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# SMART PHONE CONTROLLED ROBOT USING ARDUINO

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## Abstract -

Robots are machines that continuously perform different tasks with high efficiency. They spent a lot of time collecting information and exploring places that are too dangerous to send humans. The design concept can store and drop items from one place to another. The robotic arm was designed using Arduino to pick up and place items via Bluetooth commands. The robot gripper is a cable that holds an object in its jaw and places it from one place to another. The robot is powered by an Android-based smartphone. The robot receives commands from the app. All actions or functions are controlled by the Arduino microcontroller and a pair of drives. The robot has four motors; one pair is used to control the direction, one motor is used to compress and release the clamp, and another motor is used to open and close the clamp.

**Key Words:** SMS- Short Message Service, GSM- Global System for Mobile, RF- Radio Frequency, IC- Integrated Circuits, USB- Universal Serial Bus, USART-Universal Synchronous/Asynchronous Receiver/Transmitter.

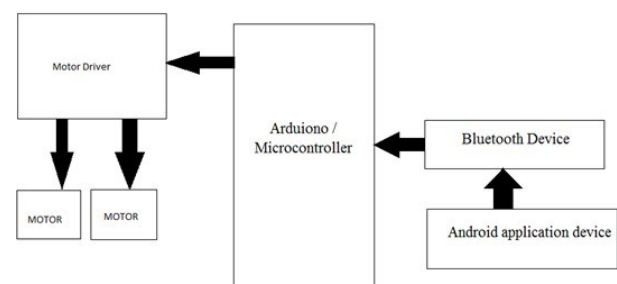
## 1. INTRODUCTION

Robot is a machine that performs work to assist people. It deals with the design of robots manufacture and applications. Robots consist of five major components, they are- computer which acts as the brain, effectors which are arms and legs of the robot, actuators that activate physical action and sensors that receive information about the surrounding environment and mechanical fixtures which performs overall robot hardware. Robots play very important role in the modern world as they are involved in assisting laborer's in industry to involving in human rescue operations under critical situations. Now-a days in the modern world, industries are focusing of unmanned or an computerized devices to operate to increase productivity and delivery of the final products with greater quality in a shorter period of time. These robots can be fast, accurate and with almost zero error in performing the task. It cost less to operate than a human labor to do the same task. The proposed robot model can pick and place objects from source to destination. The movement of robot is controlled using android based smart phone. The android device has a Bluetooth controller application installed. Robot will operate based on the Bluetooth commands. The over all actions of motor drivers, Bluetooth controller is controlled by Arduino microcontroller.

## 2. LITERATURE REVIEW

- Mohamed et.al. introduced a Pick and place robotic arm controlled by Computer vision. Here the robot picks the object at a specific orientation only. The gripper used here is a mechanical gripper. So it can't handle the object safely. Objects in a specific orientation is only picked up by the robotic arm.
- T Yoshimi et.al. introducing a system for picking up operation of thin objects by robotic arm with two fingered parallel gripper. Thin objects like paper and plastic cards are picked up by this robotic arm. The objects may slide down due to the use of parallel gripper. This method does not provide safety of the object.
- Anush et.al introduced design and fabrication of pick and place robotic arm to be used in library. Here the robots pick the books from library and places it in the destination. RFID tags are used to identify the books. The system is capable of doing when it is a line following robot, each RFID has its own path and this makes the robot complex.
- N F Begum et. Al introducing an autonomous android controlled robot design using wireless energy. In this system works according to voice commands or speech delivered by the user and the robotic arm is capable of picking the objects of any type orientation. RF technology is used so line of sight is a major constraint in communication.

## 3. BLOCK DIAGRAM



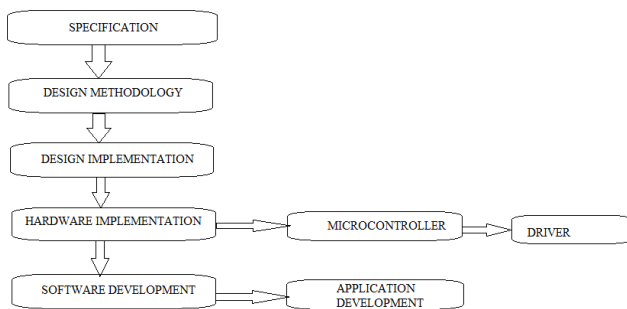
**Fig-1:** Block diagram of Pick and Place Robot

The proposed model is designed to control the pick and place robot using android based smart phone. Bluetooth is interfaced to the control unit for sensing the signals

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transmitted by the android application. The data signals are serially passed to the control unit which makes the movement of robot. The Aurdino controller is used as a controlling element in the model. An android device is connected to the Bluetooth module and commands are passed from the smart phone for the actions of motors. The motors are connected to the controller through motor drivers. On passing high signals motor drivers activate. The program on the Aurdino controller is interfaced to the serial data to generate respective output based on the input data to operate the motors through motor driver IC.

#### 4. SOFTWARE DESIGN AND FLOW CHART



**Fig-2:** Software design and Flow chart

**Specifications:** In designing of a pick and place robot, it is very imporant to know the design specifications. This gives the information required to the design. The various parameter like supply voltage, type of motor drivers, type of micro controller, sensors, softwares used in the designing etc...

**Design methodolgy:** This block gives various methods that can be used to achieve the required design specification. In the model proposed, it makes use of an microcontroller with a set of motor drivers, blueetooth module to control the actions of the robot.

**Design Implementation:** The implementation section gives clear idea of implementing the proposed design methodolgy. The designed model is implemented using both hardware and software.

**Hardware Implementation:** the hardwares used in the model is aurdino controller for control unit. A pair of motor drivers to drive the motors, a bluetooth module for passing the signals to the android, and an android device to remotely operate the robot.

**Software Development:** Developing a efficient and a accurate application is very important because the robot is controlled via the application software. An application need to be developed with the keys with up Down, forward, backward, hold, unhold, pick, place keys.

#### 5. HARDWARE REQUIREMENTS

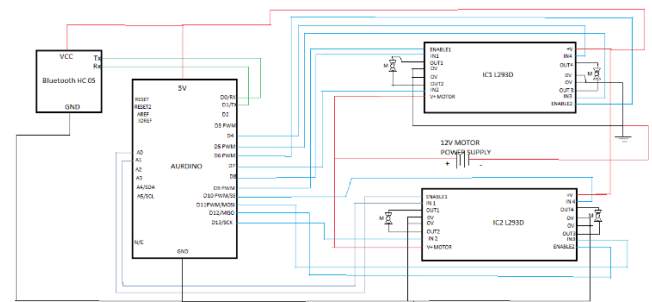
**Aurdino controller:** the Aurdino Uno is a microcontroller board based on the Atmega328P. it has 14 digital input/output pins(of which 6 be used as PWM output), 6

analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, onboard voltage regulator, ICSP header, and a reset button to power it with AC to DC adapter.

**Bluetooth:** the HC 05 bluetooth is majorily interfaced with aurdino or microcontrollers, which can add two way(full duplex) Wirless functionality. This module can be used to communicate between two microcontrollers like aurdino or communicate with any device with bluetooth functionality like a phone or laptop. The module communicates with the help of USART at 9600 baud rate .

**Motor drivers:** the L298D motor driver module is a high power motor driver module for driving DC motors. This module consist of an L298D motor driver and a 78M05 5V regulator. It can control upto 4 DC motors or 2 DC motors with directional and speed control.

#### 5. IMPLEMENTATION

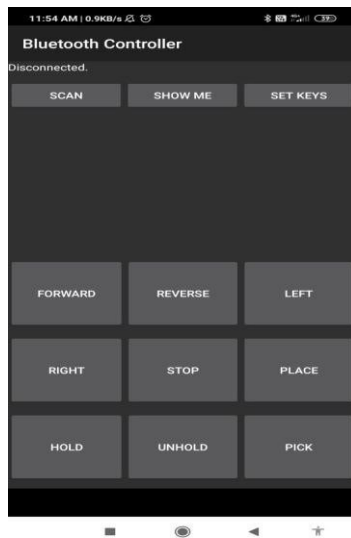


**Fig-3:** Circuit connections

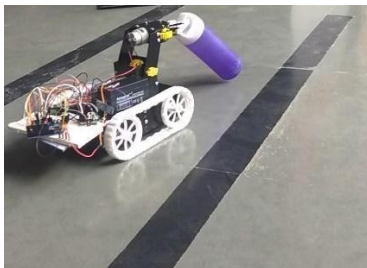
A robotic arm is designed using Aurdino to perform pick and place the objects via Bluetooth commands. The robot gripper is cable to holding the objects in its jaw and safely place from one place to another. The movement of robot is controlled by android based smart phone controlled through Bluetooth controller. The robot receives commands from the application. All the actions or the tasks are controlled by an Aurdino micro controller with a pair of motor drivers. The robot consist of four motors, a pair for the direction control, a motor of the holding and un holding of the gripper and another motor for opening and closing of the gripper.

#### 7. RESULTS

The proposed design can pick and place objects safely from one place to another. The below figure shows the layout of the Bluetooth controller application for android and the hardware module of the project.



**Fig-4:**Layout of bluetooth controller application



**Fig-5:** Pick and place robot model

## 8. CONCLUSION

The main objective of the project is to control the pick and place robot using android or smart phone. The proposed model can be used in places where the work is done repeatedly. So it is used in industrial activities and hazardous operations. It can perform the programed task easily and safely in a short span of time.

## 9. ABOUT FUTURE SCOPE:

As robots can be used in lot of rescue operations, the pick and place robot can be used as a rescue robot in the natural disaster by using a suitable gripper to lift the human. The gripper should be safe enough to lift the human. The detection of human is done by placing sensor to the grippers. So once when it is identified it has to intimate concerned people through GSM either through via a recorded phone call or SMS.

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