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Voice to Gesture Converter Using Internet of Things

Annapoorna HR, Anvith Kulal, K Pravalika, Harshavardhan K R
Department of Electronics and Communication Engineering, Bangalore Institute of Technology, Bangalore
Department of Electronics and Communication Engineering, Bangalore Institute of Technology, Bangalore
Department of Electronics and Communication Engineering, Bangalore Institute of Technology, Bangalore
Department of Electronics and Communication Engineering, Bangalore Institute of Technology, Bangalore
Corresponding Author: Dr. Narendra C P

Abstract
The purpose of robotics in commercial & residential intentions has come to be quite essential for executing challenging work in a more convenient way. A voice-controlled robot using a mobile phone, based on a NodeMCU microcontroller is designed and developed. The control system of the robot movement will be employed by the voice and the robot will respond to the commanding persons by making hand gestures. The proposed system is designed based on a microcontroller which is connected to a smart android phone through Wi-Fi module for receiving voice commands. The voice command is converted to text by an app of the android phone and sends necessary data to the microcontroller for controlling robot movement. After receiving the data, the robot responds according to the command by performing proper movement according to the voice command.

Keywords: *Internet of Things, NodeMCU, Gesture, Blynk, Wi-Fi*

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I. INTRODUCTION

One of the most precious gifts of nature to human beings is the ability to express themselves by responding to the events occurring in their surroundings. Every normal human being sees, listens and then reacts to the situations by speaking himself out. But there are some unfortunate ones who are deprived of this valuable gift. This creates a gap between the normal human beings and the specially abled ones, as they can't communicate like normal people. Our aim is to make a robot which can be controlled by the voice command of a person. Normally these types of systems are called Speech Controlled Automation Systems (SCAS). Our design is a prototype of the SCAS. The connection between the application and the robot is facilitated with Wi-Fi technology.

The commands issued will be relayed over through the channel and will be received by the module. The objective of a voice-controlled robot (VCR) is to listen and act on the commands of the user. Learning sign language is similar to learning any other languages, but the problem is, not everyone is interested in learning it. In fact, many don't feel it necessary to learn, but from the point of view of specially-abled people, it is very important for the other person to understand the signs and gestures made by specially-abled people, so that the communication is established on both ends.

In the technology era, the space between the physical and the digital world is brought closer by the introduction of gesture concepts. For all complex tasks, we prefer technology rather than people. With the help of our bot, communication between specially-abled and normal people can be made easier. The target of this work is to simplify the controlling mechanism. The hardware part consists of the mechanical design of the robot, the adequate choice of the servo motors, and the electronic devices to properly drive the robot joints. We are using Arduino for coding, which is similar to C language. Hence programming the robot is also simple, as C language is quite simple to understand.

1.1.1 Introduction to Internet of Things

The Internet of Things (IoT) refers to a system of interrelated, internet-connected objects that are able to collect and transfer data over a wireless network without human intervention. Figure 1 shows and example of an IoT system. An IoT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors and communication hardware, to collect, send and act on data they acquire from their environments. IoT devices share the sensor data they collect by connecting to an IoT gateway or other edge device where data is either sent to the cloud to be analysed or analysed locally.

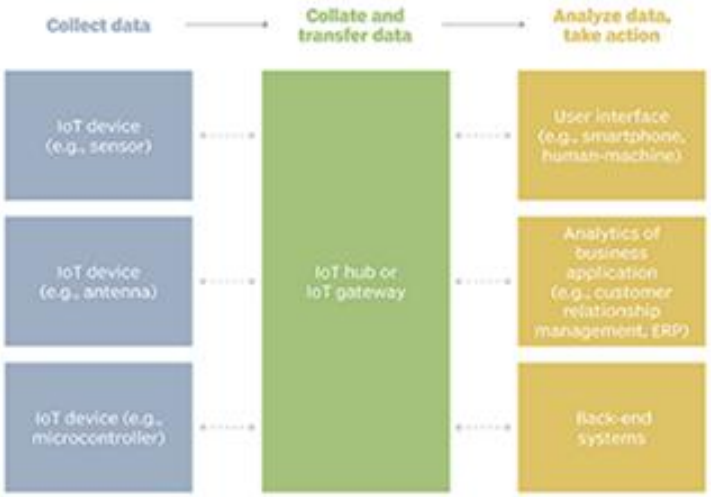

Figure 1: An example of IoT System

1.1.2 Aproach

Voice commands are given through Google Assistant, to the bot. Particular commands are mapped to particular actuators. Based on the commands given, the actuators linked to it are activated. The action corresponding to the command is acted. When communicating with a specially abled person, this bot can be used to convert your speech to actions, so that they can understand and respond. Through this bot one can communicate without any hindrance with the specially abled. The block diagram shown in figure 2 explains the approach.

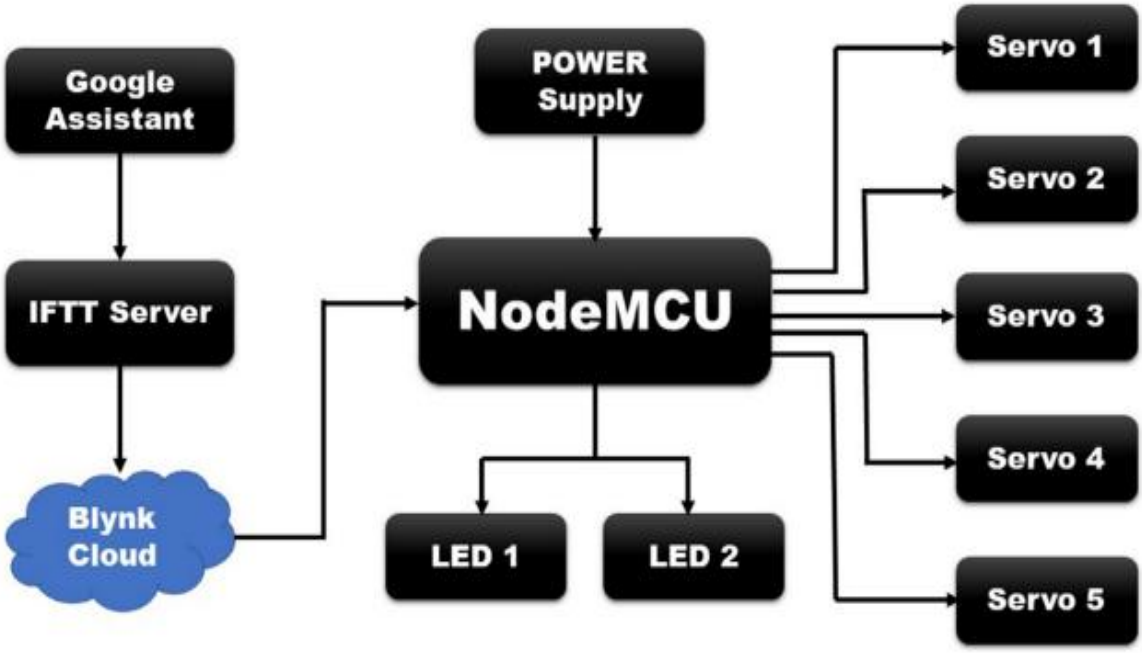

Figure 2: Block Diagram

1.2 IMPLEMENTATION AND DESIGN

The implementation and the designing of the robot is described below.

1.2.2 Working

The NodeMCU is used as a main microcontroller for transmission and reception of data. The voice command is given through the Google Assistant which raises the required web request to Blynk Cloud via IFTTT server. Blynk is in turn integrated with the controller which sends the suitable command to the controller. The voice command from google assistant raises the web request via IFTTT server and suitable pin is triggered in the Blynk application. The Blynk application sends the command to the controller and the controller executes the function defined for the particular pin (virtual) pin trigger. The Controller actuates the respective servo motors to perform the commanded/requested action. The circuit connections are made according to the circuit diagram shown in figure 3.

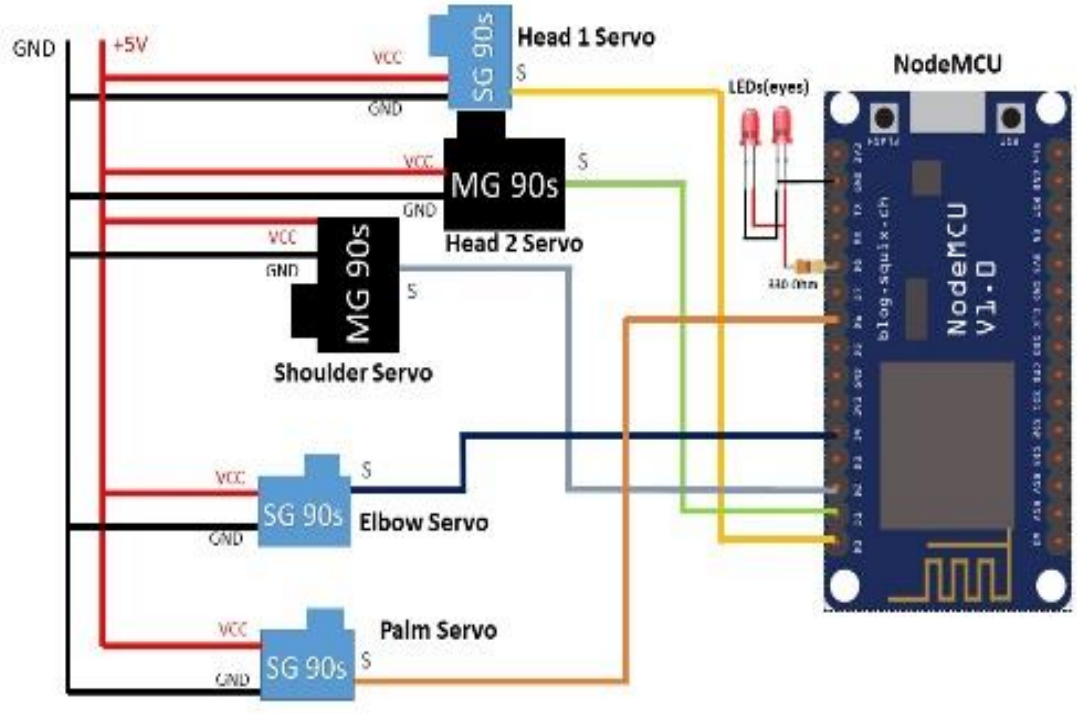

Figure 3: Circuit Diagram

1.2.3 Program Flow

The working of the robot can be described in the form of flowchart. Figure 4 shows the flow chart for the working of the robot.

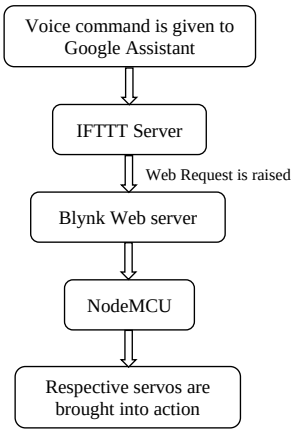

Figure 4: Program Flow

II. RESULT AND DISCUSSION

While testing the hardware, servo motors responded correctly to the given commands. We successfully tested all the components used. Communication between android phone and bot was fast and not interrupted. The circuit implemented is shown in figure 5.

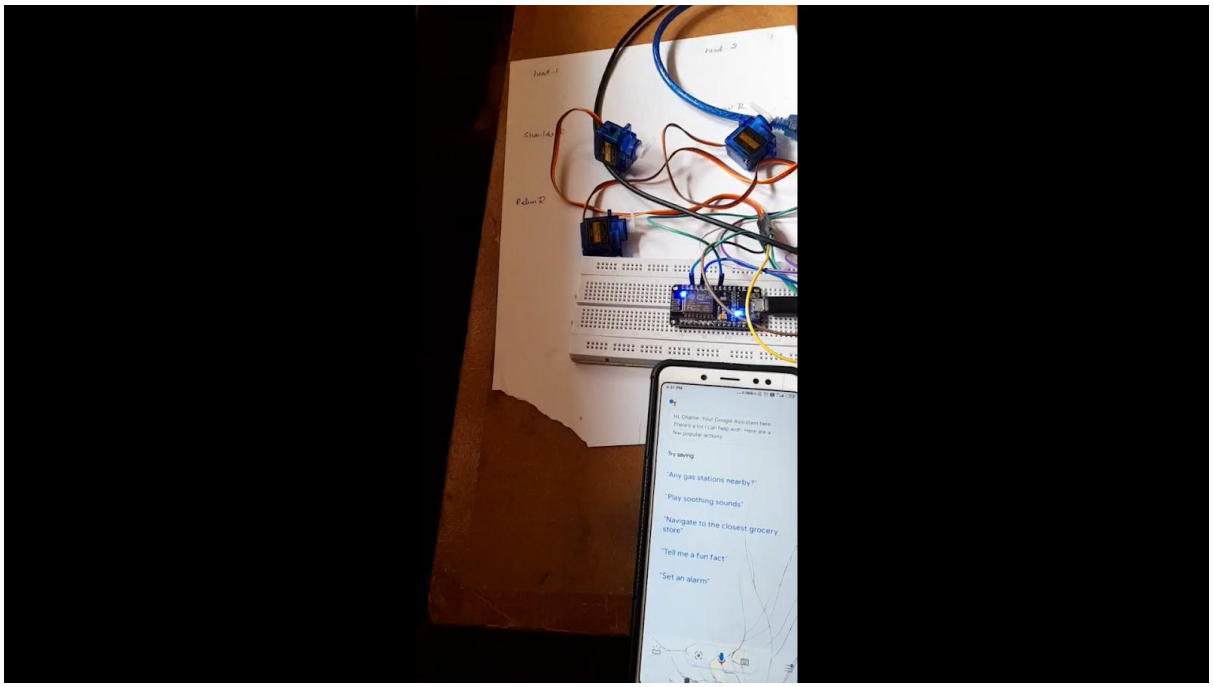

Figure 5: Circuit implemented

III. CONCLUSION

The "Voice to Gesture Converter using IoT" project has many applications in present and future. The project can be made more effective by adding features to it in the future. We were successful in implementing a simple model of voice-controlled robot using the available resources. The implementation of this project is easy, so this robot is beneficial for human life. It works on simple voice command, so it is easy to use. The size of this robot is small, so this bot can be easily carried around.

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