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Design of an Intelligent Electric Vehicle for Obstacle Avoidance

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Abstract: - As the technology increases we can solve many problems of the people. There are lots of persons who cannot walk very easily due to blindness. For them travelling with safety is a major problem. An intelligent electric vehicle is thus required to solve their problem. The vehicle is made with a lot of technologies such as obstacle detection, edge detection and road detection, Infrared based we propose a design of completely intelligent electric vehicle for blind. The vehicle is designed in such a way that it can climb footpaths, we propose an intelligent system for guiding individuals who are blind or partially sighted. The system is used to enable blind people to move with the same ease and confidence as a sighted people. The system is linked with a GSM-GPS module to pin-point the location of the blind person and to establish a two way communication path in a wireless fashion. A beeper, an accelerometer sensor and vibrator are also added to the system. The whole system is designed to be small and light weight. The results have shown that the blinds that used this system could move independently and safely.

Keywords:-Artificial Intelligence, Obstacle Avoidance, GPS & GSM, Short Message Service (SMS)

I.INTRODUCTION

Independent mobility is a key component in maintaining the physical and psychosocial health of an individual. Further, for people having blind, independent mobility increases vocational and educational opportunities, reduces dependence on caregivers and family members, and promotes feelings of self-reliance. Psychologically, a decrease in mobility can lead to feelings of emotional loss, anxiety, depression, reduced self-esteem, social isolation, stress, and fear of abandonment. Even though the benefits of powered mobility are well documented, the safety issues associated with operation of

Powered vehicles often prevent clinicians and rehabilitation practitioners from prescribing powered mobility. So we are introducing an intelligent vehicle for blind. This vehicle is powered by rechargeable battery. It can be operated in automatic as well as in manual mode. A lot of features are there in this vehicle which makes it distinguishable from other suggested vehicles. The vehicle can be used for blind, handicapped and elders.

MAIN ADVANTAGES

l. Design: The vehicle is designed in such a way that it can climb footpaths or steps of size 10- 12 cm.

II. Navigation: The GPS with map is used to find the location.

III. Obstacle Avoidance: The IR sensor is used to detect and avoid the obstacles.

IV. Mobile Service: The text to speech and speech to text servicing is provided for GSM communications. .Voice Commanding: The vehicle works based on voice commands.

II.LITERATURE SERVAY

In year 2012 the paper Advanced Driving Assistance Systems for an Electrical vehicle was written by Pau Mufloz-Benavent , Leopoldo Armesto,Vicent Girbe ‘s ,J. Ernesto Solanes, Juan Dols,Adolfo Mufloz,and Josep Tornero is implemented Robotics Operating System framework.This paper describes the automation of a Neighborhood Electric Vehicle (NEV) and the embedded distributed architecture for implementing an

Advanced Driving Assistance System (ADAS) with haptic, visual, and audio feedback in order to improve safety's year 2013 the paper Automated Mobility and Orientation System for Blind or Partially Sighted People was written by Abdel Ilah Nour Alshbatat, in this paper blind people use a traditional canes.

A tool for directing them when they move from one place to another. Although, the traditional cane is the most widespread means that is used today by the visually impaired people, it could not help them to detect dangers from all levels of obstacles Sensors are used in everyday objects such as touch-sensitive elevator buttons (tactile sensor) and lamps which dim or brighten by touching the base, besides innumerable applications of which most people are never aware. With advances in micro machinery and easy-to-use micro controller platforms, the uses of sensors have expanded beyond the most traditional fields of temperature, pressure or flow measurement,[1] for example into MARG sensors. Moreover, analog sensors such as potentiometers and force-sensing resistors are still widely used. Applications include manufacturing and machinery, airplanes and aerospace, cars, medicine, and robotics. it is also included in our day-to-day life.

III. AIMS AND OBJECTIVE

An intelligent electric vehicle is thus required to solve their problem. The vehicle is made with a lot of technologies such as obstacle detection, edge detection and road detection. Infrared based Obstacle avoidance, GPS and Map based location guidance for vehicle, GSM based emergency servicing. The vehicle is designed in such a way that it can climb footpaths. The vehicle is designed and useful for real world.

IV .PROBLEM DEFINITION

The design of an electric vehicle is divided into several systems and which are again subdivided into several subsystems to reduce complexity. The design includes:
Sensor techniques

- Speech to text and text to speech interface for GSM
- Interfacing of GPS and map with voice commands.

- **Sensor techniques Infrared (IR) sensors:-**

IR sensors are widely used as proximity sensors and for obstacle avoidance in robotics. They offer lower cost and faster response times than ultrasonic (US) sensors. However, because of the iron-linear behavior and their dependence on the reflectance of surrounding objects, measurements based on the intensity of the back-scattered IR light are very imprecise for ranging purposes. For this reason, environment maps made with this type of sensor are of poor quality, and IR sensors are almost exclusively used as proximity detectors in mobile robots.

A sensor is a device that detects and responds to some type of input from the physical environment. The specific input could be light, heat, motion, moisture, pressure, or any one of a great number of other environmental phenomena. The output is generally a signal that is converted to human-readable display at the sensor location or transmitted electronically over a network for reading or further processing. Here are a few examples of the many different types of sensors:-

In a mercury-based glass thermometer, the input is temperature. The liquid contained expands and contracts in response, causing the level to be higher or lower on the marked gauge, which is human-readable.

An oxygen sensor in a car's emission control system detects the gasoline/oxygen ratio, usually through a chemical reaction that generates a voltage. A computer in the engine reads the voltage and, if the mixture is not optimal, readjusts the balance.

Motion sensors in various systems including home security lights, automatic doors and bathroom fixtures typically send out some type of energy, such as microwaves, ultrasonic waves or light beams and detect when the flow of energy is interrupted by something entering its path.

A photo sensor detects the presence of visible light, infrared transmission (IR), and/or ultraviolet (UV) energy.

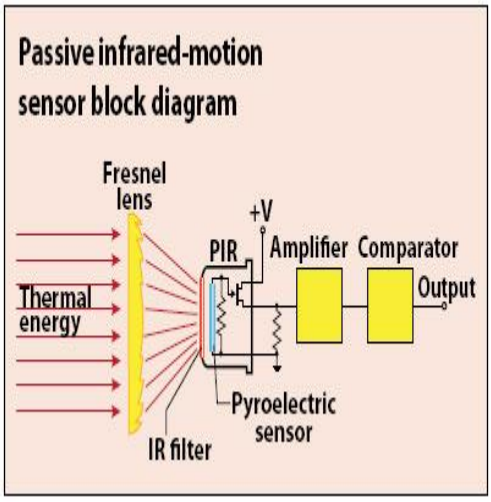

Fig :-IR Sensors (A)

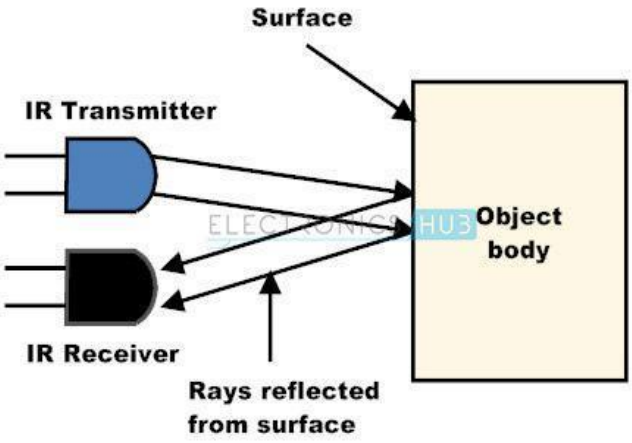

Fig :-IR Sensors (B)

Both the figure shows the working of sensors according to application needed .

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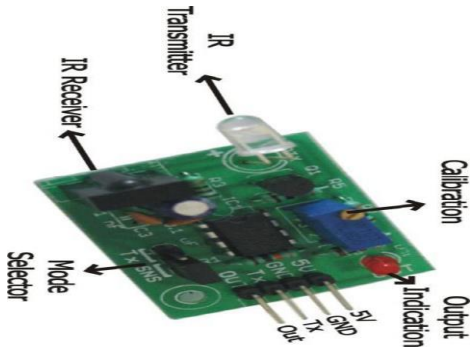
parameters like the fundamental frequency (pitch), duration, position in the syllable, and neighboring phones. At run time, the desired target utterance is created by determining the best chain of candidate units from the database (unit selection). This process is typically achieved through specially weighted decision tree.

- **Interfacing of GPS and Map with Voice Commands**

Using android, a voice guided navigation system is made by interfacing with GPS map. So blind can find the destiny and can reach the place with the help of vehicle. The voice guided navigation is coded and it is send as a

2 bit data to ECU, where it decodes and generates control signals to run the motor. ECU commands the motor driver for any action by considering all sensor outputs and the GPS guided output.

V. WORKING



FEATURES

- Range of around 25 cm o Input Voltage: 5V DC
- Comes with an easy to use digital output
- Can be used for wireless communication and sensing IR remote signals
- Uses the popular TSOP1738 for sensing IR signals and works on the 38 kHz frequency
- Sensor comes with ambient light protection
- The sensor a hole of 3mm diameter for easy mounting.

The board can be used in two modes – as an obstacle sensor and in the other as an IR signal receiver and transmitter. The two modes can be selected with the mode selector jumper. Putting the jumper in one position (SNS) will make the sensor work as an obstacle sensor and putting it in the other position (Tx) will put the sensor in the IR signal receiving and transmitting mode. In the both the modes the sensor works on 5V input provided to the header pins labeled 5V and Gnd.Please take note not to apply voltages exceeding 5V and observe the right polarity while making connections. When using the sensor as an obstacle sensor, apply 5V at the input pins and get the output at the Output pin (Out).

The sensor provides a digital output. The sensor outputs a logic zero (0V) when an object is placed in front of the sensor and a logic one (5V), when there is no object in front of the sensor. An onboard LED is used to indicate the presence of an object. The sensor can be used to detect signals from IR remotes that work on the 38 kHz sensor modules, one for transmitting the signals and other for receiving it. To do wireless communication, put the mode selection jumper to the Tx position on both the modules. Any signal (0V or 5V) applied to the Tx pin on the transmitter will appear at the Out pin on the Receiver. You may use this setup to do simple and short range IR communication. The Calibration potentiometer is used to tune the transmitter's pulses to 38 kHz. The sensor gives maximum range when the transmitter is emitting pulses at 38 kHz. For best performance, tune it with a screw driver until you get maximum range from the sensor.

VI.CONCLUSION

This paper presents the architecture of Intelligent Electric vehicle using embedded system and digital image processing techniques. Features associated with it are Obstacle avoidance, Footpath climbing, Road and Edge detection, GPS based navigation assistance , for the assistance to all handicapped peoples to handle all routine life easily with use of high technological power in low price which is affordable to all and ease technology .

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