International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 05, 2020
ISSN: 1475-7192

Sensor based Human Assistance System

D. Charansai and Dr.P. Shyamala Bharathi

Abstract--- *Right now are going to structure a robot that follows man. These days robot assumes a fundamental job in human life. Numerous looks into are going on in the field of mechanical technology so as to lessen the work weight of people. On the off chance that this is succeeded the robots will be utilized in every day applications alongside people. Indeed, even in enterprises and in emergency clinics we are wanting to utilize robots to support people. The principle testing idea is that the robot that we are planning ought to adhere to the guidelines given by people if this is succeeded everything will be in right in a robot instrument. Here we have planned a robot that will really takes a shot at a ultrasonic sensor. This will recognize the human and begin tailing him. As this is the initial step we can build up a decent robot in the up and coming works.*

Keywords--- *Ultrasonic, Transmission Rate, Arduino, Radio Frequency.*

I. INTRODUCTION

The humans activities can be reduced day by day by the machine and the electrical equipment. These can do all the things which human can do and also do the activities apart from the human which cant able to do by them. The robot can also act as a safeguard for the humans in the various fields. They act as a protection for the border security people. The robot can interact with the humans through the signal waves. The signal can be transmitted in the form of waves. The interaction between the human and the robot can be done through the receiver and transmitter. The signal from the human is received by the receiver of the Robot. The signal can be transmitted as the radio frequency. The receiver signal is in the range of 9600 baud rate. The baud rate is the mathematical conversion of the frequency. The frequency is determined by the number of waves can be generated per second. The signal is the radio frequency waves that can be extended to the large extent. The radio frequency waves cannot be stop the communication when there is an external disturbance occurs. These waves can be transmitted through the medium. The scientist has been done a research that the interaction of human to human. The human can communicate through the voice signal and it can be transfer to the large distance at the range 20-20000 Hz. The signal cannot be deviate when the external disturbance occurs. The signal can be filtered from the external noise in the atmosphere with help of filters.

Then the signal can be accurate and it does the process. These things can be implemented in the robotic to human communication. The robot can follow the human with the help of ultra sonic sensor. The robot can also act as a safeguard for the humans in the various fields. They act as a protection for the border security people. The signal can be transmitted in the form of waves. This sensor can traverse to the long distance. The interconnection of the signal can be in the local area network. The transmission and receiver of the signal are processed in the network area. The proximity sensor can detects the harmful equipment and it can send the signal to the receiver medium by giving a buzzer alert and message to the required team. This communication process can be done through the controller. The controller can acts as heart of the whole medium and it can operate the transmitter and the receiver of the ultra sonic

D. Charansai, Saveetha School of Engineering, SIMATS, Chennai. E-mail: doniparthicharansai@saveetha.com
Dr.P. Shyamala Bharathi, Assistant Professor, Saveetha School of Engineering, SIMATS, Chennai.
E-mail: shyamalabharathip.sse@saveetha.com

DOI: 10.37200/IJPR/V24I5/PR2020717
Received: 18 Apr 2020 | Revised: 26 Apr 2020 | Accepted: 16 May 2020

sensor. The various sensors can be designed and implemented in the structure and they can perform the different operation according to the signal received. The signal can be received is analog or digital signal. The sensor can operate through various signal depends in the configuration.

II. LITERATURE SURVEY

Qin yong et., al., proposed a robot designed to follow the humans with the help of the signal transmitted from the human and it get received by the sensor. The sensor which is used in the structure implementation is ultra sonic sensor. This sensor can detects the surrounding signal which gets emitted from the surrounding obstacles. Where the PIR sensor can detects the signal from the humans that respond according to that. They can detect from the particular distance between the human and the robot. [1]

Shinnosuke et., al., proposed, a system to measure the distance with the help of the ultra sonic sensor. The sensor has the trigger and the echo pins. The echo pins can receive the signal which is the echo signal. The signal is travelled in the form of pulse. The pulse receives by the echo pin so it is called the pulse echo process. This process can measure the distance of the target medium. The signal is not get interfere with one another. The signal is not get affected by the other medium disturbance during the period of processing. The various sensors can response to various signals according to their specific configurations. The ultra sonic sensor can received the signal as the digital format. The digital signal processing has been made to the controller. The noise at the period of communication can be avoided with the help of the noise to signal system and the use of the filters bank. The paper mainly shows the distance measurements using cross correlation method it reduces the time of interaction between the robot and the human. The signal comparison has to be made and to predict the way of measuring the distance using the digital signal by reducing the noise. [2]

Jongil lim et., al., proposed a robot to detect the particular object at some distance. But this paper is differing from them they want to predict the localization of the detected obstacles and they send the data to the smart phone. Here the smart phone acts as a brain of the smart robot. The localization of the obstacles has been measured from the limited distance. The microcontroller can act as a major part of the process. The Bluetooth is used and it gets connected to the smart phone to transmit and receive the data. The wireless connection has been made between them. When the particular object is located the data signal is transmit through the smart phone. In addition to that the servo motor is used in which it gets rotated for 180 degree phase shift and the ultra sonic sensor is placed upon the servo motor. The sensor can rotate can detects the surrounding objects. So the use of the addition number of sensor gets reduces and the time is also get reduced. [3]

Seungin shin et., al., proposed the measurement of signal by the ultra sonic sensor gets differed by the normal sensor measurement. This sensor can measure the target signal from the large distance. The distance gets totally varied by the normal measurement. They used the CPPM process they can sends the single bit of signal. The signal gets processed and they perform according to the signal. To avoid such external disturbance the mathematical system is used which is the Fourier transform method. The ultra sonic sensor can received the signal as the digital format. The digital signal processing has been made to the controller. The noise at the period of communication can be avoided with the help of the noise to signal system and the use of the filters bank. The paper mainly shows the

DOI: 10.37200/IJPR/V24I5/PR2020717
Received: 18 Apr 2020 | Revised: 26 Apr 2020 | Accepted: 16 May 2020

distance measurements using cross correlation method it reduces the time of interaction between the robot and the human. The cross talk disturbance from the external agent can be removed with the help of the filters. The noise can be reduced when compared to normal sensor. These sensors can use the CPPM process so that the time of communication can get reduced. The signal can be transmitted in the form of the pulse. The signal is the digital signal it can respond at the single bit of transmission. The line of sight is not get affected by the surrounding medium. It is long range measuring but the efficiency is high and it is more attractive in measuring the distance is accurate. [4]

Seungin shin et., al., proposed the configuration of the ultrasonic sensor they can measure only the short distance object and the accuracy also less and it can be mainly affected by the surrounding noise and the sampling rate is less. So the research has been undergone to overcome the drawbacks of the measurement of the ultra sonic sensor. They designed a new algorithm in the proposed method in which can overcome the drawbacks of the old algorithm method. The main aim of the algorithm is to increase the distance measurements, the measurement is more accurate and the noise can be reduced from the signal which can be created by the external agent. Experiment has been conducted as a demo method and the simulation is done in proteus. [5]

Chen – Chein hsu et., al., proposed, the detection of the distance measurement by the ultra sonic sensor of phase angle detection method. The ultrasonic in the robot is act as the transmitter on the opposite part the four ultra sonic are placed in the form of square. This sensor can act as a receiver part. They both are separated by the distance which is unknown. The each ultra sonic sensor is connected to the WIFI module. The WIFI module is used to transmit the data between the slave and the master part. The time of signal transmission and the reception can helps to detect the distance between the master and the slave part. The noise can be avoided by the filters. The various objects can be placed in the squared surface and it can be easily detected. The experiments have been made to perform the distance measurement accuracy between the two separated ultra sonic sensors. The data can be transmitted to the database and can be retrieved by the signal. [6]

Seong jin kim et., al., proposed that ultra sonic method has been implemented in the inner circle of the environment to detect the distance of the each particular object and their localization. The ultra sonic sensor is placed at the each pillars of the inner environment they can act as transmitter. The movable robot is constructed in which the ultrasonic sensor has been placed it act as receiver. By using the enlargement kalman filter the distance can be predicted between the transmitter and the receiver. The inner surrounding are gathered by the several ultra sonic sensor. The movable robot can moves around the surrounding when the signal gets matched the data transmission can occurs. Here the robot speed is not considered if the signal wants to match it wants move slowly in the surrounding area so that the interaction has made between the transmitter and the receiver part. The main is to track the particular object in the surrounding object but it wants to predict the all the object in the surrounding but individually. The EKF algorithm has been made to transfer the signal and receive the signal among the various obstacles. [7]

Andrea Rocchi et., al., proposed the environmental problems. By using the ultra sonic sensor the water it gets monitored whether is polluted or not. The marine waters are mainly polluted by the waste water which is get

DOI: 10.37200/IJPR/V24I5/PR2020717
Received: 18 Apr 2020 | Revised: 26 Apr 2020 | Accepted: 16 May 2020

released by the industry and the oil spills. This sensor can check the water is get polluted and it periodically monitored the level of the sea water to provide form the disaster. They both are separated by the distance which is unknown. The each ultra sonic sensor is connected to the module. The module is used to transmit the data between the slave and the master part. The time of signal transmission and the reception can helps to detect the distance between the master and the slave part. The noise can be avoided by the filters. The various objects can be placed in the squared surface and it can be easily detected. The movable robot is constructed in which the ultrasonic sensor has been placed it act as receiver. By using the enlargement filter the distance can be predicted between the transmitter and the receiver. The inner surrounding is gathered by the several ultra sonic sensors. The movable robot can moves around the surrounding when the signal gets matched the data transmission can occurs. Normally to monitor the sea water pollution it takes much cost and time but this paper is proposed to checking the polluted water by using low level cost ultra sonic sensor. In change of the climatic conditions and the temperature the sensor can monitor and intimate through the signal. The combining of more ultra sonic sensor can provide a accurate measurement. [8]

Luc Chassagne et., al., proposed small range measurement has to be done with the use of six ultra sonic sensor. The aim is to predict the human position in the 3D pattern and to localize the position of the human robot. The robot consists of three receivers and three transmitters and it communicated to the signal at the range of frequency is 50-60 Hz. Then the sensor can calculate the position of the each and every movement of the robot. The distance prediction can be very small in range of millimeter to several centimeters. The continuous monitor of the distance is the main criteria when the human starts moving and till them come into the rest position. The distance can vary from the movement of one person to other person. The signal is transmitted in the form of waves they can travel to the small distance because of the transmitter and the receiver part is nearer to each other. [9]

Jinjin Wang et., al., proposed, Ultrasonic sensor can detect the target object which is in front of the sensor. The main problem is that the sensor cant ability to distinguish the various targets and it produces the measurement errors. In this proposed paper the problem gets rectified by using the mathematical algorithm with noise removal rejection. So the signal strength increases which can be able to distinguish the target object among them. With reduced the distance measurements error. The phase angle error gets reduces. The single bit of signal can be transmitted but it gets processed immediately at the period of data sent. The experiment is more accuracy and it gets going to implement in the real time system. The simulation has been done at the various frequency ranges. [10]

III. REVIEW IN ROBOT FOLLOWING MAN

In this paper the implementation of human detecting robot in the proposed system. The robots are used in the various medical, defecnce fields. The robot can follow the human with the help of sensor. The sensor can transmit and receive the data. The signal can be transmitted in the pulse to a greater extent. The pulse vector method is used to detect the opponent at the various measurements in the surrounding border area. Once the robot target the opponent the weapon is get operated to attack. The operation of the robot is monitored in the control room by the help of processing software.

DOI: 10.37200/IJPR/V24I5/PR2020717
Received: 18 Apr 2020 | Revised: 26 Apr 2020 | Accepted: 16 May 2020

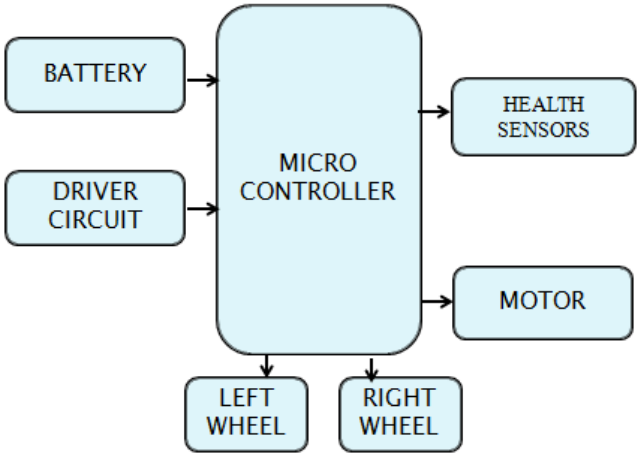

Fig. 1: Proposed Block Diagram

IV. Results And Discussions

In our proposed system we have developed a robotic vehicle which is having ultrasonic sensor attached to it. This ultrasonic sensor is placed before the vehicle which helps in tracking humans. This vehicle will move only in the front direction to find out the opposite person to whom the robot should help. So depending on the human tracking the motor driver in the vehicle will allow the robot to move forward. We can use this robot in many applications such as military, hospitals, restaurants etc to reduce the work of humans.

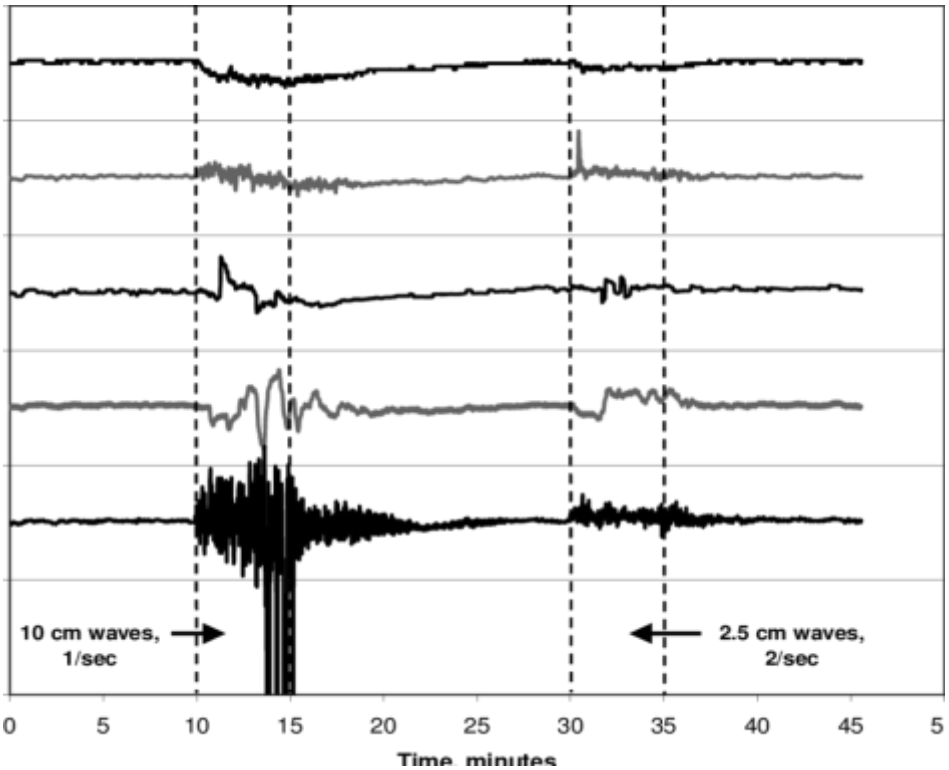

Fig. 2: Ultrasonic Detection Graph

DOI: 10.37200/IJPR/V24I5/PR2020717
Received: 18 Apr 2020 | Revised: 26 Apr 2020 | Accepted: 16 May 2020

Graph indicates the detection of human by using ultrasonic sensor. The ultrasonic detected the human then waveform will be generated this shows the detection. The graph remain same until the detection of the human. The lighter lines denotes the object getting notified and darker region denotes the object is very close.

V. CONCLUSION

Our man following automated vehicle is specially designed in order to reduce the work of humans. In earlier no such robot is designed to help humans to reduce his work. As we are using ultrasonic sensor here it is very effective in finding out humans in a better and high accurate way. So thus the valuable time and work of humans is saved.

REFERENCES

[1] Measuring system for mobile robot based on multiple sensors" by Qin yong College of Measurement and Control Technology and Communication Engineering, *Harbin University of Science and Technology, Harbin China* in 2012.

[2] Real-time ultrasonic distance measurements for autonomous mobile robots using cross correlation by single-bit signal processing" by shinnosuke Hirata Interdisciplinary graduate school of science and engineering, *Tokyo Institute of Technology, Yokohama*, 226-8502, Japan in 2011.

[3] Indoor localization and navigation for a mobile robot equipped with rotating ultrasonic sensors using a Smartphone as the robot's brain by jongil lim in 2015

[4] Ultrasonic Distance Measurement Method with Crosstalk Rejection at High Measurement Rate" BY seungin shin Department of Mechanical Engineering, Korea Advanced Institute of Science and Technology, Daejeon, South Korea in 2019.

[5] Improving efficiency of ultrasonic distance sensors using pulse interval modulation" by seungin shin Automotive Control Laboratory, Korea Advanced Institute of Science and Technology, Daejeon, Korea in 2016.

[6] Localization of mobile robots based on omni-directional ultrasonic sensing" by chen – chein hsu Department of Applied Electronics Technology, National Taiwan Normal University, Taipei, Taiwan in 2012.

[7] Dynamic Ultrasonic Hybrid Localization System for Indoor Mobile Robots" by seong jin kim Department of Electrical Engineering, Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea in 2013.

[8] Characterization and Optimization of Level Measurement by an Ultrasonic Sensor System by andrea rocchi Dipartimento SIMAU, Università Politecnica delle Marche, Ancona, Italy in 2019.

[9] Ultrasonic Sensor Triangulation for Accurate 3D Relative Positioning of Humanoid Robot Feet" by luc chassagne Laboratoire d Ingénierie des Systèmes de Versailles, University of Versailles Saint-Quentin, Versailles, France in 2015.

[10] Range resolution of ultrasonic distance measurement using single bit cross correlation for robots" by jinjin wang National Laboratory of Underwater Acoustic Technology, Harbin Engineering University, Heilongjiang Province, China in 2010.

[11] Janku, P., Dosek, R., & Jasek, R. (2014). Obstacle detection for robotic systems using combination of ultrasonic sonars and infrared sensors. *In Modern Trends and Techniques in Computer Science (pp. 321-330). Springer, Cham.*

[12] Kim, S., & Kim, H. B. (2010, August). High resolution mobile robot obstacle detection using low directivity ultrasonic sensor ring. *In International Conference on Intelligent Computing (pp. 426-433). Springer, Berlin, Heidelberg*.

DOI: 10.37200/IJPR/V24I5/PR2020717
Received: 18 Apr 2020 | Revised: 26 Apr 2020 | Accepted: 16 May 2020