Semiconductor Optoelectronics

SMART CANE USING ARDUINO NANO AND ULTRASONIC SENSOR

Dr.A.Saravanan

Professor: Electrical & Electronics Engineering, SMK Fomra Institute of Technology
Chennai, India, Saravanandr2006@gmail.com

Dr.G.Kavitha

Associate Professor: Electronics and Communication Engineering, SMK Fomra Institute of
Technology, Chennai, India, kavithakumara@gmail.com

Ms.K.Malarvizhi

Assistant Professor: Electronics and Communication Engineering, SMK Fomra Institute of
Technology, Chennai, India, Shana.malar86@gmail.com

Ms.S.Sujatha

Assistant Professor: Electronics and Communication Engineering, SMK Fomra Institute of
Technology, Chennai, India, selvamsujatha@gmail.com

Abstract—

Blindness is a natural curse; it does not prevent these people from having the same experiences in life as a sighted person. They must complete daily tasks in such a procession, such as walking, which presents several challenging obstacles up front. It is difficult to design a white cane that is supportive because it offers numerous tasks to predict more accurately and timely to avoid obstacles both on the ground in the air. Design of a white cane device which protects the people during dangers. This paper innovative design of smart white cane which is advanced in embedded system. This has a feature to guide both blind and deaf people at the radius of 5meters. It helps them to reduce man power for guiding them.

Keywords- smart cane, ultrasonic, blind and deaf.

INTRODUCTION

The visually challenged must overcome many obstacles in their daily lives. A person who is blind is one whose vision is limited, according to the United Nations. In order to complete their regular tasks, they frequently run across difficulties. Vision problems undoubtedly make it difficult to learn new things and acquire new experiences. engage the environment. as well as the capacity to relocate. Particularly when they travel to strange locations, the problem gets worse. One of the elements of movement is path. Orientation is the process of using one's senses to establish a foothold in relation to nearby objects. It would be wonderful if they could be used in conjunction with the white cane that blind people typically use.

Blind people require a tool that they can readily utilize. White cane is a tool to detect obstacle in the way and leading them to their destination But those canes also have sonic difficulties like to detect the obstacles from some distance little bit far away and above the knee level e.g.. barrier in the sweet. The technologies have grown to solve this problem faced by those people. For the better future. Microcontroller which can able to process the distance from the sensor and intimate the banter and potential threat in their way. So those people *can* avoid most of the obstacle.

II SYSTEM DESIGN

Block Diagram description

The Proposed system process has been explained through the block diagram shown in figure1. Majorly there are three blocks
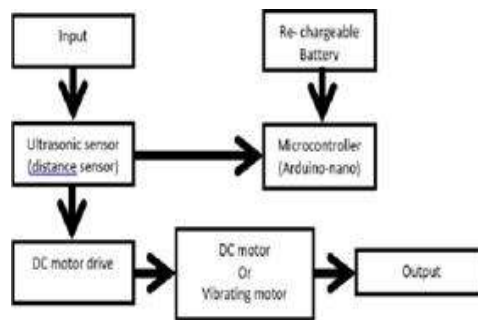

Figure I Block Diagram

I) **Input block**

This block is used to interface all input devices to the microcontroller and provide the digital values. To process with the program to give the output.

2) **Microcontroller**

This block is essential part of our proposed system. This microcontroller part receives the all signals from ultrasonic sensor and generates the output signal based on programming done for various requirement or application of the system

3) **Output block**

It is similar to the input block whereas interfacing all output devices with microcontroller i.e two button type dc motor is connected with buzzer which gives the output according the program from the output.

Ill LITERATURE REVIEW

I. *GSM based tracking* system:-

This project location of a blind person has been accessed by their family members through SMS. The recipient's latitude and longitude are included in this SMS. Installed is a GPS modem that feeds data to the microcontroller continually. The data comprises several types of information, such as the present location of the person inside the project's longitude and latitude. So periodically microcontroller fetches the information and it send SMS.

It is totally depending on the signals, when the signal is not available, blind person suffers to and the

navigation.

If the signal connects predominantly then the person suffers

2. Image processing *tracking* obstacle:-

It focuses specifically on systems that transform visual information into alternative rendering modalities that can be useful for blind users by using image-associated video processing. These additional senses can be auditory, hepatic, or a combination of the three. Therefore, modalities must be converted. When moving from one visual modality to another, image and video processing is essential. The potential other sensory pathways are investigated with the intention of using them to provide visually impaired individuals with information. Then, aids that are either currently in existence or still being developed are offered, with distinctions made based on the channel for the intended output. The most popular method for Hatt encoding the visual data is tactile or mixed tectonic kinesthetic encoding. Although devices with aural encryption may be more cost-effective, there is a substantial risk of information loss when switching from visual to audio data. Regardless of the higher technical excellence. The benefit of audio hepatic encryption is that it makes use of every sensory channel available to consumers

Limitation of image processing

Complex programming and deep learning of algorithms. Weight of the stick get increases and maximum possibilities of malfunctioning Cow of the stick is high which cannot be affordable to normal or middle class & poor peoples

Buzzer based alerting system:-

A buzzer can be an piezo electric or piezo acoustic based audio signaling *device.* A piezo electric based buzzer is used for driving an oscillating electronic Arduino .Base pin is connected is connected diode . Parallel from diode motor connection is given and the other end of the motor is given to positive charge circuit or other types of sound or voice signal source like, beep or a ring This buzzer can be used for visually impaired person to guide the threat in front of them using the input signal from the buzzer. Through this blind people can able to judge the distance variation of object or threat by the sound variation. *E.g.* when the stone is at a distance of 3 meter buzzer beeps in a specific sound but when the object comes closer of I meter the beep sound is high from this blind people can judge the distance of object and able to avoid the object.

Limitation of buzzer type alerting system

Buzzer has one limitation is that it cannot be audible at traffic areas and other high acoustic surroundings, it makes blind people to recognizes the buzzer sound.

3. **Vibration alerting system:-**

a)   *Advantages of Arduino board over swan*

Over other, larger Arduino boards, the Arduino nano boasts a seemingly minor but important advantage. Because of its smaller size, it does not experience the same uneven pin spacing as the original Arduino designs.

On ATmega32S, it is obscene. This flexible board is appropriate for practically all electric tasks. It serves as a good starting point for newcomers and its small size makes it ideal for tasks that require

a small footprint. It can be placed on a breadboard, simplifying prototype.

b) Design Consideration

Design of the system indicates the interconnection of microcontroller with ultrasonic sensor and small button type vibrating motor for the output.

Pin configuration.

Input is fetched from the ultrasonic sensor in a form of sound signal at a particular frequency which has echo (sending sound waves) and trigger (receiving sound waves).

I. Ultrasonic sensor shown in figure X left side echo pin has been connected to the D3 and trigger pin sensor has made contact with DI I. Similarly right ultrasonic sensor echo Pin and trigger pin has been connected with D6 and D respectively

2. Tip 122 of left pin has 3 pin , collector pin is connected to IL ohm resistor and it is connected to DI I in Arduino . Base pin is connected diode. parallel from diode motor connection is given and the other end of the motor is given to positive charge. Similarly Tip122 of right pin has 3 pin, collector pin r. connected to 1kilo ohm resistor and it is connected to D9 in some of the user or customers require high space of breadboard connection part for testing. The pin layout works in good condition. Pins TX top, GND ground and other ATN shown in figure Y

3. All this pin arc connected to arduino nano, from the software using arduino 1.6.1 on can able to program and fetch the required data.
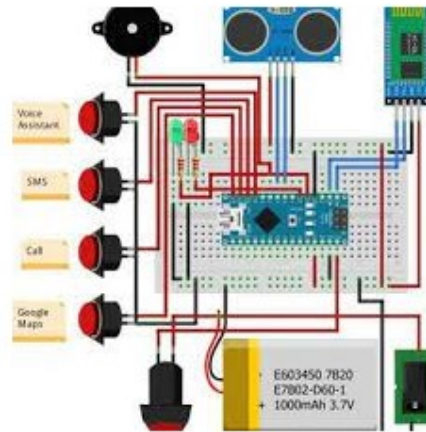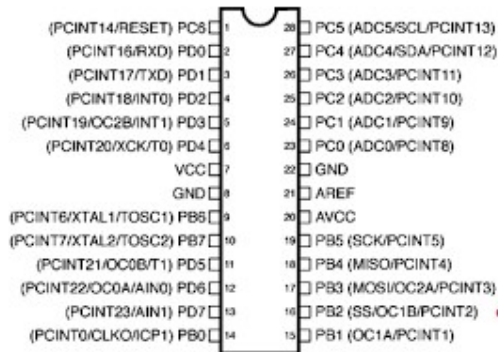
Figure 2 Hardware setup

Figure 3 Pin configuration

Arduino nano microcontroller:

It an embedded version of USB with microcontroller. It has more features of enhancing the analog input pins and +5V jumper reference in the board with decimal. There is no need of selecting the jumper switch the nano sensor received a command and it switches to higher potential source mode. Nano board has feature of small point for boarding with mini USB. An ultrasonic sensor is a sound based distance measuring device of an object. Sound waves are usually measuring the distance and defects of an objects in NDT testing same principle has been applied here to measure the distance with frequency of sound waves crosses an object and bouncing back to transmitter end
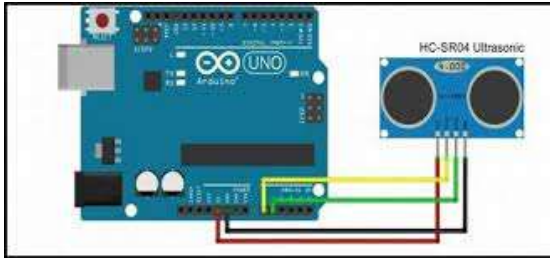

Figure 4 Hardware setup configuration

Figure 4 Sensor interfacing with microcontroller. The above Froes Ultrasonic waveform. 9.8 o.7 L. 20+2 .I R.6 8±0.1 to

t lF 0   It shows the operating function of induction sensor. Mutual Inductance is the working principle of induction sensor this mutual inductance induced because of coil and object. Due to mutual inductance it decreases the parallel resonance impedance of circuit. This resonance change makes an impact as a rise the count of proximity price. Detection of metal system has not been influenced by magnetic fields so it will sight various conducting material without effect of magnetic properties of materials.
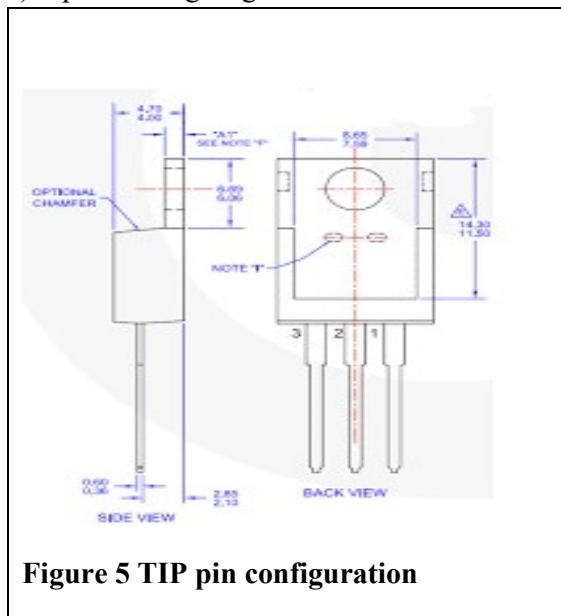
e) Tip122 voltage regulator:-

Figure 5 TIP pin configuration

- High DC Current Gain –

     hFE   = 2500 (Typ) @ IC

= 4.0 Adc
• Collector−Emitter Sustaining Voltage − @ 100 mAdc
VCEO(sus) = 60 Vdc (Min) − TIP120, TIP125
= 80 Vdc (Min) − TIP121, TIP126
= 100 Vdc (Min) − TIP122, TIP127
• Low Collector−Emitter Saturation Voltage –
VCE(sat) = 2.0 Vdc (Max) @ IC = 3.0 Adc
= 4.0 Vdc (Max) @ IC = 5.0 Adc
• Monolithic Construction with Built−In Base−Emitter
Shunt Resistor Pb−Free Packages are Available*

The Darlington Bipolar Power Transistor is designed for general-purpose amplifier and low-speed switching

The Darlington Bipolar Power Transistor is designed for requirement of general- purpose amplifier and low-speed switching application TIP 122 arc complementary devices.
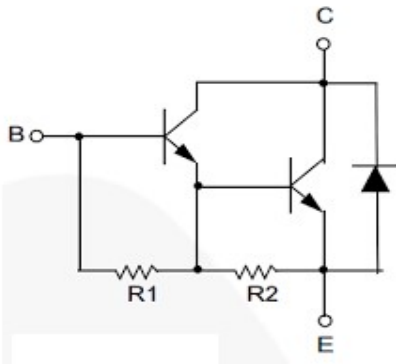

Figure 6 Tip1 22 Darlington Amplifier

IV CONCLUSION

This paper we exhibited work on building up a moderate and proficient strategy that can assist daze individuals with alerting risk going ahead their way. This can diminish dank individuals to maintain a strategic distance from greatest danger going ahead their way. The vibration which can be effortlessly sensible and it is free from commotion and other flag unsettling influence. As it is reduced in measure and less weight daze individual can convey any were and utilize the stick, in this undertaking the stick which daze individuals is utilized can be foldable which makes considerably less demanding to the visually impaired individuals to convey. Utilization of intensely is less and it can be rechargeable were visually impaired individuals can keep charge. Flattery reserve is long that a visually impaired man can ready to movement certainly. Daze individuals can ensure him by that brilliant white stick.

Reference

[1] Jin, Yongsik, et al. "Smart cane: Face recognition system for blind." *Proceedings of the 3rd International Conference on Human-Agent Interaction*. 2015.

[2] Jin, Yongsik, et al. "Smart cane: Face recognition system for blind." *Proceedings of the 3rd*

International Conference on Human-Agent Interaction. 2015.

[3] Wahab, Mohd Helmy Abd, et al. "Smart cane: Assistive cane for visually-impaired people." *arXiv preprint arXiv:1110.5156* (2011).

[4] Sharma, Tushar, et al. "Smart cane: Better walking experience for blind people." *2017 3rd International Conference on Computational Intelligence and Networks (CINE)*. IEEE, 2017.

[5] Pawaskar, Pratibha Shantaram, D. G. Chougule, and A. S. Mali. "Smart cane for blind person assisted with android application and save our souls transmission." *International Journal of Engineering and Management Research* 8.3 (2018): 235-240.

[6] Mutiara, Giva Andriana, Gita Indah Hapsari, and Ramanta Rijalul. "Smart guide extension for blind cane." *2016 4th International Conference on Information and Communication Technology (ICoICT)*. IEEE, 2016.

[7] Nassih, Mehdi, et al. "Obstacles recognition system for the blind people using RFID." *2012 Sixth International Conference on Next Generation Mobile Applications, Services and Technologies*. IEEE, 2012.

[8] Hapsari, Gita Indah, Giva Andriana Mutiara, and Dicky Tiara Kusumah. "Smart cane location guide for blind using GPS." *2017 5th International Conference on Information and Communication Technology (ICoIC7)*. IEEE, 2017.

[9] Chen, Qingtian, et al. "CCNY smart cane." *2017 IEEE 7th Annual International Conference on CYBER Technology in Automation, Control, and Intelligent Systems (CYBER)*. IEEE, 2017.

[10] Husin, Mohd Heikal, and Yang Kwang Lim. "InWalker: smart white cane for the blind." *Disability and Rehabilitation: Assistive Technology* 15.6 (2020): 701-707.

[11] Narayani, T. Lavanya, et al. "Design of Smart Cane with integrated camera module for visually impaired people." *2021 International Conference on Artificial Intelligence and Smart Systems (ICAIS)*. IEEE, 2021.

[12] Nazri, Nur Maisarah, et al. "Smart Cane for Visually Impaired with Obstacle, Water Detection and GPS." *International Journal of Computing and Digital System* (2021).

[13] Hussain, M. Asad, et al. "The smartcane for blind people an electronically smart stick to aid mobility." *International Journal of Computer Science and Information Security* 14.4 (2016): 276.

[14] Megalingam, Rajesh Kannan, et al. "Sound and touch based smart cane: Better walking experience for visually challenged." *2014 IEEE Canada International Humanitarian Technology Conference-(IHTC)*. IEEE, 2014.

[15] Frizziero, Leonardo, et al. "Smart Cane Developed with DFSS, QFD, and SDE for the Visually Impaired." *Inventions* 6.3 (2021): 58.