



ULTRA SONIC ECHO LOCATION OBSTACLE DETECTOR (UOD)

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Abstract: The main goal of this project is to help visually impaired people with smart device. This device is an innovative and cause effective guide system for blind people. Blind people main challenge is to navigate their way outdoors. This device based on Ultrasonic technology and designed for trying to solve the impossible situation that afflicts the blind people. The device helps the user to navigate their environment easily. This method also helps, when the visually impaired people feels alone in a missing environment by allowing him to make a connection between environment. Apart from this, the device is added with a interface which enables the VIP to recognize nearby obstacles.

Key words(blind people, helpful,)

I. INTRODUCTION

In this device people can use it to explore, enjoy and feel the environment They are used as multi-purpose devices for many professional (and non-professional) applications. They are always with us and we can use them simply and efficiently. The purpose of this device is based on a simple principle called as eco-location this What is almost unknown in the engineering community, are the increased boundaries and possibilities of devices to be used in the field of vibration analysis, system identification and structural monitoring. Beside advanced performance and increased efficiency, different hardware components, like accelerometers and gyroscope improved considerably. To take advantage of these advanced techniques, there is an “iDynamics” app has been developed at the University of Kaiserslautern. It uses the potential and sensitivity of build-in sensors of phones for the purpose of simple vibration analysis, system identification and structural monitoring

II. LITERATURE SURVEY

The important sense of a person is their ability is to see. vision is the major source of information about the environment around us. banners, signs indicating the right way or potential danger, advertising a new product in the market, these are all the visual types of information we all come across in our daily life. Since the blind cannot get most of the information around them, , inhibiting their independence.

- Work becomes extremely difficult if you're visually impaired. Almost all work places perform based on profits they consider a visually impaired person an liability for the company. This will cause extreme depression and isolation of the particular visually challenged individual.
- Already they carry the burden of being blind makes them feel worse. They face extreme mental problems and

most counseling centers don't provide mental treatment. They have limited activities to do which causes discrimination or oppression and unemployment, all lead to the isolation of blind individuals. To help these visually impaired people and improve their lifestyle this device can be used effectively

- THIS DEVICE CONSISTS OF AN ULTRASONIC EMITTER AND RECEIVER.
- THE ULTRASONIC EMITTER SEND THE SIGNALS THAT FALL ON THE OBSTACLE.
- THE ULTRASONIC RECEIVER IS FIXED ON THE STICK WHICH RECEIVES THE SIGNAL THAT COMES FROM THE OBSTACLE.
- THE RECEIVED SIGNAL IS CALCULATED IS WITH PROPORTIONAL TO TIME.
- THEN THE OBSTACLE IS DETECTED, THE VIBRATORY MOTORS FIXED IN THE HANDLE OF THE STICK VIBRATES ACCORDING TO THE OBSTACLE DISTANCE.
- THE VIBRATION INCREASES, WITH PROPORTIONAL TO THE OBSTACLE DISTANCE.
- THE ULTRASONIC EMITTER AND RECEIVER ARE ALSO COST EFFICIENT.
- SINCE THE ULTRASONIC IS LONGITUDINAL WAVES, HENCE THE SCATTERING OF THE EMITTED SIGNALS ARE COMPLETELY OMITTED.
- THE VIBRATION SENSORS USED ARE "ERM SENSORS" WHICH ARE VASTLY USED IN MOBILE PHONES
- THE STICK CAN ADAPTED TO THE ENVIRONMENT LIKE IN INCREASE IN HUMIDITY.
- ULTRASONIC WAVES HAS A VELOCITY OF 340m/s IN AIR AND 1530m/s IN WATER

Vibration Sensor Working Principle

Different optical otherwise mechanical principles for detecting observed system vibrations The basic principle of vibration sensor is a sensor which operates based on shifts in the characteristic optical signal of an optical platform resulting from interactions with analytic molecules

III. Existing system

The existing system is nothing but a simple cane where the user has to physically make contact with the obstacle to detect and change the course and also the obstacle must be in range of the cane so the user can detect the obstacle and change the course accordingly. The traditional cane comes with variety of defects and restrictions, some restrictions such as physical contact to the obstacle, limited range, tiring process to the user and etc.

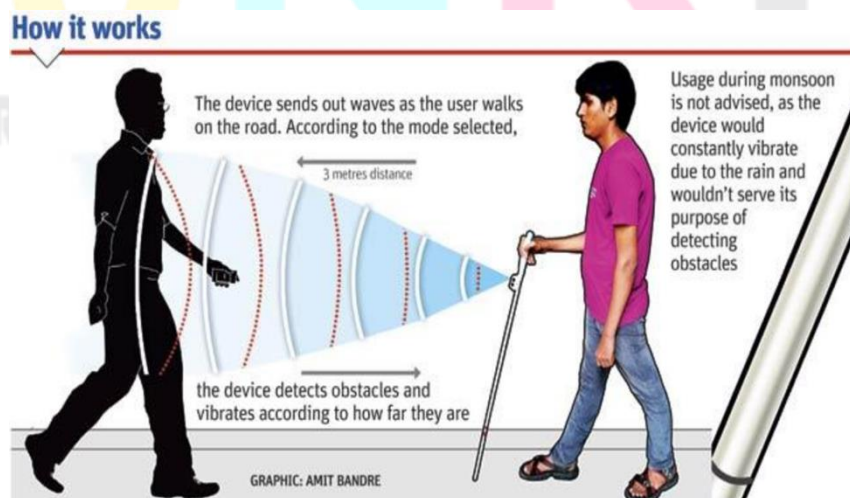


Fig 1 Working of blind stick

IV. Proposed System

The ultra sonic obstacle detection stick proposed is basically a cane where it is being embedded with an ultrasonic sensor to detect the obstacle from a distance according to the user's convenience and the closer the obstacle is approaching to the user the higher the vibration. The way this stick functions is that it emits ultrasonic waves continuously and feeds the data to the Arduino Uno microcontroller and the controller processes the data according to the program it's been given and when there is a disturbance in the given range of the ultrasonic waves (in the receiver) it sends the data to the microcontroller and the controller directs the signals to the EMS vibrators that are placed in the handle of the stick so that the user can understand and sense the obstacle, likewise the closer the obstacle gets to the user the vibrator increases its frequency.

V. IMPLEMENTATION

The proposed system provides an improvement to the existing system and design also making it more efficient user-friendly.

The implementation of the proposed system consists of the following hardware components:

1. Ultrasonic Sensor
2. Arduino Uno Microcontroller
3. Bread board

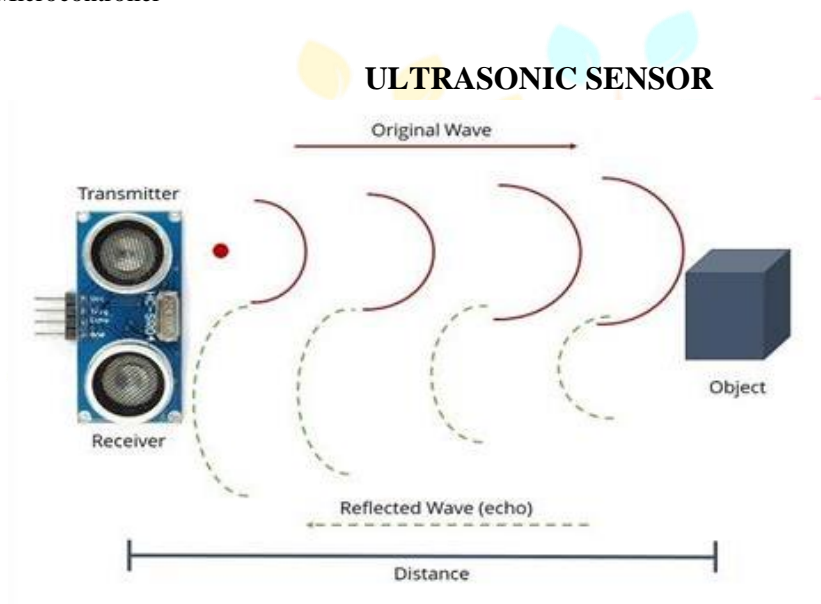


Fig:2



Fig:3

Ultrasound refers to a sound wave with a frequency greater than the upper limit of human hearing, which is generally over 20 kHz. In general, humans can hear sounds with a frequency between 20 Hz and 20 kHz. Some animals including bats and dolphins rely on ultrasound to live. Bats emit ultrasound from their mouths and receive its echo. From the time interval between sending the sound and receiving the echo as well as the angle of the echo received, they can determine the distance to targets and their location. Bats can thus sense the terrain and detect their prey. Similarly dolphins use ultrasound to capture the surrounding conditions and communicate with their peers.

MAJOR PROPERTIES OF ULTRASOUND

These waves travel through all matter states but cannot travel along vacuum. The medium determines the speed of the sound. Sound is likely to travel faster through solids, followed by liquids and gases.

Another property of sound is it loses less energy in gases compared to liquids and solids.

Medium determines the type of the sound waves. Sound waves travel through the air and liquids as longitudinal waves. Through solids, however, it can be transmitted as both longitudinal waves and transverse waves as well as surface waves. interface between materials with different speeds of sound . An interface between materials with a larger difference in acoustic impedance reflects ultrasonic waves more strongly and that with a smaller difference in acoustic impedance reflects them less strongly and lets part of them travel through. Cells strike by the ultrasonic waves are reflected differently. Ultrasonic waves are gradually alter to become weaker while travelling through any medium. Those with a higher frequency show a higher attenuation factor. Ultrasound travels in a very straight line. An ultrasonic wave is reflected when it strikes the sensor and sends signal to the ERM vibrators.

CONCLUSION

This paper presents the implementation of a ultrasonic obstacle detection stick where it can assists visually impaired people and help them lead them to a stress free environment. We make use of ultrasonic sensors and ems vibrators so that they act as input and output devices whereas ardino uno microcontroller processes the data accordingly. The ems vibrator vibrates when the ultrasonic sensor detects obstacle in the range and the microcontroller process and exchanges the data, the frequency of vibration produced is directly proportional to the obstacle distance in the range.

REFERENCES

- [1]Radhika.R,Payal.G.Pai , Rakshitha ,Rampur Srinath Implementation of Obstacle Detection and Navigation Smart Stick for, International Journal of Latest Research in Engineering and Technology, Volume 02 - Issue 05 || May 2016
- [2]M. Sumithra and Dr. S. Malathi, " Modified Global Flower Pollination Algorithm-based image fusion for medical diagnosis using computed tomography and magnetic resonance imaging", International Journal of Imaging Systems and Technology, Vol. 31, Issue No.1, pp. 223-235,2021
- [3]B.Buvanswari and T.Kalpalatha Reddy, "A Review of EEG Based Human FacialExpression Recognition Systems in Cognitive Sciences" International Conference onEnergy,Communication,Data analytics and SoftComputing(ICECDS),CFP17M55-PRJ:978-1-5386-1886-8",August 2017
- [4]B.Buveneswari and Dr.T. Kalpalatha Reddy, "ACPT- An Intelligent Methodology for Disease Diagnosis",Journal of Advanced Research in Dynamical and Control Systems,ISSN : 0974-5572,Vol.11,No.4,Pp.2187-2194,2019.
- [5]Sumithra, M., Shruthi, S., Ram, S., Swathi, S., Deepika, T., "MRI image classification of brain tumor using deep neural network and deployment using web framework", Advances in Parallel Computing, 2021, 38, pp. 614–617.
- [6]K. Sridharan , and Dr. M. Chitra "RSSE: A Paradigm for Proficient Information Retrieval using Semantic Web" , Life Science Journal 2013;10(7s), pp: 418-425
- [7]Sharanyaa, S., S. Vijayalakshmi, M. Therasa, U. Kumaran, and R. Deepika. "DCNET: A Novel Implementation of Gastric Cancer Detection System through Deep Learning Convolution Networks." In *2022 International Conference on Advanced Computing Technologies and Applications (ICACTA)*, pp. 1-5. IEEE, 2022.

Research Through Innovation