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Wireless Controlled Robot for Multi Puropose

Dr.C.Gangaiah Yadav[1], K.Sanjana Reddy[2], P.Saikumar[3], V.Ram Neeraj Reddy[4], K.Teja Suresh[5]

(Associate. Prof , ECE Dept, Siddartha institute of science and Technology, Puttur, A.P, India)[1]

(B.Tech. IV Year Student, ECE Dept, Siddartha institute of science and Technology, Puttur, A.P, India)[2]

(B.Tech. IV Year Student, ECE Dept, Siddartha institute of science and Technology, Puttur, A.P, India)[3]

(B.Tech. IV Year Student, ECE Dept, Siddartha institute of science and Technology, Puttur, A.P, India)[4]

(B.Tech. IV Year Student, ECE Dept, Siddartha institute of science and Technology, Puttur, A.P, India)[5]

(Email.id:- pothurisaikumarnaidu807@gmail.com)

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Abstract:

In today's world, to minimize manual effort across a number of dynamic works, in this area, there is the development of artificial machines that make it possible to do the work of a human being seamlessly and in lesser time. Robots are designed and used in many real contexts, including agriculture, military, space, industry, healthcare, smart home, and many more. The pick and place robot are built by programming hardware components to move, trace, catch, raise, and drop the target. The target object is placed on the floor, then the robotic arm is controlled either by audible voice commands or by hand movements. Voice instructions are pre-loaded onto the robotic arm on which they are depending on the human order is obeyed. Hand movements are only understood when specially assigned actions to the robot. This hand motion defines the physical action, the axis switches, and the robotic arm moves.

***Keywords*—Robotic arm,artificial machines, Arduino controller, IP web cam**

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IINTRODUCTION

To make daily life more easy and effortless, we have to take the help of technology may be autonomous or manual. But life of human being can be smoother if the technology becomes hands free. If human can control machines totally by their voice, gestures and other activities, then interactions will be easier. There are many high tech bots which can do these things but still normal people are still far away from that types of technology mainly due to high price of that products. Our target is to make low cost smart products which can easily be bought. Not only that but also it will be easier to operate that types of machines. Our dream is to make such kind of bots which will made of wires and circuits but acts like personal assistant in more realistic way. The robot works on Voice, Text, gesture sensors, accelerometer, etc. Gesture Controlled robot is a kind of robot which can be controlled by our hand gestures not by old buttons.

II LITERATURE SURVEY

The Emergence of strive Robots in early 90's (Helpmate Robots and Robot-Caddy) followed by The development of natural language interface through keyboard has been given by Torrance in 1994.Speech recognition evolved as an upgradation of the past work to communicate with machines but it lacked the standardization of commands due to varying languages, pitch and accent of different users.Hence, researchers proposed vision-based interface that included gesture recognition through camera to provide geometrical information to the robots. They developed mobile robot systems that were instructed through arm positions but those

robot systems couldn't recognize gestures defined through specific temporal patterns. Other limitation faced by the cameras was the poor illuminations at night and in foggy weather.Motion technology facilitates humans to interact with machines naturally without any interventions caused by the drawbacks of mechanical devices. Using the concept of gesture recognition,it is possible to move a robot accordingly. Gyroscope and Accelerometers are the main technologies used for human machine interaction that offer very reasonable motion sensitivity, hence, are used in large array of different applications. A lot of work has been done on motion technology using accelerometers.

M.Cianctietti, A.Arienti, B.M.Follador, B.Mazzalai, P.dario they get inspired by the Octopus to and make an interesting model in robotics due to its high dexterity, variable stiffness and very complex behavior. In this experiment they study the key features and patterns of movement of Octopus arm and this features and patterns and patterns of movement are that is elongation, shortening, bending and reaching etc. used for guide the movement of actuator. They conclude that the concept proposed for the mechanism at the base of the robotic arm inspired to the Octopus muscular hydrostat where successfully implemented on mock-ups and the corresponding models have been modified and validate.

RavikumarMourya, Amit Shelke, Saurabh Satpuite, Sushant Kakade, MonojBotre have main objective of their project are to design and implement a four DOF pick and place robotic arm. They conclude that the CAD tools like Creo1.0 and Auto CAD are used to model the desire manipulator. To determine the end effectors position and orientation, theoretical analysis of inverse kinematics are carried out. Ansys software is used for FE Analysis.

Prof.S.N.Teli, AkshayBhalerao, SagarIngole, Mahesh Jagadale. This project aims to design and fabricate the pneumatic arm for pick and place of cylindrical objects. They conclude that arm is controlled by manually flaw control and direction control valve. Arm rotation and movement is done by pneumatic cylinder using helical slot mechanism. Total arm weight is 25 kg. The model is expected to lift at least 10 kg weight.

S.Premkumar, K.Surya Varman, R.Ballamurgan, Experimental aim is to collaborate the gripper mechanism and vacuum sucker mechanism working in single pick and place robotic arm. These robot can perform tasks like gripping, sucking, lifting, placing, releasing, in a single robotic arm. It will reduced the cycle time, Ideal time, cost of operation, space consumption. It is user friendly and effectively used in glass handling system.

S.C.Gutierrez, R.Zotovic, M.D.Navarra, M.D.Meseguer. Their purpose of work is to manufacture a light weight robot arm with a low cost budget. They conclude that to avoid negative influence on the total weight of the arm, the plastic material reinforced with fiber is used and vacuum infusion man process is used for manufacturing. Local reinforced elements must be included during construction of arm shell. The mast light gear reducer, harmonic drive types are used but because of lack of alignment causes disassembly of gear package to avoid these flexible couplings are required.

Gabrielle J.M. Tuithaf, Just L.Harder. Current robots are not safe for interaction with humans, especially for children therefore safe four DOF robot arm is develop. Firstly, the joint stiffness of arm is brought to zero then the arm is supplied with pneumatic artificial muscles and their stiffness can be adjusted by open loop stiffness control.

M.Pellicciari, G.Berselli, F.Leali, A. Verganana. This paper shows the method for reducing the total energy consumption of pick and placed robotic arm. Firstly, electro mechanical models of both series and parallel manipulators are derived and then by means of constant time scaling, the energy optimal trajectories are calculated. It is seen that blowing down an operation as much as possible is not always beneficial. Energy consumption of given operation as a function of the task execution time. Future work includes improvement of the motor

model, development of online programming algorithms.

Mohd Ashiq Kamaril, Yusuff, Reza EzucinSamin, Babul Salam, Kader Ibrahim, paper presents the development of wireless mobile robot arm. Wireless PS2 controller is used to control the pick and place operation. The development of this robot is based on Arduina Mega Platform. Analysis of speed, distance, load lifted by arm is done to know its performance. This robot expected to overcome the problem such as placing or picking object that is away from the user, pick and place hazardous object fast and easily.

H. Hagenah, W. Bohm, T. Breitsprecher, M. Merklein, S. Wartzack. This paper will show how modern materials as cellular titanium &nano crystalline aluminium can be used to build advanced light weight robot arms. This paper will cover the definition of the product specification, the setting of a basic design and the optimization of this by means of topology optimization. This optimization requires an intelligent modeling to be able to investigate different initial setting and boundary conditions. Different innovative light weight construction materials and the corresponding manufacturing technologies are developing and analyzed.

MohdAliff, ShujiroDohta, Tetsuya Akagi, flexible Hui Li the aim of study is to develop the and light weight actuator and applied into has flexible hose robot arm. In this paper, the Slavic Master's degree height flexible control and the trajectory control of the robot arm are proposed. This robot arm has 3DOF i.e. bending, expanding and contracting and will be applied into has device for human wrist rehabilitation. In this paper the analytical model of year has flexible hose robot arm is proposed for Slavic Master's degree height control in trajectory control.

1 Development Of Robotic Arm Using Arduino UNO by PriyambadaMishra,Riki Patel, TrushitUpadhyaya, Arpan Desai:- In this paper, they have used 4 servo motors to make joints of the robotic arm and the movement will be controlled with the help of potentiometer. The controller used is Arduino UNO. The analogue input signals of the Arduino's is given to the Potentiometer. The arm has been built by the Cardboard and individual parts are attached to the respective servo motors. The arm is specifically created to pick and place light weight objects. So low torque servos, with a rotation of 0 to 180 degrees have been used. Programming is done using Arduino 1.6.10. Thus the paper basically focuses on creating a robotic arm with non useful materials and its application on small purposes.[1]

2.2 Design of Robotic Arm with Gripper and End effector for spot welding' by Puran Singh, Anil Kumar, MaheshVashishth According to the paper the robotic arm consists of 2 degrees of freedom is being made for the purpose of spot welding, gripper will be used in the arm. The end effector consists of an arrangement of spur gears and threaded shafts along with an AC motor. Aims considered while building the robotic arm are1.To have a rigid structure. 2.Movement of parts to defined angles. 3.To attain consumption of power at optimum level. 4.To perform spot welding operation with the help of end effectors. The material used for manufacturing the bottom of robotic arm was plywood which has the dimensions as followsLength-48 cm, Breadth-28 cm, Thickness-2 cm. Arm manipulator will be made up of plastic and has the following description- ● Weight=(30)2=60 g for big arm and (10)2=20 g for small arm. ● Length=25 cm for big arm And 5cm for small arm. At the assembly point of wrist and end effector, 2 end effectors are used, in which one end effector is fixed and the other is movable, the end effector assembly has meshing of spur gears and worm gears which are connected to a 9 V stepper motor. The stepper motor has a step angle of 1.8 degrees and a speed of 100rpm. Force calculation on joints is done. This design of the robotic arm has two d.o.f. which performs the function of lifting, and for each linkage the center of mass was acting at the half of the length. Since there are many possible configurations for the

robotic arm, the maximum degrees of rotation of each joint is 180 degrees. All the locations of the End Effector to which it can reach so that the workspace required can be calculated. This type of technology which is used in robotic arms can help in doing spot welding operation more efficiently. The material handling was carried out easily by picking and placing of the desired object. We can change the variation in the robot arm structure and their angle of movement.[2]

2.3 Review on Object-Moving Robot Arm basedonColorByAreepenSengsalonga, Nuryono Satya Widodo The objective of this finding is to make a manipulator which can sort objects on basis of color using specific motors and photodiode sensors programmed with a Arduino Mega series microcontroller. The light photodiode sensor can identify RGB colors. In this system the output of Arduino Mega 2560 is displayed on a LCD screen which is an indication of the observed color. The first step of object moving process is by distinguishing the RGB color. The gripper of robotic arm will move to pick objects based on color, depending on the color input given by the light photodiode sensor. Arduino Mega 2560 is a microcontroller that uses ATmega2560 which is installed in robotic arm having 54 digital I/O ports segregated into different types. In this paper a color sensor testing is also carried out ,having a target to determine the ability of Photodiode sensor for distinguishing of color .The resultant voltage from photodiode will be sent to ADC to process and show result on the LCD screen provided.[3]

2.4 Modeling and Simulation of Robotic Arm Movement using Soft Computing by V. K. Banga, Jasjit Kaur, R. Kumar, Y. Singh In this research paper the authors successfully built a 4 degrees of freedom robotic arm using soft computing. They have formulated ways for controlled movement of robotic arm and planning of trajectory with the help of Genetic Algorithms (GAs) and fuzzy logic (FL). As optimal movement is critical for efficient autonomous robots. This architecture is used to limit the issues related to the motion, friction and the settling time of different components in robotic arm. Genetic optimization is used to find the finest joint angles for this four d-o-f robotic system. This type of optimization replaces the long process of trial and error in search of better combination of joint angles, which are valid as per inverse kinematics for robotic arm movement. These logic models (Fuzzy logic) have been developed for the joint movement, friction and least settling time attributes as the fuzzy logic input.[4]

III.EXISTING SYSTEM:

The current systems are robots like line follower robot, edge averting robot, DTMF robot, gesture controlled robot. These type of robots are not efficient since they require more power to run, cost is also very high. In the existing system they don't use voice commands, making it not possible for physically handicapped people todrive. The voicecommands are interpreted via an offline server in real time. The commands are at once transmitted to the server directly by the means of a wired network. The car is built primarily on a platform based on a microcontroller. Some of the fields that can likewise be equally enhanced are the effect of the mouth-microphone range on the robotic, the overall performance (scope) of the robot and the effect of noise on the translation of speech to textual content. In the existing system Bit Voice Server is used, it's a database for speech processing and automation synthesis. It was designed to make voice operation possible with simple gadgets having low processing power. Microcontrollers usually do not have enough storage and computing ability to perform sophisticated speech treatment and synthesis. By doing the tough work Bit Voice Server removes the consequences of these limitations so that the microcontroller can assign its key functionality to most of its origin sources.

IV.PROPOSED SYSTEM

In this proposed device we perform a variety of research on control style variants for robots. It shows that it's feasible to study to successfully manipulate actual world objects with solely voice

(human voice) as a control mechanism. The reason of this lookup is to provide simple robotic hardware architecture so that this shape can focal point on Bluetooth connection infrastructure. It is also beneficial for academic robotics due to the fact human beings can construct their personal robots with low cost. When the app is operating in the system, a microphone on the mobile is used to identify user voice commands. Commands are interpreted and the program utilizes Google's speech-recognition software to translate voice to text within the app. The text will then be sent with the aid of Bluetooth to the receiver part.

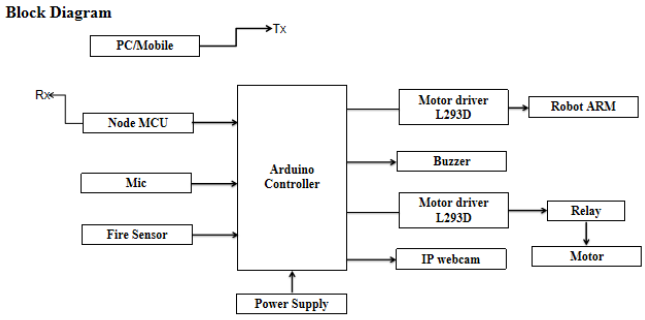
The microcontroller Arduino UNO R3 has 32kB of ISP flash memory, 2kB of RAM and 1kB of EEPROM. The panel incorporates serial communication connectivity with UART, SPI and I2C. The MCU will operate at 16MHz clock speed. The digital Arduino I / O pins 3, 4, 5 and 6 are programmed as output pins in this design. For serial communication with the Bluetooth unit, pins 0 and 1 of Arduino are used. Text obtained with the aid of Bluetooth is forwarded to Arduino UNO microcontroller panel by the usage of UART serial conversation protocol.

The voice commands to the robotic device are dispatched via Bluetooth with the aid of an Android device. These commands are received on the robotic device by using Bluetooth module set up on it. The motor driver circuit is used to manipulate the velocity of the car. The complete circuitry is powered by the usage of a 12V rechargeable battery hooked up on the system.

Upon successfully pairing the device, open the app on the smart phone and press on the IOT Module textual and emblematic pushbutton. The number of associated gadgets will now be shown. Select HC-05 from the listing to join the smart phone with HC-05 Bluetooth module on the receiver side. After successful connection, 'connected' will be displayed on the primary screen of Voice control app. Press the pushbutton with microphone image and a prompt will show up asking for voice commands.

When it appears, voice instructions are detected via the app, which converts them into textual content and sends it to the receiver aspect wirelessly by using IOT Module. On the receiving side, Arduino tests the text. If it is a matching string, it controls the moves of the robot in accordance to the description.

Once the app launches the user has to connect to the robot via Bluetooth. Once connected the status of the application changes to 'connected'. Then clicking the microphone button opens up the speech recognizer. The recorded audio is processed after which the transcribed text is displayed and sent to the connected Bluetooth in the form of a string or character array.



V.CODING:

```
#include <LiquidCrystal.h>
constintrs = 13, en = 12, d4 = 11, d5 = 10, d6 = 9,
d7 = 8;
LiquidCrystallcd(rs, en, d4, d5, d6, d7);
int buzzer=3;
int mic=13;
int fire=12;
int up1=8;
int up2=9;
int open1=10;
int open2=11;
int m1 = 7;
int m2 = 6;
int m3 = 5;
int m4 = 4;// select the pin for the LED
int x = 0;  // variable to store the value coming from
the sensor
int y = 0;  // variable to store the value coming from
the sensor
int z = 0;  // variable to store the value coming from
the sensor
```

```
String data;
void setup()
{
pinMode(buzzer, OUTPUT);
pinMode(fire, INPUT);pinMode(mic, INPUT);
pinMode(m1, OUTPUT);pinMode(m2,
OUTPUT);pinMode(m3, OUTPUT);pinMode(m4,
OUTPUT);
pinMode(up1, OUTPUT);pinMode(up2, OUTPUT);
pinMode(open1, OUTPUT);pinMode(open2,
OUTPUT);

digitalWrite(m1,LOW);digitalWrite(m2,LOW);digi
talWrite(m3,LOW);digitalWrite(m4,LOW);

digitalWrite(up1,LOW);digitalWrite(up2,LOW);dig
italWrite(open1,LOW);digitalWrite(open1,LOW);
digitalWrite(buzzer,LOW);delay(1000);
Serial.begin(9600);
}
void front()
{
Serial.println("FRONT");delay(1000);
delay(1000);digitalWrite(m1, HIGH);
digitalWrite(m2, LOW); digitalWrite(m3, HIGH);
digitalWrite(m4, LOW);delay(1000);

}
void back()
{
Serial.println("BACK");delay(1000);
delay(1000);digitalWrite(m1, LOW);
digitalWrite(m2, HIGH); digitalWrite(m3, LOW);
digitalWrite(m4, HIGH);delay(1000);

}

void left()
{
Serial.println("LEFT");delay(1000);
delay(1000);digitalWrite(m1, HIGH);
digitalWrite(m2,LOW); digitalWrite(m3, LOW);
digitalWrite(m4, HIGH);delay(1000);
stop1();
}
void right()
{
Serial.println("RIGHT");delay(1000);
delay(1000);digitalWrite(m1, LOW);
digitalWrite(m2,HIGH); digitalWrite(m3, HIGH);
digitalWrite(m4, LOW);delay(1000);
stop1();
}
void stop1()
{
Serial.println("STOP");delay(1000);
digitalWrite(m1, LOW); digitalWrite(m2,LOW);
digitalWrite(m3,LOW); digitalWrite(m4,
LOW);delay(1000);
}

void up()
{
Serial.println("up");delay(1000);
digitalWrite(up1, HIGH); digitalWrite(up2,LOW);
delay(500); digitalWrite(up1,LOW);
digitalWrite(up2, LOW);delay(100);
}
void down()
{
Serial.println("down");delay(1000);
digitalWrite(up2, HIGH); digitalWrite(up1,LOW);
delay(500); digitalWrite(up1,LOW);
digitalWrite(up2, LOW);delay(100);
}
void open11()
 {
Serial.println("open");delay(1000);
digitalWrite(open1, HIGH);
digitalWrite(open2,LOW); delay(1000);
digitalWrite(open1,LOW); digitalWrite(open2,
LOW);delay(100);
 }
void close1()
 {
Serial.println("close");delay(1000);
digitalWrite(open2, HIGH);
digitalWrite(open1,LOW); delay(1000);
digitalWrite(open1,LOW); digitalWrite(open2,
LOW);delay(100);
 }
```



```
void loop()
{
back:
Serial.println("i need voice command from
bluetooth to start...");
while(1)
 {

intfireval=digitalRead(fire); delay(10);
intmicval=digitalRead(mic);  delay(10);
if(fireval==LOW)
 {
Serial.println("FIRE
DETECTED");delay(100);stop1();

digitalWrite(buzzer,HIGH);delay(1000);digitalWrit
e(buzzer,LOW);delay(100);
digitalWrite(buzzer,HIGH);delay(1000);digitalWrit
e(buzzer,LOW);delay(100);
 }
if(micval==LOW)
 {
Serial.println("SOUND
DETECTED");delay(100);stop1();

digitalWrite(buzzer,HIGH);delay(1000);digitalWrit
e(buzzer,LOW);delay(100);
digitalWrite(buzzer,HIGH);delay(1000);digitalWrit
e(buzzer,LOW);delay(100);
 }

while(Serial.available())
  {
data=Serial.readString();delay(100);Serial.println(d
ata);delay(100);
if(data[0]=='f' )
   {
data="";
front();
   }
   else if(data[0]=='f' && data[1]=='r'  &&
data[2]=='o'  && data[3]=='n'  && data[4]=='t')
   {
data="";
front();
   }
  else if(data[0]=='*' && data[1]=='f'  &&
data[2]=='r'  && data[3]=='o'  && data[4]=='n' &&
data[5]=='t'  && data[6]=='#')
   {
data="";
front();
   }

else if(data[0]=='b'  )
   {
data="";
back();
   }
else if(data[0]=='b' && data[1]=='a'  &&
data[2]=='c'  && data[3]=='k' )
   {
data="";
back();
   }
  else  if(data[0]=='*' && data[1]=='b'  &&
data[2]=='a'  && data[3]=='c'  && data[4]=='k' &&
data[5]=='#')
   {
data="";
back();
   }
else if(data[0]=='l'  )
   {
data="";
left();
   }
else if(data[0]=='l' && data[1]=='e'  &&
data[2]=='f'  && data[3]=='t' )
   {
data="";
left();
   }
  else if(data[0]=='*' && data[1]=='l'  &&
data[2]=='e'  && data[3]=='f'  && data[4]=='t' &&
data[5]=='#')
   {
data="";
left();
   }
else if(data[0]=='r' )
   {
```



```
data="";
right();
  }
else if(data[0]=='r' && data[1]=='i'  &&
data[2]=='g'  && data[3]=='h'  && data[4]=='t')
  {
data="";
right();
  }
 else if(data[0]=='*' && data[1]=='r'  &&
data[2]=='i'  && data[3]=='g'  && data[4]=='h' &&
data[5]=='t'  && data[6]=='#')
  {
data="";
right();
  }

else if(data[0]=='s'  )
  {
data="";
stop1();
  }
else if(data[0]=='s' && data[1]=='t'  &&
data[2]=='o'  && data[3]=='p' )
  {
data="";
stop1();
  }
  else if(data[0]=='*' && data[1]=='s'  &&
data[2]=='t'  && data[3]=='o'  && data[4]=='p' &&
data[5]=='#')
  {
data="";
stop1();
  }

if(data[0]=='u' )
  {
data="";
up();
  }
if(data[0]=='u' && data[1]=='p'  )
  {
data="";
up();
  }
  if(data[0]=='*' && data[1]=='u'  && data[2]=='p'
&& data[3]=='#')
  {
data="";
up();
  }

if(data[0]=='d'  )
  {
data="";
down();
  }
 if(data[0]=='d' && data[1]=='o'  && data[2]=='w'
&& data[3]=='n' )
  {
data="";
down();
  }
   if(data[0]=='*' && data[1]=='d'  && data[2]=='o'
&& data[3]=='w'  && data[4]=='n' &&
data[5]=='#')
  {
data="";
down();
  }


if(data[0]=='o'  )
  {
data="";
open11();
  }
 if(data[0]=='o' && data[1]=='p'  && data[2]=='e'
&& data[3]=='n' )
  {
data="";
open11();
  }
   if(data[0]=='*' && data[1]=='o'  && data[2]=='p'
&& data[3]=='e'  && data[4]=='n' &&  data[5]=='#')
  {
data="";
open11();
  }
```



```
if(data[0]=='c' )
  {
data="";
close1();
  }
  if(data[0]=='c' && data[1]=='l'  && data[2]=='o'
&& data[3]=='s'  && data[4]=='e')
  {
data="";
close1();
  }
  if(data[0]=='*' && data[1]=='c'  && data[2]=='l'
&& data[3]=='o'  && data[4]=='s' && data[5]=='e'
&& data[6]=='#')
  {
data="";
close1();
  }


 }
}
}
```

VI.CONCLUSION

In a summary, we may infer that voice-controlled robots will undoubtedly be a future market for numerous industrial and home applications including the automation of daily routines. After multiple runs and tests, our suggested Bluetooth communication mechanism worked well with an acceptable time delay. The connections between the microcontroller and Bluetooth performed successfully, with just a few mistakes in voice command recognition.

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