a switch near the handle of the cane for ease of accessibility. The IR sensor and the buzzer is placed near the assisting wheel in the lower part of the cane to increase the range of the sensor to detect the obstacles.

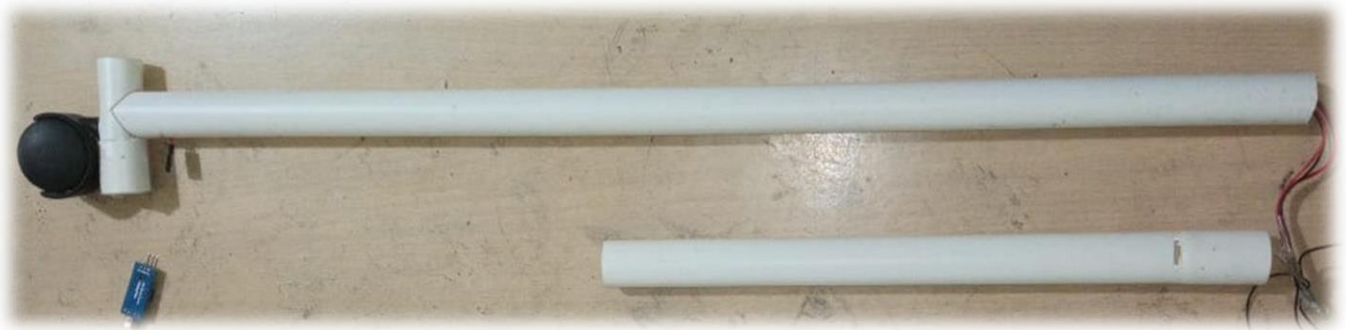


Fig 1 THE CANE

2. The Assisting Wheel

It is an additional component in the cane just for convenience. It also helps in keeping the IR sensor at a minimum height above the ground to avoid erroneous detections.

3. The IR Sensor.

It is the main component of the cane. The sensor works on the principle of detection of reflected waves at some distance. The sensor comprises an emitter LED and a receiver photodiode. On receiving a reflected wave at a minimum distance of 10-15 cms the sensor detects the obstacle.



Fig 2 IR Sensor.

4. Arduino Nano

The Arduino Nano is the brain of the device. The microcontroller is coded to activate the buzzer and LED to warn the user of the obstacle. The small and compact size of Nano makes it the best available microcontroller for the project.

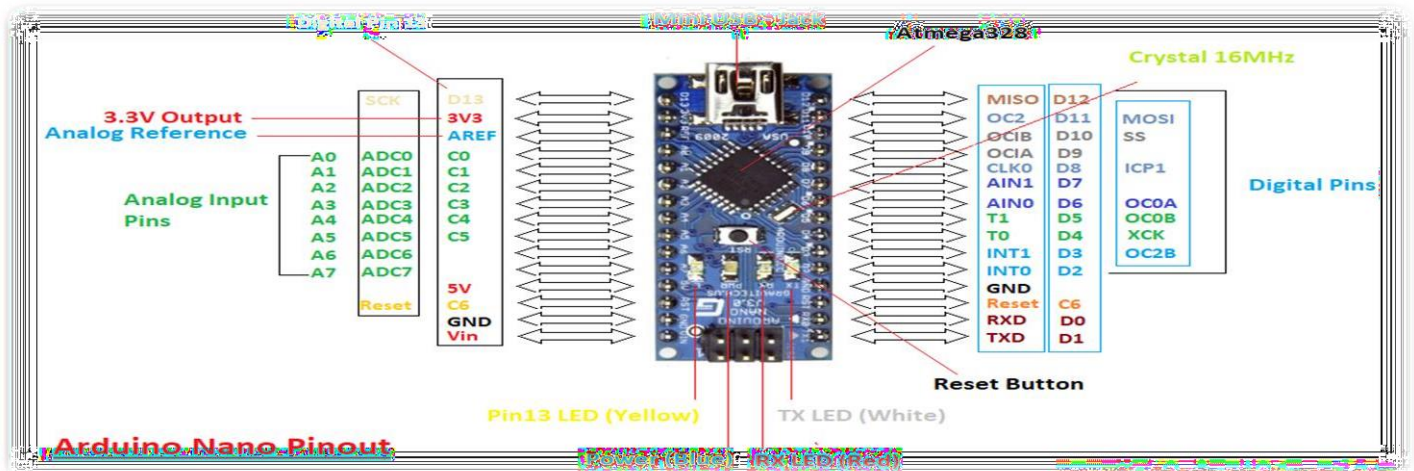


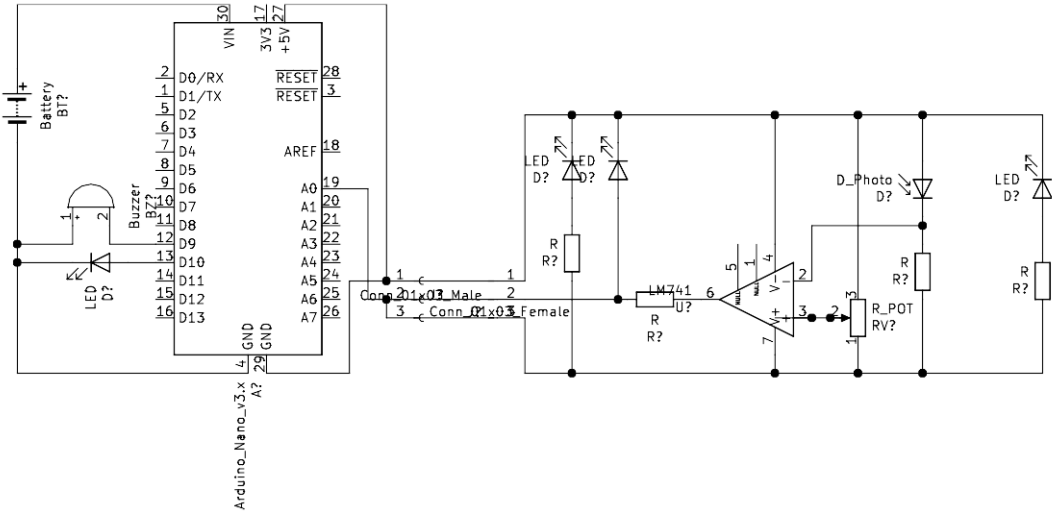
Fig 3. Arduino Nano

5. The Buzzer and LED

The buzzer and LED are used for alarming the user in case of any obstacle.



Fig 4. Buzzer and LED



M/C – Arduino Nano
IR sensor based Obstacle detection.

Tech Analogy

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Title: Schematic of IR sensor based Obstacle detection using arduino.

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The CODE.

```
// Analog input pin that the potentiometer is attached to
```

```
int analogInPin = A0;
```

```
int led =10;
```

```
int buzzer =9;
```

```
// value read from the pot
```

```
int sensorValue = 0;
```

```
void setup()
```

```
{
```

```
  // initialize serial communications at 9600 bps:
```

```
  Serial.begin(9600);
```

```
  pinMode(led, OUTPUT);
```

```
}
```

```
void loop()
```

```
{
```

```
  // read the analog in value:
```

```
  sensorValue = analogRead(analogInPin);
```

```
  Serial.print("sensor = " );
```

```
  Serial.println(sensorValue);
```

```
  delay(200);
```

```
  if(sensorValue<80)
```

```
  {
```

```
    digitalWrite(led,HIGH);
```

```
    digitalWrite(buzzer, HIGH);
```

```
  }
```

```
  else
```

```
  {
```

```
    digitalWrite(led,LOW);
```

```
    digitalWrite(buzzer, LOW);
```

```
  }
```

```
}
```

WORKING

The principle of an IR sensor working as an Object Detection Sensor can be explained using the following figure. An IR sensor consists of an IR LED and an IR Photodiode; together they are called as Photo – Coupler or Opto – Coupler.

When the IR transmitter emits radiation, it reaches the object and some of the radiation reflects the IR receiver. Based on the intensity of the reception by the IR receiver, the output of the sensor is defined.

The output of the sensor is then received by the microcontroller which is set on the LED and the buzzer to alarm the user.

Scope Of Development.

The current project is one of the simplest possible solutions available around us. With the type of technology, we are surrounded by so much more may be possible. But stating about the project the sensor works within a very short range which may be rectified with the help of a better sensor or different sensor. The use of a camera may be a better option with the help of the Open CV library, the extent of correct obstacle detection will be increased.

CONCLUSION.

The Smart Cane may be a simple solution to a problem, but has a lot of scope for development with the current tech that we have. The use of an IR sensor may not be the best solution but is indeed a cost-effective one. The overall price of the whole equipment is roughly about Rs. 500 making it one of the best available options in the market.

Visually Challenged people face several problems every day. The above technology is not a solution to all of their problems, but rather a solution to a better living. Similar models with better technology may be made to give them the best life possible.

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