

# Wireless Speech Activated Robot with Artificial Intelligence

<sup>[1]</sup>Thilagavathy <sup>[2]</sup>R Anitha K

<sup>[1][2]</sup>Assistant professor, Department of ECE,  
GSSS Institute of Engineering and Technology for Women, Mysuru-16

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**Abstract:** - In this paper, it is aimed to control a robot with speech commands. The robot is able to recognize spoken commands to move correctly. To give a direction to robot, first the voice command is send to the microcontroller using a microphone. The microcontroller recognizes the command by speech recognition system. And then microcontroller converts the voice command to direction command that predefined and recognizable by robot. When the robot gets the direction command, it moves according to spoken command. The robot is designed such that it senses and detect the obstacle in its path and takes deviation using artificial intelligence.

**Keywords-** Microcontroller, Speech Processing, Speech Recognition

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## I. INTRODUCTION

A voice communication and speech processing has been one of the most exciting areas of the signal processing. Speech recognition technology has made it possible for computer to follow human voice commands and understand human languages. The main goal of speech recognition area is to develop techniques and systems for speech input to machine.

The purpose of this project is to present the illustration of advancement in artificial intelligence, in the perspective of speech recognition. It has been documented in the research, that these approaches include artificial intelligence approach, acoustic phonetic approach. In accordance with the views and perceptions, artificial intelligence is the most developing and effective technique, which supports flawless and accurate speech recognition. It is because artificial intelligence incorporates certain algorithmic approaches, which fosters coherent conversion and transformation of speech into actions and vice versa.

This research will assist in understanding these concepts, which are associated with speech recognition. Among all the approaches, artificial intelligence is found to be the most effective and integrated approach, which has strengthened and improved speech recognition practices. The proceeding manuscript will commendably help in illustrating the core concept of artificial intelligence, as

well as the technological advances, which have been occurred in artificial intelligence. In addition to this, the work will also assist in understanding and identifying the statistical models for speech recognition.

Artificial Intelligence is a way of making a computer, a computer-controlled Robot or a software think intelligently, in the similar manner the intelligent humans think. AI is accomplished by studying how human brain thinks, and how humans learn, decide, and work while trying to solve a problem, and then using the outcomes of this study as a basis of developing intelligent software and systems.

Robotics is a domain in artificial intelligence that deals with the study of creating intelligent and efficient robots. Robots are the artificial agents acting in real world environment. Robots are aimed at manipulating the objects by perceiving, picking, moving, modifying the physical properties of object, destroying it, or to have an effect thereby freeing manpower from doing repetitive functions without getting bored, distracted, or exhausted.

## II. LITERATURE SURVEY

NISHANTH DADWAL, PRAVEEN, PRATAP SINGH, PANKAJ PANDEY, RAVIKANTH, MRS. PREETHI DIMAN [1] explains the brief survey on Automatic Speech recognition and discusses the major themes and advances made in the past. After years of research and development

the accuracy of automatic speech recognition remains one of the important research challenges. The design of speech Recognition system requires careful attentions the following issues: Definition of various types of speech classes, Speech representation, feature extraction techniques, speech classifiers, and Database and performance evaluation. The problems that are existing in ASR and the various techniques to solve these problems constructed by various research workers have been presented in a chronological order. The objective of this review paper is to summarize and compare some of the well-known methods used in various stages of speech recognition system and identify research topic and applications which are at the forefront of this exciting and challenging field.

ANUPAM CHOUDRY, RAVI KSHIRSAGAR [2] explained the detail process of speech recognition using artificial intelligence technique. It includes acoustic model, Language model, Trigram model, Class model, Source channel model .Speech recognition or natural language processing referred to artificial intelligence methods of communicating with a computer in natural language like English. The objective of NLP Program is to understand the IP and initiate the action. Method gives theoretical conceptual view to process the speech recognition, an acoustic model needs to be able to interface with telephony system because there is no GUI it needs to manage a spoken dialogue with user.

SHIRISH SHARMA, SUKHWINDER SINGH [3] suggested that Speech is the most important way of communication for people using the speech as an interface for processes has become more important with the improvements in artificial intelligence. In this project it is implemented to control a robot with speech comments. Speech commands were taken to the computer by a microphone, the features were extracted and recognized with Microsoft Visual Studio 2008 (based on C#) which is an integrated development environment (IDE) from Microsoft. It is basically used to develop console and graphical user interface applications. Finally the comments were converted to the form which the robot can recognize and thus, move accordingly using the Arduino Software which is an open source electronics prototyping platform based on flexible, easy to use hardware and software.

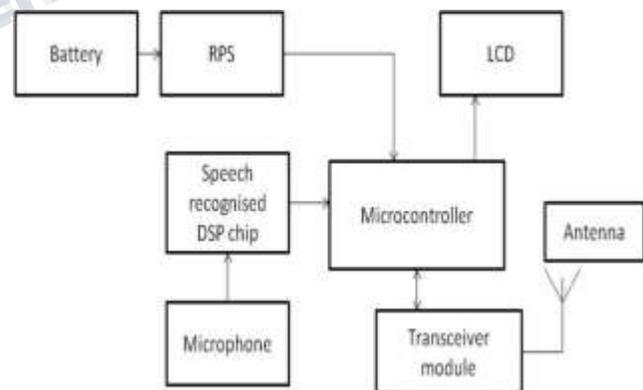
SATRIO HALIM AND WIDODO BUDIHARTO [4] explained about the research on the development of framework for navigation and voice recognition system designed for robot in store/supermarket. The proposed system consists of a microcontroller and a voice recognition processor that can recognize many voice patterns. The robot is controlled through voice recognition

system which allows customers to interact with the robot, in order the robot able to shows the desired location. The advantage of voice recognition system on a robot guidance are fast data input operation and easy to use. The compass is used for navigates the robot from start to goal position. The voice recognition system is trained in such a way that it is recognizing commands and the robot navigates based on the instruction through the voice commands. Based on the experiment, the system run very well and we evaluate and show the performance of this system.

### III. DESIGN METHODOLOGY

#### *Transmitter Section*

The voice commands are stored into the easy VR DSP chip. The input voice commands are given through the condenser microphone to the DSP chip. Input voice command is compared with the stored voice command in the DSP Chip which provides data encryption and also security. The stored strings in the easy VR DSP chip is serially communicated with the PIC16f877A microcontroller. The PIC microcontroller 16F877A assigns the digital code to the corresponding string and the digital code is transmitted by the transceiver module CC2500 which is widely used for low power wireless applications providing extensive hardware support through the patch antenna .The command is displayed using LCD (2x16) display. The battery used is Lead-Acid battery 1.4AH of 12V, the regulated power supply IC7805 outputs the voltage of 5V required for the PIC 16F877A microcontroller. The block diagram of the transmitter section is as shown in figure 1.

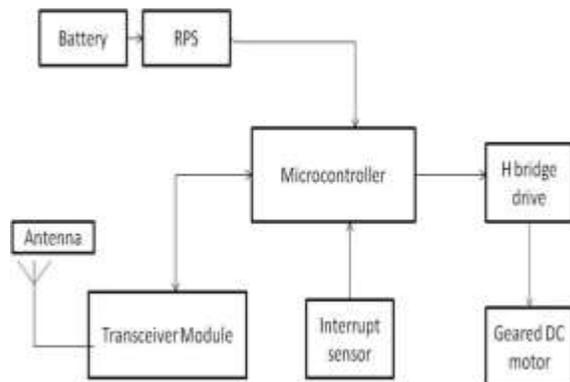


**Figure 1: block diagram of transmitter section**

#### IV RECIEVER SECTION

In the receiver section, the transmitted digital code is received by the transceiver CC2500. The PIC16f88 microcontroller is a 18 pin flash board which retrieves and converts the digital input to corresponding digital output,

the H bridge drive L293D is a high current driver of 1A upto 4.5V to 36V. The H bridge drive amplifies the current of microcontroller 10mA into 100 milliamps required by the geared dc motors. The Geared dc motors is used because of the high torque. The interrupt sensors used to sense and detect the obstacle are IR sensor and ultrasonic sensor. The IR sensor detects the obstacle by measures the heat of that obstacle. The ultrasonic sensor measures the distance between the sensor and the obstacle. The total power consumption is 100 mA. The block diagram of the receiver section is as shown in figure 2.



**Figure 2: block diagram of receiver section**

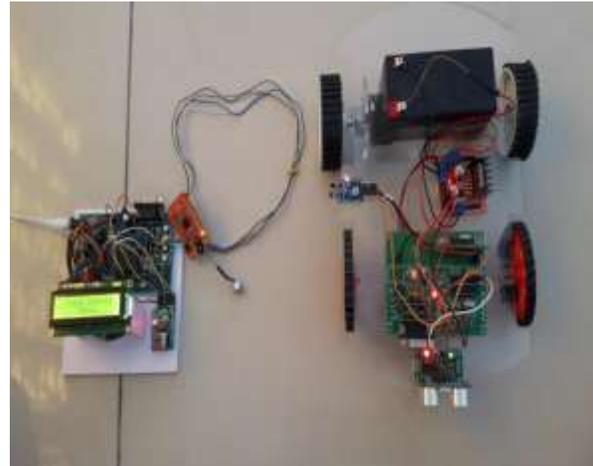
#### IV. RESULTS

The system tested with the command sets 5 commands are used for the command set. The command set is created one English word commands. The commands are FORWARD, REVERSE, RIGHT, LEFT and STOP. The system is tested with the current user, who educate the system, and other users. The results are shown below:

**Table 1: Results of the system for different command sets and users**

Command set	Command User	Other Users
Command set 1	95% - 100%	75% - 85%
Command set 2	95% - 100%	75% - 85%
Command set 3	90% - 100%	60% - 70%

For the command set, for other users, the success is low relatively. The reason of that is the different pronunciation of the English words of the users. The figure 3 represent the Voice controlled robot model



**Figure 3: speech activated robot model**

#### V. CONCLUSION & FUTURE SCOPE

In this project, a robot is controlled with the speech commands. Speech commands are taken by a microphone. The features of the commands are extracted, the commands are recognized using RF network. The recognized command converted to the form in which the robot can recognize. The final form of the commands is sent to the robot and the robot move accordingly.

The system is tested with different command sets and both current user and other users. Generally the system recognizes the commands with % 95 - % 100 success ratios for current user and %75 - %85 for other users. For the development and further research, the system can be implemented using image processing to detect the color and the objects. The system can be designed as a multiple voice controlled robot

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