

SPACE DETECTING ROBOT USING ULTRASONIC SENSOR

**P. VENKATESAN¹, IV YEAR B.tech, Information Technology, IFET College of Engineering,
Villupuram, India.**

**V.SUGANTHI², Associate Professor, Information Technology, IFET College of
Engineering, Villupuram, India.**

Abstract— The most popular gadgets of these days are Android smart phones. Nowadays most of the applications on the internet are exploits with the inbuilt hardware in this mobile phone, such as Bluetooth and Wi-Fi, to control the other device. The robot that can be controlled using the applications running on the android phone. The control commands are sending via Bluetooth and the robot and it has features as: It can be controlled from the android smart phone by touch or voice command. The speed of the robot can also be controlled by speech recognition. The robot will sense the information to the phone by calculating its distance from the nearer obstacles. It will send the information about in which the direction moves. Ultrasonic sensors are used to identify the distance between their obstacles and robot, by sending information to the Smartphone. The part of process is detecting the obstacles where the robot moves as identifiers as ultrasonic sensor.

Key word: 7805 REGULATOR, 9V BATTERY, ANDROID SMARTPHONE, ATMEGA 328, DC MOTOR, JY MCU BT (HC-05) MODULE, L293D MOTOR DRIVER, SOME CONNECTOR, ULTRASONIC SENSOR HC -SR04.

I. INTRODUCTION

Nowadays Robotics is a part of today's communication & communication is part of advancement of technology, so we decided to work on ROBOTICS field, and design something which will make human life today's aspect. There are different types of mobile robots which can be divided into several categories consists of wheeled robot, crawling robot and legged robot. This project deals with a wheeled autonomous ROBOT. It is the part of Automation. Robot has sufficient intelligence to cover the maximum area. This robot uses ultrasonic

sensor to detect the obstacle in between the path and then avoid them to complete its objective. The ultrasonic transmitter continuously generate an sensor signal of 8cm moves, when an obstacle comes in the path the sensor signal reflected back from the object and is received by the ultrasonic receiver and then generate a positive high signal with the help of the receiver circuit that is there is an obstacle in the path. In such a way the robot is able to detect obstacles. The main motto of designing such type of Robot or the technology is that this technology can be used in today's very fast way of finding the empty space. If we use this technology in the finding empty space or any measuring distance, it will automatically sense the obstacles then it will take a side to the available free space. An obstacle may be a living things or any object. Autonomous Intelligent Robots are robots that can perform desired tasks in unstructured environments without continuous human guidance. Thus by using this technology makes the measure accurately.

Robots are smart machines that can be programmed and used in many areas such as Industry, manufacturing, production lines, or health, etc. These robots perform Hard, dangerous, and accurate work to facilitate our life and to increase the production, Because they can work 24 hours without rest, and can do works like human but more precisely and with less time. Assistive mobile robots that perform different kinds of work over everyday activities in many areas such as industry, manufacturing, production lines, or health, etc. are very commonly used to improve our life.

Nowadays smart phones are becoming more powerful with reinforced processors, larger storage

capacities, richer entertainment function and more communication methods. Bluetooth is mainly used for data exchange; add new features to smart phones. Bluetooth technology, created by telecom vendor Ericsson in 1994, shows its advantage by integrating with smart phones. It has changed how people use digital device at home or office, and has transferred traditional wired digital devices into wireless devices. A host Bluetooth device is capable of communicating with up to seven Bluetooth modules at same time through one link. Considering its normal working area of within eight meters, it is especially useful in home environment. Thank for Bluetooth technology and other similar techniques, with dramatic increase in Smartphone users, smart phones have gradually turned into an all-purpose portable device and provided people for their daily use. In recent years, an open-source platform Android has been widely used in smart phones. Android has complete software package consisting of an operating system, middleware layer and core applications. Different from other existing platform like iOS (iPhone OS), it comes with software development kit (SDK), which provides essential tools and Application. Using a Smartphone as the “brain” of a robot is already an active research field with several open opportunities and promising possibilities. In this review of current robots controlled by mobile phone and discuss a closed loop control systems using audio channels of mobile devices, such as phones and tablet computers. In our work, move the robot upward, backward, left and right side by the android application such as Bluetooth.

The project aims in designing a Robot that can be operated using Android mobile Phone. The controlling of the Robot is done wirelessly through Android smart phone using the Bluetooth are present in it. Thus the project on Android smart phone is used as a remote control for operating the Robot. Android is a software stack for mobile devices that includes an operating system, middleware and key applications. Android boasts a healthy array of connectivity options, including Bluetooth, and wireless data over a cellular connection. Android provides access to a wide range of useful libraries and tools that can be used to build rich applications. In addition, Android includes a full set of tools that have been built from the ground up alongside the platform providing developers with high productivity and deep insight into their applications. Bluetooth is an open standard specification for a radio frequency (RF)-based, short-range connectivity technology that promises to change the face of computing and wireless communication. It is designed to be an inexpensive, wireless networking system for all classes of portable

devices, such as laptops, PDAs (personal digital assistants), and mobile phones. It also will enable wireless connections for desktop computers, making connections between monitors, printers, keyboards, and the CPU cable-free. The controlling device of the whole system is a Microcontroller. Bluetooth module, DC motors are interfaced to the Microcontroller. The data received by the Bluetooth module from Android smart phone is fed as input to the controller. The controller acts accordingly on the DC motors of the Robot. The robot in the project can be made to move in all the four directions using the Android phone. The direction of the robot is indicated using LED indicators of the Robot system. In achieving the task the controller is loaded with a program written using Embedded ‘C’ language.

II. LITERATURE SURVEY

In this section, we are focus on the different methods for robot control problem and as bases on advantage of some paper as follows: [1] Monika Jain, Aditi, AshwaniLohiya, Mohammad Fahad Khan, AbhishekMaurya Professor, Dept of Electrical & Electronics Engg, Galgotias college of Engg&Tech ,Greater Noida, India Student, Dept of Electrical & Electronics Engg, Galgotias college of Engg&Tech ,Greater Noida, India, International Journal of Advanced Research in Computer and Communication Engineering Vol. 1, Issue 10, December 2012 are proposed on these paper as Hand gesture robot can move any direction just making simple gesture and the system sensitivity to the gesture can be easily adjusted as per your liking. Hand-gesture recognition has various applications like computer games, machinery control (e.g. Crane), and thorough mouse replacement. One of the most structured sets of gestures belongs to sign language. In sign language, each gesture has an assigned meaning (or meanings). Computer recognition of hand gestures may provide a more natural-computer interface, allowing people to point, or rotate a CAD model by rotating their hands. Hand gestures can be classified in two categories: static and dynamic. A static gesture is a particular hand configuration and pose, represented by a single image. A dynamic gesture is a moving gesture, represented by a sequence of images. We will focus on the recognition of static images. Interactive applications pose particular challenges. The response time should be very fast. The user should sense no appreciable delay between when he or she makes a gesture motion and when the computer responds. The computer vision algorithms should be reliable and work for different people. There are also economic constraints: the vision-based interfaces will be replacing existing

ones, which are often very low cost. Even for added functionality, consumers may not want to spend more. When additional hardware is needed the cost is considerable higher. Some of Advantage: The robot receive the instruction through the gesture, the microcontroller drives the motor to the corresponding to the instruction received. It is User friendly, wireless operating robot. And from Disadvantage: It only transmission can be achieved through gesture, receiving any data could not be done. [2] M.Z.A RASHID, H.N.M Shah, M.S.M Aras, M.N.Kamaruddin,A.M. Kassim, H.I.Jaaafar Faculty of Electrical Engineering, Hang Tuah Jaya, 75260 Durian Tunggal, Melaka, Malaysia, Journal of Theoretical and Applied Information Technology 30thJune 2014. Vol. 64 No.3 proposed on line following robot as using pixel points form a line to move the robot from starting point to ending point. Line follower is a machine that can follow a path. The path can be visible like a black Line on a white surface (or vice-versa) or it can be invisible like a magnetic field. Sensing a line and maneuvering the robot to stay on course, while constantly correcting wrong moves using feedback mechanism forms a simple yet effective closed loop system. As a programmer you get an opportunity to 'teach' the robot how to follow the line thus giving it a human-like property of responding to stimuli. Practical applications of a line follower: Automated cars running on roads with embedded magnets; guidance system for industrial robots moving on shop floor etc. such type Advantage: They can move in straight forward direction. From part of problem as many pixels must be classified for different uses. It cannot move in curved path or circular path because they cannot turn left right. [3] DattaSainathDwarampudi Electronics and Communication Engineering, Mahatma Gandhi Institute of Technology, Hyderabad, Andhra Pradesh, India. International Journal of Engineering Research and Development e-ISSN: 2278-067X, p-ISSN: 2278-800X, www.ijerd.com Volume 10, Issue 11 (November 2014), PP.22-28 they propose as detects obstacles and manipulates its direction as per the input from their infrared sensor mounted in front of the robot and the remote control. This is the first wireless control technique available for a beginner. Since the wavelength of IR light is longer than that of visible light, it is invisible to the human eye. IR concept is easy to understand and implement. A transmitter in your controller transmits IR light (or pulses) and an IR receiver on your robot receives the signal, which is decoded with the help of a microcontroller. IR requires line of sight control and best suited for applications which require shorter control range. However care must be taken while designing IR

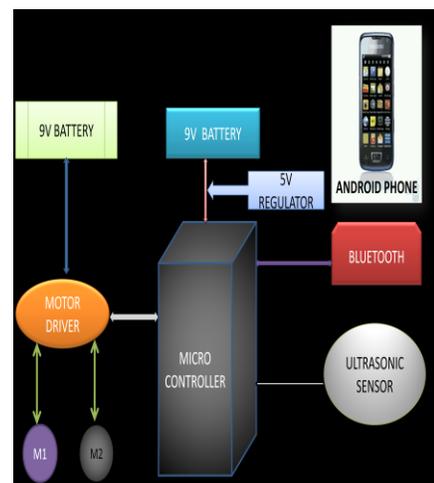
transceivers, because sunlight or any heat generating objects gives out infrared light. From these advantage as Most universal remote scan be configured to send messages to the robot. The sensor senses whether receiver of it is receiving light from transmitter or not and feeds the result to the comparator. If any obstacle comes in between receiver or transmitter then the path of infrared between receiver and transmitter breaks off. This result of receiver receiving the light or not is sent to the comparator. The part of problem as the angle of sensor and remote control should be in the minimum range (30+30degree)Transmitter only cannot obtain the receiver data from the robot.[4]Computer Science & Engineering: An International Journal (CSEIJ), Vol. 3, No. 4, August 2013, In develop world speech processing is the important one for data communication and controlling device, which is mainly implement in all searching operation, in my prompt I implement for robot. In this paper we describe an interface for human-robot interaction, which uses built-in speech recognition in Android phones to control a mobile robot. We discuss benefits of using a Smartphone for speech-based robot control and present speech recognition accuracy results for younger and older adults obtained with an Android Smartphone. Google's ASR was chosen because it is freely available in Android-based devices which are being activated at a rate of 1 million per day worldwide. Google's approach to ASR is also unique because it continuously integrates speech samples from users in addition to existing acoustic models. We created an Android application that handles the audio data and sends the transcription to the robot for language processing over a wireless network. We also integrated a TCP server into the robot code. Voice controlled robot should be the last option for a beginner. You would need a voice recognition module which transforms your (or any others) voice/words into digital signals for a microcontroller to understand. Also you can imagine how far your voice may reach for your robot to take your orders. Although there are few advantages of using voice communication over others technologies, it is easier to not use them in any robots. The use of a Smartphone for the voice control of a home robot has several benefits. Smartphone have built-in microphones. An ASR mobile app allows the user to decide when they want to communicate with the robot, which prevents the robot from reacting to speech directed to other people and allows the user to see and cancel incorrect transcriptions. Android ASR API also has the option of letting the user choose the best transcription from a list of suggestions; we used this feature, increased the amount of time the speaker is silent before the command is complete to

accommodate older adult speech and used the Free-Text language model instead of the Web-Search model to accommodate the spatial language descriptions their proposes as command can be obtain for instead of keys Void command can be implement in future development for any process, problem from as Required silent place to work with speech communication Pronunciation must be accurate, to control anyone.[5] Distance measurement of an object in the path of a person, equipment, or a vehicle, stationary or moving is used in a large number of applications such as robotic movement control, vehicle control, blind man's walking stick, medical applications, etc. Measurement using ultrasonic sensors is one of the cheapest among various options. In this paper distance measurement of an obstacle by using separate ultrasonic transmitter, receiver and a microcontroller is presented. The experimental setup and results are described and explained. Ultrasonic sensors precisely detect objects made from various materials regardless of their shape, color, or surface contour. They operate using high-frequency sound waves that are inaudible to the human ear. Ultrasonic transducer uses the physical characteristics and various other effects of ultrasound of a specific frequency. It may transmit or receive the ultrasonic signal of a particular strength. These are available in piezoelectric or electromagnetic versions. The piezoelectric type is generally preferred due to its lower cost and simplicity to use. The Ultrasonic wave propagation velocity in the air is approximately 340 m/s (meter/second) at 15°C (Celsius) of air or atmospheric temperature, the same as sonic velocity. To be precise, the ultrasound velocity is governed by the medium and its temperature hence the velocity in the air is calculated using the formula as $V = 340 + 0.6(t - 15)$ m/s (1) t:temperature, °C In this study, a room temperature of 20°C is assumed; hence the velocity of ultrasound in the air is taken as 343 m/s. Because the travel distance is very short, the travel time is little affected by temperature. It takes approximately 29.15µsec (micro second) for the ultrasound to propagate waves through 1cm distance; therefore it is possible to have 1cm resolution in the system. They function as an ultrasonic sensor response is not dependent upon the surface color or optional reflectivity of an object, for example, the sensing of a clear glass plate, a brown pottery plate, a white plastic plate, and a shiny aluminum plate is the same. Ultrasonic sensors with digital (ON/OFF) outputs have excellent repeat sensing accuracy. It is possible to ignore immediate background objects, even at long sensing distance because switching hysteresis is relatively low. The response of analog ultrasonic sensors is linear with distance. By

interfacing the sensor to an LED display, it is possible to have a visual indication of target distance. This makes ultrasonic sensors ideal for level monitoring or linear motion monitoring application. Ultrasound sensors are very versatile in distance measurement. Ultrasonic sensors are also quite fast for most of the common applications. Disadvantage: Ultrasonic sensors must view a surface (especially a hard, flat surface) squarely (perpendicularly) to receive ample sound echo. Also, reliable sensing requires a minimum target surface area, which is specified for each sensor type. While ultrasonic's exhibit good immunity to background noise, these sensors are still likely to falsely respond to some loud noises, like the hissing sound produced by air hose and relief valves. Smooth surface reflect sound energy more efficiently than rough surfaces: however, the sensing angle to a smooth surface is generally more critical than to a rough surface.

III. CIRCUIT AND WORKING

The circuit is built around an programmer board as ATMEGA 328 broad ultra sonic trans-receiver module(HC-SR04),Bluetooth module(JY MCU BT),motor driver (L293D) (ICI),DC motor M1 and M2 few components. The circuit use two 9v battery one to power for programmer board and other power to motor.Regulator 5v supply for rest of programmer board itself. Led board indicate present of the power supply.



IV. BLUETOOTH MODULE

Bluetooth module (JY MCU BT) used in project can be connected to any device, via built in UART interface, to communicate with the accuracy and stable reading in an easy to use package. It comes

completely with an ultrasonic transmitter and receiver module. To start the measurement distance, pin2 (TRIG) of the module should received at a high pulse for ten millisecond .The pulse will indicate the module transmit to module ultrasonic burst at 40 kHz and wait for the reflection ultrasonic burst. When sensor reflect the ultra sonic burst, it setup pin 3(echo) to 'high state' Duration of the reflection pulse depend upon the distance from obstacles which can easily calculates by the

Distance (in cm) = $T/58$

Where T=width of the pulse echo pins in microsecond

V. PROGRAMMER BOARD (ATMEGA 328)

It is an open source electronic board prototyping platform based on flexible, easy to use hardware and software. It is intended for artists, designers, hobbyists and any interested is creating interactive object or environment. Programmer board is base on ATMEGA 328 microcontroller. It has 14 digit input/output pins, six analog inputs, USB connected on the programming on the board of microcontroller power jack as a ICSP header and reset button. It operate with a 16MHTZ crystal oscillation and contain everything need to be supported by the microcontroller.

VI. CONSTRUCTION

An actual size, single side PCB layout for the phone controlled robot.Following step for robot running at first time:1. Provide power supply to robot-batteries.2. Pair the Bluetooth module with android phone.3. Run the already installed apps in the phone. Press Welcome screen to get main interface.4. Select the Bluetooth device from making robot using the paired device from mobile phone.5. from mobile apps slider to right/left to speed and select the arrows to move the robot in the control direction.6. To control the robot using the speech command by clear voice speech.

VII. CONCLUSION

Enormous amount of work has been done on wireless gesture controlling of robots. In this paper, various methodologies have been analyzed and reviewed with their merits and demerits under various

operational and functional strategies. Thus, it can be concluded that features like user friendly interface, light weight and portability of android OS based Smartphone has overtaken the sophistication of technologies, Data transmitted by the phone is received by the Bluetooth module at the robot end. The received data is fed to pin8 of board. The micro controlled on the board process the received data and drives the motor accordingly.

REFERENCE:

1. Monika Jain, Aditi, AshwaniLohiya, Mohammad Fahad Khan, AbhishekMaurya Professor, Dept of Electrical & Electronics Engg, Galgotias college of Engg&Tech ,Greater Noida, India Student, Dept of Electrical & Electronics Engg, Galgotias college of Engg&Tech ,Greater Noida, India, International Journal of Advanced Research in Computer and Communication Engineering Vol. 1, Issue 10, December 2012.
2. M.Z.A RASHID, H.N.M Shah, M.S.M Aras, M.N.Kamaruddin,A.M. Kassim, H.I.Jaaafar Faculty of Electrical Engineering, Hang Tuah Jaya, 75260 Durian Tunggal, Melaka, Malaysia, Journal of Theoretical and Applied Information Technology 30 thJune 2014. Vol. 64 No.3.
3. DattaSainathDwarampudi Electronics and Communication Engineering, Mahatma Gandhi Institute of Technology, Hyderabad, Andhra Pradesh, India. International Journal of Engineering Research and Development e-ISSN: 2278-067X, p-ISSN: 2278-800X, www.ijerd.com Volume 10, Issue 11 (November 2014), PP.22-28.
4. Suma Swamy and K.V Ramakrishnan Department of Electronics and Communication Engineering, Research Scholar, Anna University, Chennai suma_swamy@yahoo.com, ramradhain@yahoo.com Computer Science & Engineering: An International Journal (CSEIJ), Vol. 3, No. 4, August 2013.
5. A. K. Shrivastava, A. Verma, and S. P. Singh International Journal of Computer Theory and Engineering, Vol. 2, No. 1 February, 2010 1793-8201.
6. SaliyahKahar, RizaSulaiman,AntonSatriaPrabuwono, NahdatulAkma Ahmad, andMohammadAshri Abu Hassan, Faculty of Information Science and Technology, UniversityKebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia 2012 International Conference on System Engineering and Modeling (ICSEM 2012) IPCSIT vol. 34 (2012) © (2012) IACSIT Press, Singapore.
7. ZhenghuaXin, Guolong Chen1, Qixiang Song, Liangyi Hu, Hongmei Lu, Pei Jiang, Yayun Sun and Lei Chen School of Information and Engineering, Suzhou University, Anhui Province, China School of Economics and Management, Suzhou University, Anhui Province, China 118955711392 begin0000@qq.com International Journal of Smart Home Vol.8, No.5 (2014), pp.269-278 <http://dx.doi.org/10.14257/ijsh.2014.8.5.24>.
8. Rakesh Chandra Kumar1, Md. Saddam Khan2 , Dinesh Kumar3,Rajesh Birua4,Sarmistha Mondal5, ManasKr.Parai6 B.Tech students, Dept. of ECE, Siliguri Institute Of Technology, Sukna ,Darjeeling-734009(W.B), India1,2,3,4 Asst. Professor, Dept. of ECE, Siliguri Institute Of Technology, Sukna,Darjeeling-734009(W.B), India5,6 International Journal of Advanced

Research in Electrical, Electronics and Instrumentation Engineering Vol. 2, Issue 4, April 2013.

9. Arpit Sharma¹, Reetesh Verma², Saurabh Gupta³ and SukhdeepKaur Bhatia Student, Dept. of Instrumentation & Control Engg. J.S.S. Academy of Technical Education Noida, India International Journal of Electronic and Electrical Engineering. ISSN 0974-2174, Volume 7, Number 5 (2014), pp. 443-448 © International Research Publication House <http://www.irphouse.com>.

10. Mr.M.Arun Kumar^{#1}, Mrs.M.Sharmila^{*2} #Department of ECE, SVCET & JNT University AnantapurIndia International Journal of Engineering Trends and Technology (IJETT) – Volume 4 Issue 6- June 2013.

11. Ritika Pahujal, Narender Kumar^{2 1, 2}Electronics & Communication Engineering, Department, BRCM College of Engineering & Technology, Bahal, India International Journal of Scientific Engineering and Research (IJSER) www.ijser.in ISSN (Online): 2347-3878 Volume 2 Issue 7, July 2014.

AUTHORS BIOGRAPHY



Mr.VENKATESAN.P, B.Tech- Information Technology Final year student in IFET COLLEGE OF ENGINEERING, VILLUPURAM.



Mrs.V.SUGANTHI, received her B.E, in CSE from Jayaram college of Engineering and Technology, Bharathidasan University and her M.Tech in IT from Sathyabama University. She has got one year of Industry Experience. She is currently working as an Associate Professor in the department of Information Technology, IFET College of Engineering, and Villupuram, India. She has published three International Journal. Her areas of interests includes Computer Networks, Programming paradigms and Network Security.