IOT Based Smart Robotic Arm

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Abstract:- A robotic arm is that the foremost vital device in an industrial automation for the autonomous performance of tasks. In this project, we are going to work with a 5DOF robotic arm along with ultrasonic sensors. We used ultrasonic sensors to wait for few seconds when it senses a person or obstacle nearby distance of that the robotic arm stretches a maximum of 38cm [1].

Keywords- Robotic Arm, Ultrasonic Sensor, Arduino, Blynk Application, Area.

I. INTRODUCTION

A robot could also be a programmable, multifunctional manipulator which is well-known in industrial automation. It absolutely was inclusive of a tough and fast number of rigid sections. Each rigid section is assumed as Links, which provides relative motion between input link and output link. Links are associated with joints and move concerning their joints. The essential part of the Robotic manipulator is End-effector and it consists of grippers and Tools. Grippers are want to hold an object to perform tasks. Degrees of Freedom is the most vital term in robotic manipulator, it interpreted because the prowess of a joint to supply linear or rotary movement when initialized. The number of DOF for a robot is similar to the number of joint axes within the robot manipulator [2].

Robotic Manipulator plays an important role in Industrial Automation as they work in dangerous, dirty, and mechanical tasks with even exact and accuracy. Modern robots are used for a lots-of applications like welding, spraying, palletizing, handling, etc.

II. PROPOSED METHODOLOGY

In this step with our project, we want one robotic arm, NodeMCU board, Ultrasonic sensors, Arduino software, Blynk application. We've got designed our robotic arm using 3d printing equipment, due to the 3d printing equipment we made our robotic manipulator parts like Grippers, links, joints, base [3].

2.1 UltraSonic Sensors

An ultrasonic sensor is an electronic device that calculates the distance of a object by ejecting ultrasonic sound waves and transform the reflected sound into an electrical signal. Ultrasonic waves travels as fast as the speed of sound (i.e. the sound that humans can hear)

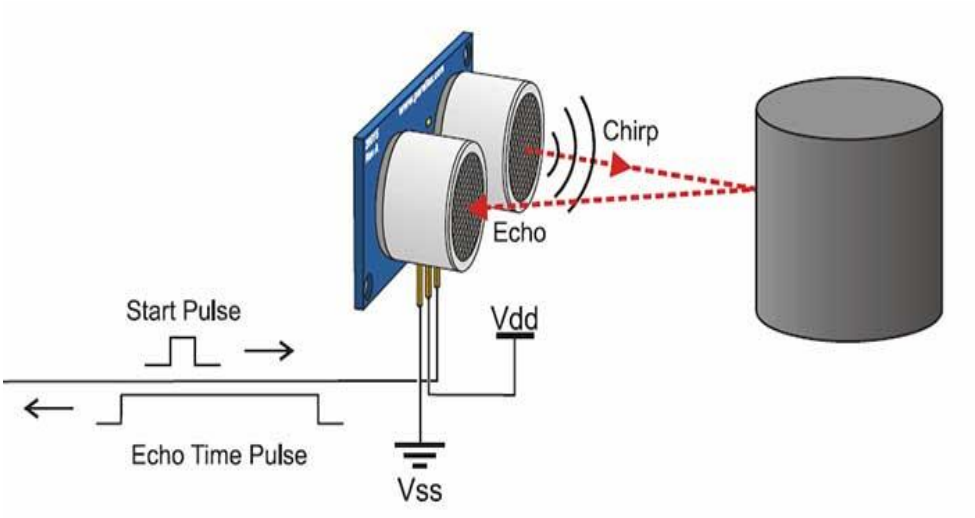


Figure 1: Working of Ultrasonic sensor

We have used the ultrasonic sensors to send the signal that there is an obstacle around the robotic arm, when it is doing its job. The Ultrasonic sensor has put on both sides to the of the robotic arm, so that it can wait or stop the work until the obstacle is not in the range of robotic arm maximum length of 38cm.

Esp8266 NodeMcu:

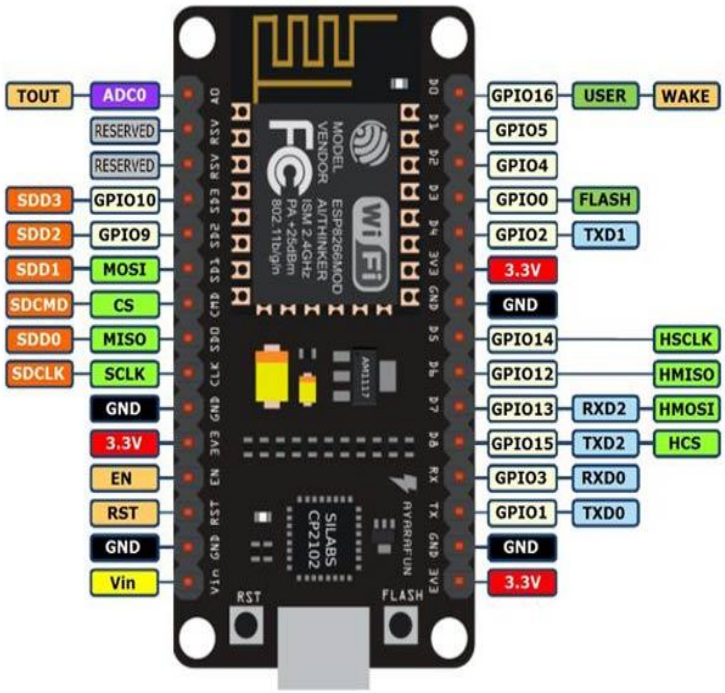


Figure 2: Node MCU

NodeMCU ESP8266 development board made from the ESP 12e module consists of ESP8266 chip having Tensilica Xtensa 32bit LX106 RISC microprocessor. The microprocessor maintains RTOS and operates on 80MHz to 160MHz variable clock frequency. NodeMCU includes 128KB RAM and 4MB of nonvolatile storage to store data and programs. Its high transforming power with congenital wi-fi or Bluetooth and deep sleep operating features referee for IoT projects [4].

NodeMCU board can easily be programmed with Arduino IDE Since it's easy to use.

We've used Arduino IDE software to regulate the robotic manipulator using NodeMCU. Arduino IDE is software where are often ready to write the program in c/c++.

Table 1: Components used

1.	NodeMcu-ESP8266	1
2.	5V 2A DC supply	1
3.	MG996R sevo motors	3
4.	S690 Micro Servo	3
5.	Ultrasonic Sensor	2

Circuit Diagram :

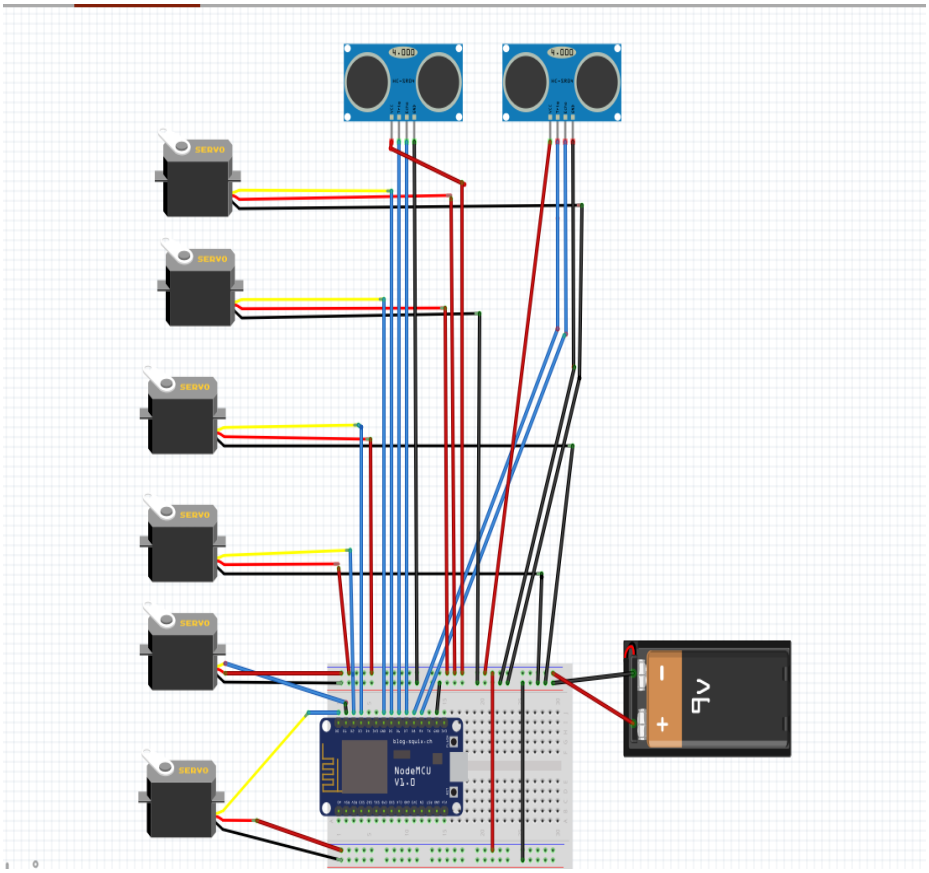


Table 2: Circuit Connections

NodeMCU	**Servo Motors**	**Power Adapte**r
D0	Servo1-MG996R yellow (PWM pin)	-
D1	Servo2-MG996R yellow (PWM pin)	-
D3	Servo3-MG996R yellow (PWM pin)	-
D4	Servo4-SG90 Micro yellow (PWM pin)	-
D5	Servo5-SG90 Micro yellow (PWM pin)	-
D6	Servo6-SG90 Micro yellow (PWM pin)	-
Ground	Servo's 1,2,3,4,5,6 Black (GND pin)	GND
Vcc	Servo's 1,2,3,4,5,6 Red(+5V)	+5v

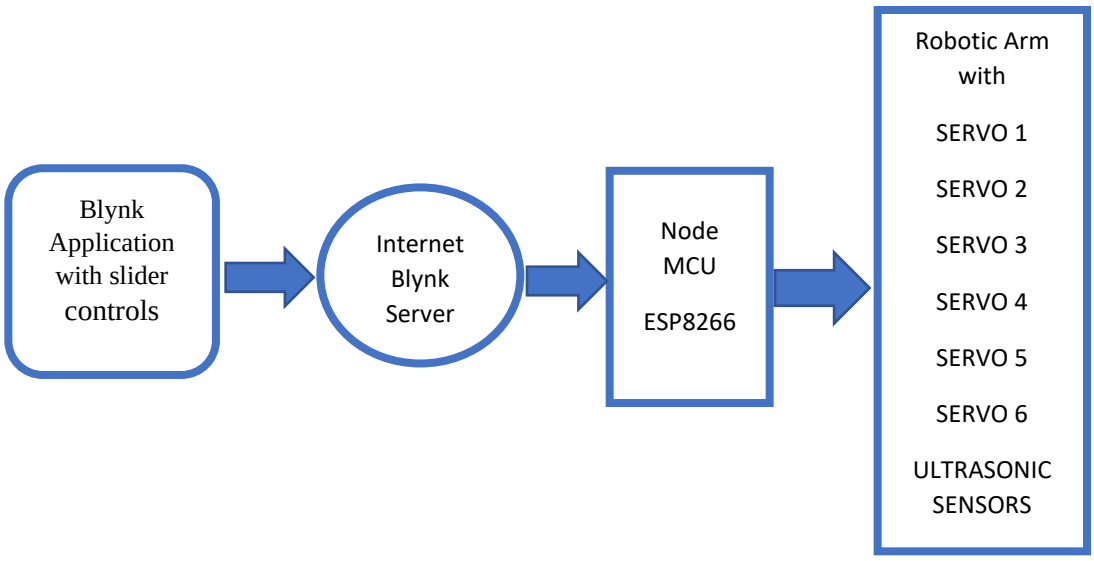
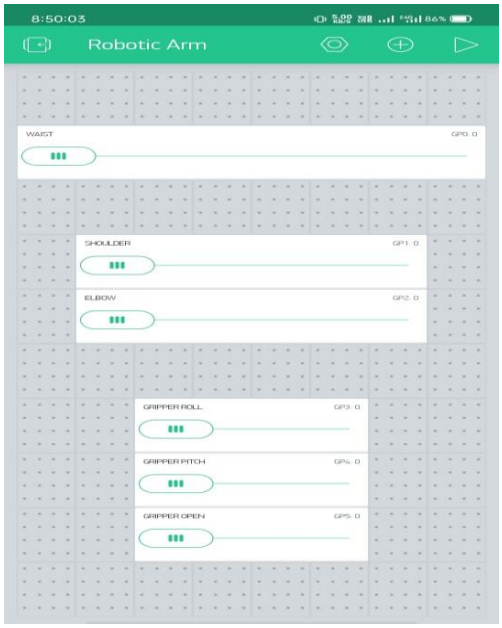


Figure 3: Functionality Of IOT based Smart Robotic Arm

The mechanism of this project is intelligible, we are supervising the robotic manipulator with four servo motors using an application together with the web connection called the Blynk application. since we connect NodeMcu to the net using that we are able to easily control our robotic arm movements. As we've got created different slides called Grippers, Left or Right, Up or down, Forward or Backward using these slides we are able to control comfortably our robotic actions using NodeMcu [5].

BLYNK application for robotic arm:

Blynk is an IOT platform, where we will rapidly build projects for commanding and keep track of the information making use of mobile phones like Android and IOS gadgets. There's another advantage of making the project dashboard and widgets like button, display, sliders, etc naming them as Grippers, Left and right turn, Up and downshift for governing microcontrollers, and other superficial. we are able to control the machine and may track the sensor data on the phone screen by making use of these widgets.



III. CONCLUSION

This research models a 5 DOF robotic arm and so designs and implements safe working around the robotic arm maximum distance it can cover. We have also measured its area that it can cover as ultrasonic sensor need to sense that there is no obstacle with in 30cm radius and 10cm radius. Robotic arm implemented on hardware to watch the performance in an actual working environment [6]. The system response has been recorded by the varied inputs.

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