



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Special Issue 1, April 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118

9940 572 462

6381 907 438

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www.ijirset.com

International Journal of Innovative Research in Science, Engineering and Technology
An ISO 3297: 2007 Certified Organization *Volume 11, Special Issue 1, April 2022*
9th National Conference on Frontiers in Communication and Signal Processing Systems (NCFCSPS '22)
28th -29th April 2022

Organized by

Department of ECE, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India

Intelligent Glove Using LIDAR sensor for Blind People

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ABSTRACT:The aim is to present an intelligent glove system to help blind people walk by themselves through the streets, navigate in public places and seek assistance. The motive is implementing a model of 'Intelligent Glove', a hand mounted vibration motor feedback vibrate Navigation and LIDAR sensor for obstacle detection system, by warning through vibration motors for visually impaired to whom traveling in indoor and outdoor environments is really a difficult task. This system acts as an electronic traveling Aid providing independent mobility of the visually impaired. This model comprises of a glove strapped to the wrist, embedded with LIDAR sensors, battery, microcontroller, vibrator motors and GPS & GSM module .Along with being completely reliable, this system also provides to be a cost-effective guidance for the visually impaired. The system is designed with a LIDAR sensor which also provides a good range in the detection of the obstacle. The detected obstacle is immediately notified to the possessor thereby the presence of obstacle along is conveyed to the visually impaired person by means of a vibration motor. The blind person GPS location can be tracked and sends SMS to caretaker by using GSM communication.

KEYWORDS:LIDAR sensor, Vibration motor, LCD display, Arduino Nano, GSM and GPS module.

I. INTRODUCTION

Blindness is that the condition of lacking visual observation thanks to neurologic and physiological factors. The most important challenge featured by the blind pedestrian in their everyday life is secure quality. in keeping with the globe Health Organization (WHO) in 2012, out of seven billion international population 285 million peoples area unit visually impaired associate degreeed thirty-nine million were whole blind out of that nineteen million people area unit youngsters (below fifteen years) and this range is growing at a baleful rate. So, some navigation system is needed to help or guide these folks. Several analysis area unit being conducted to make navigation system for blind folks. Most of those technologies have boundaries as its challenges involves accuracy, ability, usability, coverage that isn't simple to beat with current technology for each indoor and out of doors navigation. the incapacity and technology area unit thought-about as 2 cooperative words, by exploiting advances in biotechnology technology, good solutions are planned for reducing the malady impact (artificial body components, increased reality sensors, etc..). The trouble in rising the usability of technological devices for impaired folks, the uncanny vale has been stuffed up and that we face at threshold of a brand new era in adopting these cyber-physical systems. This paper focuses the matter of visually impaired folks, proposing a wise device that helps to enhance their quality. The white cane is employed as a tool by the visually impaired folks for quality everywhere the globe, it's used not solely to observe obstacles, however conjointly to alert others on the bearer's disablement. The population of Asian nation has reached a hundred and twenty large integer out of these eight.90 Cr. folks area unit visually impaired. 90%of those cannot travel severally. During

this paper, we tend to gift a system for navigation of visually impaired folks light varied technologies with helps in exploitation much, helps in operating and to overcoming the challenges and also the necessities of blind folks. In recent years, several technologies are introduced to assist the physically challenged and to create their life simple. The motive of our project is that the same that is to assist the blind community. We tend to hope to create this happen by introducing a intelligent glove for the betterment of blind people’s life. The aim of this project is to assist the blind to measure life a step nearer thereto of a standard person. The user will customise the glove in keeping with his desires and access it with none struggle. It's conjointly higher than a stick since the user will carry it in their pockets and might use where they have it.

II. RELATED WORK

[1] Sylvain Cardin, Daniel Thalmann and Frederic Vexo, “Wearable Obstacle Detection System for visually impaired people”.The system has a great potential for future application requiring obstacle detections while navigating in environment. The surface colour of obstacles does not affect the detecting ability of ultrasonic sensor.

[2] FrenkelRaymond S,Coded pulse transmission and correlation for robot ultrasound ranging from a long cane platform. The code pulse approach was to generate a transmit pulse with an embedded binary code.Transmit pulse generated by phase modulating a 40 KHZ carrier signal with a 13-bit code word.Drawback of disrupting ordinary hearing of the user. The cost is potentially high.

[3] F.Vander Heijdeng, P.P.L. regtien Arduino Based Mobility canel.The designed mobility stick which is low cost, sturdy, and robust can be easily operated uses ultrasound sensors for detecting the obstructions before direct contact.In this project, they are proposing a stick with ultrasonic sensor. Our main motive is to make every blind people to walk without a stick

III. METHODOLOGY

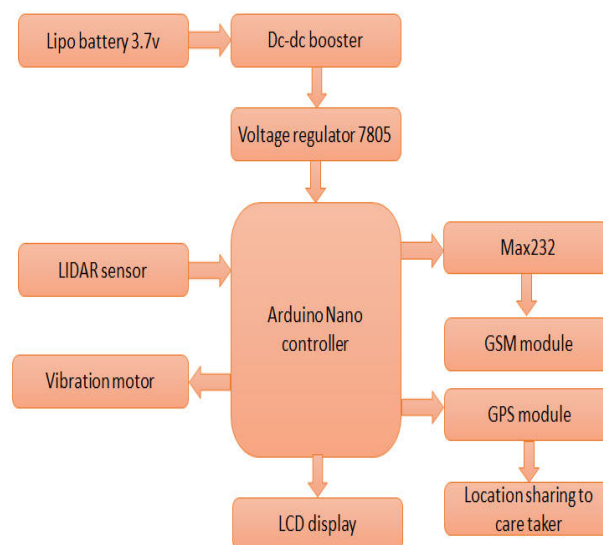


Figure 1:Block diagram

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The Glove consists of Lipo Battery, DC-DC Booster, LIDAR sensor, Arduino Uno microcontroller, voltage regulator 7805, vibration motor, LCD display, GSM/GPS module. The Arduino Nano controlling board is controlling the whole circuit. The LIDAR sensor is used for detecting the obstacle, if the obstacle is detected means the vibration motor gets activated and alert the blind people to navigate. The navigation location of the blind person can be tracked by using GPS module and send SMS alert to caretaker by using GSM communication. The Lipo battery is used for power source. A blind person can walk without a stick and without any struggle by using intelligent glove. The LIDAR sensor acts as a stick. If there are obstacles along the way, there will be a variation in the reflection time of the beam. The vibration will depend on the level of reflection time. In addition to that we have the feature of sharing the location of the blind person every 5 mins by using GSM communication. A blind person can customise the time it takes for the reflection to bounce back according to their height. The weight of the glove is comparatively much lesser than the stick. The glove is more comfortable and efficient in working compared to the stick.

A. Arduino Nano Controller



Figure 2: Arduino Nano Controller

Arduino Nano comes with a quartz oscillator of frequency 16 megacycle it's accustomed turn out a clock of precise frequency victimisation constant voltage. There's one limitation of victimisation Arduino Nano i.e. it does not associate with a DC power jack, which suggests you cannot offer associate degree external power supply through electric battery.

B. LIDAR Sensor



Figure 3: LIDAR Sensor

A Lidar sensor calculates how long it takes for beams of light to hit an object or surface and reflect back to the laser scanner. The distance is then calculated using the velocity of light. These are known as Time of Right measurements

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C. Vibration motor



Figure 4:Vibration motor

Micro Vibration Motor, It is a brushed type vibrating motors that are widely used for smart watches, fitness trackers and their wearable devices. The function of the coin vibrating motors are used for providing customer with haptic feedback, alarms or massaging.

D.GSM Module

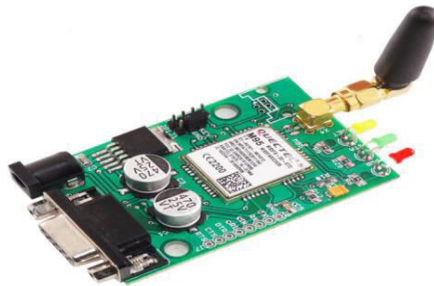


Figure 5:GSM Module

The SIM900 may be a complete Quad-band GSM/GPRS resolution in a very SMT module which might be embedded within the client applications. That includes AN industry-standard interface, the SIM900 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in a very little kind issue and with low power consumption

E.GPS Module



Figure 6:GPS Module

The NEO-6M GPS module may be a well-performing complete GPS receiver with a integral twenty five x twenty five x 4mm ceramic antenna, that provides a powerful satellite search capability. With the facility and signal indicators, you'll monitor the standing of the module.

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F. Lipo Battery



Figure 7:Lipo battery

LiPo battery cells are a unit that they need regarding fourfold the energy density of nickel metal or nickel metal binary compound batteries. LiPo batteries are a unit that are terribly light-weight and pliable, and might be created to virtually any size or form.

G.DC-DC Booster



Figure 8:DC-DC Booster

A boost converter (step-up converter) may be a DC-to-DC power converter that steps up voltage (while stepping down current) from its input (supply) to its output (load).

H.Voltage regulator 7805

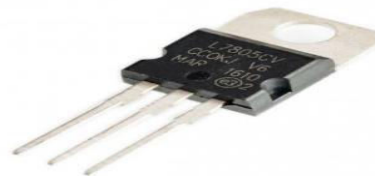


Figure 9:Voltage regulator 7805

The LM7805 is a voltage regulator that outputs +5 volts. Like most other regulators in the market, it is a three-pin IC; input pin for accepting incoming DC voltage, ground pin for establishing ground for the regulator, and output pin that supplies the positive 5 volts.

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LLCD Display:



Figure 10:LCD Display

A LCD has liquid material sandwiched between 2 sheets of glass. With none voltage applied between clear electrodes, liquid molecules area unit aligned in parallel with the glass surface.

V. EXPERIMENTAL RESULT

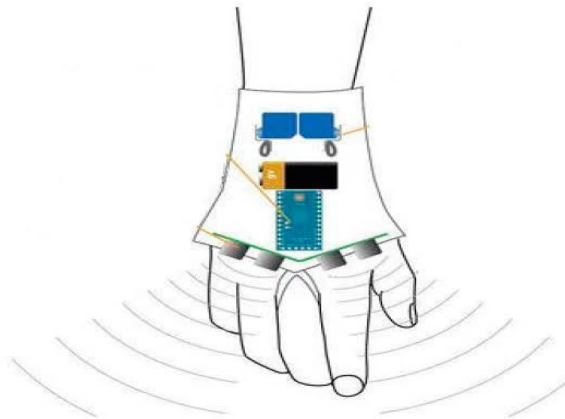


Figure 11: Glove with LIDAR sensor

Here a blind person can walk without a stick and without any struggle by using intelligent glove. The LIDAR sensor acts as a stick. If there are obstacles along the way. The LIDAR sensor is used for detecting the obstacle, if the obstacle is detected means the vibration motor gets activated and alert the blind people to navigate. The navigation location of the blind person can be tracked by using GPS module and send SMS alert to caretaker by using GSM communication.

V. CONCLUSION

Intelligent glove is a wrist mounted assistive Electronic Travelling Aid for the blind people is to help them to walk and estimate the distance from obstacles. It is Compact, affordable cost and the low power consumption are the striking features of the proposed device. The obstacle detection range and efficiency are reasonably more than the detection range of the existing system and also tracking of GPS location and alert to caretaker by using GPS/GSM communication. The novelty of the system is the remote monitoring capabilities available to family and caregivers, the detection of the obstacle and an a vibration to blind people.

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