A SMART VOICE CONTROLLED PICK AND PLACE ROBOT

SANDHYA V P[1], JOVAL BEROY.J[2], KANNAN.P[3],LENIN ADITHYA.A[4], PARTHASARATHY.R[5]

Assistant Professor, Department of ECE, SRM Valliammai Engineering College, Tamilnadu, India

[2,3,4,5] UG Students, Department of ECE, SRM Valliammai Engineering College, Tamilnadu, India

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Abstract – *The robotic arm is intended for educational purposes. In this project we are designing the robotic arm for improved accuracy by using servos to power the joints in the robotic arm.We make a Mobile Application Robot. As the robot having the most stable configuration used for various application like welding, pick and place, etc. We are moving the 3-axis complete Structure by using the wheels and dc motor and controlling the complete Mobile Application Robot with the help of which give instructions to the Microcontroller and then the micro-controller give instruction to the actuators (motor).When the servomotor is actuated it drives the pinion in the same direction of rotation.*

Key Words: *Mobile Application Robot, pick and place*

1.INTRODUCTION

Pick and place robot arms are widely employed in industries. Example, in mechanical sites and companies where they assist to choose and place components within the desired location. Here, during this work, a mobile robot which might pick and place objects through voice commands is developed for a wheelchair bound person. The person could get help from this fully automated mobile robot for choosing and placing the objects within the desired location. This mobile robot can reach up to a little cupboard for selecting the object or things.. The robot is fully controlled through human voice commands, like left, right, straight and plenty of more to point the direction for the robot to navigate around. Thus, this robot would help the disabled to hold out their daily activities without much difficulty.

2. LITERATURE SURVEY

This proposed system was finalized after checking out various references given and the implementations with methodologies was also discussed. Past ten years of reference papers was used for it.

The detailed report on these references are given below,

1. Sotiris Stavridis, Pietro Falco, Zoe Doulgeri, "Pick-and-place in dynamic environments with a mobile dual-arm robot equipped with distributed distance sensors", Mobile bimanual manipulation in an exceedingly dynamic and unsure environment requires the continual and fast adjustment of the robot motion for the satisfaction of the constraints imposed by the task, the robot itself, and also the environment. We formulate the pick-and-place task as a sequence of mobile manipulation tasks with a mix of relative, global and native targets.

2.Hae-Chang Kim, In-Hwan Yoon, Jae-Bok Song, "Target Position Estimation for Pick-and-Place Tasks using a Mobile Manipulator", A mobile manipulator uses marker detection and hand-eye calibration to catch up on the performance limitation of position estimation during pick-and-place tasks. However, whether these methods are applied or not, a mistake occurs proper to the limitation of camera calibration, so it's tough to locate the object within the correct position.

3. Muhammad Affan, Syed Umaid Ahmed, Riaz Uddin, "Pick-and-Place Task using Wheeled Mobile Manipulator", A Control Design Perspective, This paper is aimed at students and roboticists to produce the concise theoretical and applied knowledge necessary for the control design of mobile manipulators. For this purpose, topics like kinematics, motion planning, and control theory are explored. Moreover, this information is integrated from the attitude of the Mecanum wheeled 5-R mobile manipulator for the pick-and-place task of the cube.

4. Fengyi Wang, J.Rogelio Guadarrama Olvera, "Optimal Order Pick-and-Place of Objects in Cluttered Scene by a Mobile Manipulator", In this paper, we present a quick method for autonomously plane manipulation tasks for mobile manipulators. An optimal order is defined by the planner to perform and the objects are taken from pick and place operations from a cluttered scene to specific deposit areas considering both, manipulator and mobile base motion. The grasping feasibility of the objects was examined by the first method with an inverse reachability map.

5. K.N.V. Sriram, Suja Palaniswamy, "Mobile Robot Assistance for Disabled and Senior Citizens Using Hand Gestures", Numbness and movability impairments impact the autonomy of elder people while performing their independent tasks. Gesture role acts as a bridge between humans ad machines. This work focuses on Human-Robot Interaction (HRI), designed for the assistance of wheelchair-bound people with the assistance of mobile robots.

3.PROPOSED WORK

A wireless mobile robotic arm was developed to connect devices for transfer of data over a long distance wireless. Wireless controller was used that interfaced with Arduino UNO. The robot was successfully controlled by wireless controller by developing the hardware and software of mobile robotic arm with the pick and place system operation. The servo motors are connected to the Arduino UNO I/O ports while the DC motors is connected through a motor controller to control the speed of the DC motor.

4. SYSTEM ARCHITECTURE
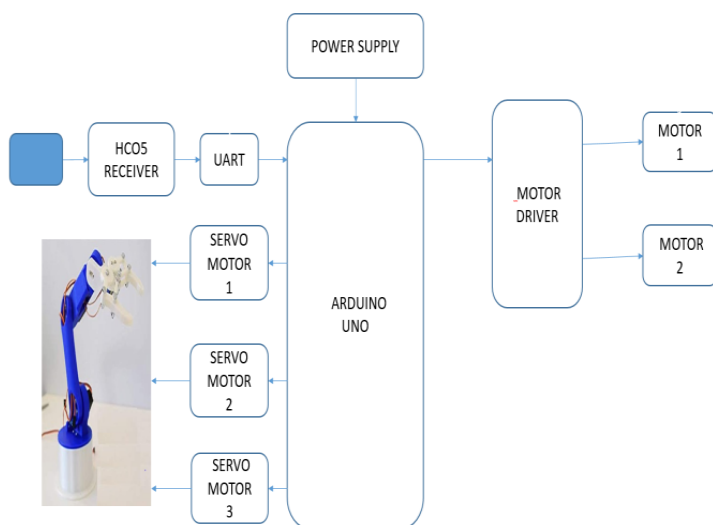
With the help of HCO5 receiver the input signal from the mobile is received. The UART is used for serial communication which sends the voice command from HCO5 to arduino. The arduino analyses the given input command and sends out the appropriate command to the output devices. Incase of movement commands, it sends out the command to the servo motors and thus does the movement actions. Incase of pick and place command, it sends out the required command to the pick and place arm and does the required action.

HARDWARE AND SOFTWARE COMPONENTS

Arduino uno: It has 20 digital input/output pins.Analog inputs of count six, a crystal oscillator of value 16MHz, a power jack, an USB connection, an ICSP header, and a reset button. Microcontroller ATmega328 microcontroller operated at an operating voltage of 5V.

The recommmended input voltage is about 7 - 12V and the limits of the Input voltage is around 6 - 12 V. The digital input-output pins are at a count of 14 in which six of them would provide 6 PWM output. There are six analog input

pins. The DC Current per input-output pin is 40mA and the DC Current for 3.3V Pin is 50Ma. 32 KB of which 0.5 KB used by bootload, the flash memory is utilised.


Arduino uno and its programming: Arduino may be a tool for creating computers that may sense and manage additional of the physical world than your personal computer. It's AN ASCII text file. The physical computing platform is supported by a simple microcontroller board and a development setting for writing computer code for the board. Arduino is to develop interactive objects, taking inputs from a spread of switches or sensors, and a dominant spread of lights, motors, and different physical outputs. Arduino will be communicating with computer code running on your pc. The boards are assembled by hand or purchased preassembled; the ASCII text file IDE is downloaded for complimentary. The Arduino artificial language is AN implementation of Wiring, an analogous physical computing platform, that relies on the process transmission programming setting.

Servo Motor : A servomotor (or servo motor) could be a (mechanism|positioner|actuator) or linear actuator that permits for precise management of angular or linear position, speed, and acceleration. It consists of an acceptable motor coupled to a detector for position feedback. It conjointly needs a comparatively refined controller, typically a fanatical module designed specifically to be used with servomotors. Servomotors aren't a selected category of motor, though the term servomotor is commonly used. A motor appropriate to be used during a closed-loop system.

HCO5 Bluetooth module: HC-05 Bluetooth Module is explicit to use Bluetooth SPP (Serial Port Protocol) module, that is designed for a transparent wireless serial association setup. Its communication is via serial communication which makes a simple way to the interface with the controller or laptop. It uses a 2.45GHz wave band. The transfer rate of the info will vary up to 1Mbps and is in the vary of ten meters. The HC-05 module is operated at intervals of 4-6V of power offered.
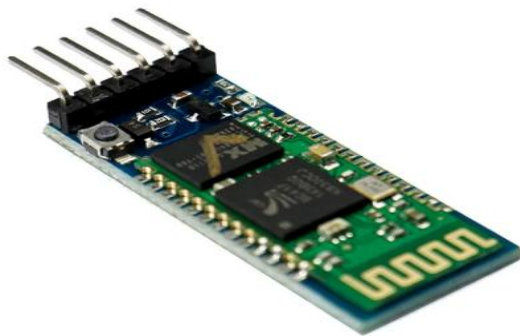
Motor Drive: Motor drivers act as associate degree interfaces between the motors and the control circuits. Motor needs a high quantity of current whereas the controller circuit works on low current signals. therefore the process of motor drivers is to take a low-current control signal and then flip it into a higher-current signal which will drive a motor. The motor driver receives signals from the silicon chip microcontroller and eventually, it transmits the reborn signal to the motors. it's 2 voltage pins (VCC1 and VCC2), and one among them is employed to show on the motor driver, and another pin is employed to use the voltage to the motor through this motor IC. This motor IC can ceaselessly toggle the output per the input wave it's receiving from the silicon chip microcontroller.

The small IC transmits the signal it receives, however it'll not modify the quality of the signal. as an example, if the silicon chip microcontroller sends a high input (1) to the motive force Ic then, driver Ic can pass a similar High (1) although it's an associate degree output pin. The H-bridge circuit will seem like this within the image below. Four switches can type an ''H'' form and these four switches are accustomed enable/disabling the supply.
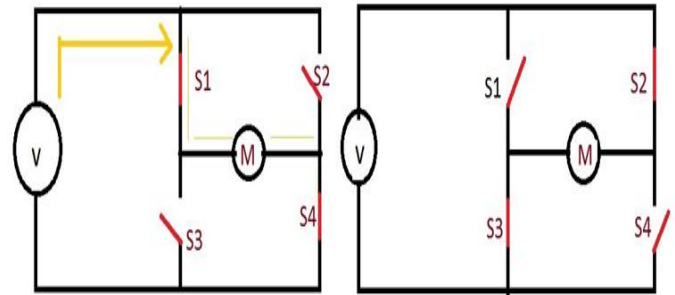
Rotate in clock-wise direction: Now, within the 1st condition, when S1 and S4 switches are closed, and S3 and S2 are open, the voltage can pass from the S1 switch to the The motor then to the S4. thus we've got an entire circuit that may permit current to drip through V to M through S1 and S4. This state is going to be a brief circuit in S1 and S4 switch conditions. during this case, the Motor is going to be in ON, and therefore the direction of the Motor is going to be in a clockwise rotation.

Rotate in counter-clockwise direction: Coming to a consecutive state, after we enable S3 and S2 by giving voltage input, then the S1 and S4 switches will shut, and therefore the voltage travels from S3 and S2. this is also a definite connection by stimulating 2 parallel-connected switches, however, the rotation of the Motor is going to be in a counter-clockwise direction.

Embedded C : Embedded C Programming is the soul of the processor functioning within each embedded system we tend to come upon in our stages of living, like mobile phones, washing machines, and photographic cameras. every processor is related to an associate degree embedded computer software. The primary and foremost factor is the embedded computer code that decides to function in the embedded system. Embedded C language is most often accustomed to programming the microcontroller.

Looking around, we discover ourselves to be surrounded by varied varieties of embedded systems. Be it a photographic camera or a mobile phone or a washing machine, all of them have some type of processor functioning within them. correlated with every processor is the embedded computer software.

If hardware forms the body of an embedded system, the embedded processor acts because the brain and embedded computer software form its soul. it's the embedded computer code that primarily governs the functioning of embedded systems. During the infancy years of silicon chips primarily based systems, programs were developed assemblers and laced in the EPROMs. There accustomed be no mechanism to find what the

program was doing. The correct execution of the program was used to check using switches and leds.

Arduino IDE : The Arduino Integrated Development Environment - or Arduino Software(IDE) - contains a text editor for writing code, a message space, a text console, a toolbar with buttons for common functions and a series of menus. Arduino hardware gets connected to communicate with them by transferring programs. it's an official Arduino Software, creating code compilation too simple that even a typical person with no previous technical knowledge can get their feet wet with the learning procedure. every one of them contains a microcontroller on the board that's programmed and accepts the data within the type of code. Sketch is often referred as the main code of the program, Hex File is generated and created by the platform of IDE that is then transferred and uploaded within the board of the controller. The IDE surroundings principally contain 2 basic parts: Editor and Compiler wherever the former is employed for writing the required code and later is employed for compiling and uploading the code into the given Arduino Module.

RESULT
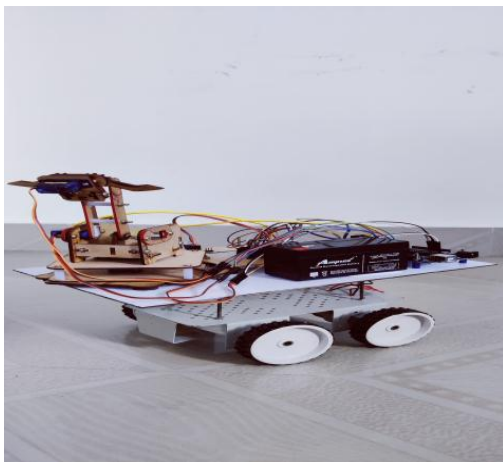
The above given figure shows a smart voice controlled pick and place robot which was build or assembled using arduino uno, HCO5 bluetooth module and fitted within a robotic arm for purpose of pick and place. It also shows a four wheel drive chasis whose speed is controlled using the motor drive.

CONCLUSION AND FUTURE ENHANCEMENTS

Arduino UNO Atmega 328 has been used and implemented to design this course.

Thus we found that our project has the ability to reach at the location from where object needs to be picked or placed, by the virtue of four wheel drive chassis and four servo motors.

Thereafter the robotic manipulator locates and lifts the required object in accordance with the motion of servos. Thus it is an integration of automation and locomotion.

In future this robot can be expanded to operate in various other fields and can be executed in a large scale. During crisis period these controlled robot can be used to diffuse bombs and further used in evacuation process. It can also be used in hospitals during pandemic period by which contactless communication between human beings is possible. Further, this robot can be used in industries for the purpose of packaging, pick and place and many more.

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