

# Design and Implementation of Smart Guidance Robot for Physically Challenged People

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## ABSTRACT

In this paper, we develop a robot with voice recognition, touch screen panel and obstacle sensor for physically challenged people. The touch and voice commands are given to the arduino microcontroller at the transmitting side. LCD displays the commands given by the user. The output signal of the arduino controller is transmitted to the zigbee which is present in the transmitter and again transmits the signal to the arduino microcontroller placed in the robot by using zigbee communication. Obstacle sensor is used to detect the object in front of the robot. The movements of robot are controlled by the DC motors. Two dc motor controls robot body and another two dc motor controls arm and hand. Then the robot performs the pick and place operation.

Keywords: Arduino microcontroller, Voice recognizer, Obstacle sensor, Touch screen panel, motors and Zigbee.

## 1. INTRODUCTION

Recently research says 10% of world's population and 650 million people are affected by the impairment. India released the census 2001 over 21 million people are having one or more disabilities. The physically challenged people always face several challenges in day-today life and that people are ignored by the society. To overcome these type of drawbacks we have designed the robot which helps physically challenged people and able to performs their work by themselves. A pick and place robot have many advantages cost effectiveness, safety, flexibility and speed. The pick and place robot system carries object safely. The movement of the robot is controlled so the results do not change. Robots can be directed to move certain limits; the operation of object lifting depends on the motor used in the robot. The instructions should be always given to the robot to perform its operations. In 2018 1.3 million robots are entered the service. The robots reduce the man power .In 30 years robots will take over most of the jobs. Nowadays the counts of robots are increasing and the robots are performed various tasks such as cleaning, weight lifting, construction of building, medicine etc.

## 2. LITERATURE REVIEW

BABU GANESH .K [1] Suggested a robotic vehicle using android application controlled for remote operation. At the transmitting side voice commands such as move forward, reverse, left, right are send to receiver for robotic movements. At the receiving end four motors are joined together to the micro controller. Two motors are used for arm and pick movement of the robot and another two motor to control body of the robot.

ANURAG MISHRA [2] illustrated a voice controlled robot. The voice commands are acquired by the Bluetooth device and the voice commands are converted into text by using online cloud server .The signal from the smart phone is transmitted to the another Bluetooth module placed in the robot. ASHLY BABY [3] described pick and place robotic arm using arduino. For handling the object safely without applying any pressure, hence used catching gripper. Android based smart phone are used to control the robot through Bluetooth device .According to the

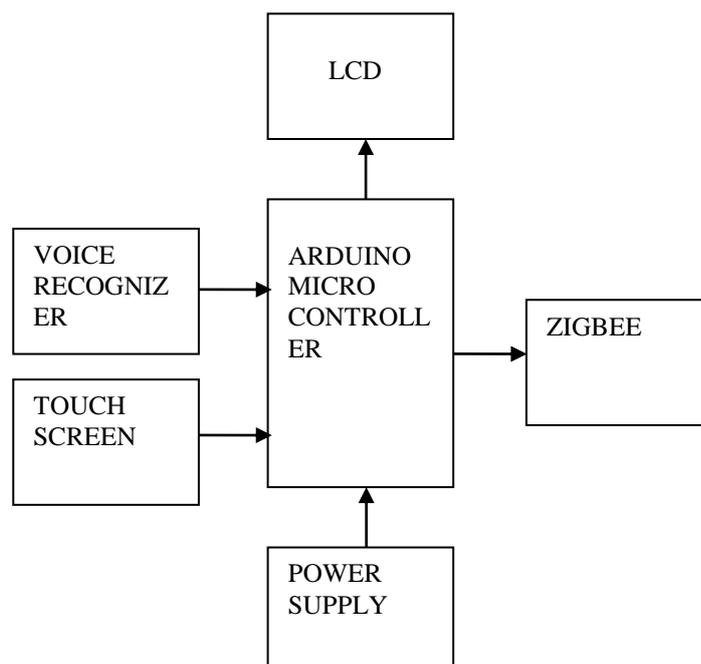
commands the robot perform the task .The four motors are combined together to the micro controller at the receiving end. Two motors are used for arm and pick movement of the robot and another two motor control the body of the robot.

### 3. PROPOSED METHOD

For accuracy, flexibility, space efficiency, safety maximization and cost savings, we introduce pick and place robot controlled by voice recognizer, touch screen and obstacle sensor. The use of zigbee communication (291m) has high range compared to the Bluetooth communication (77m).So speed is high and low power consumption during data transmission. It's mainly used for home automation It reduced work and act as a personal assistant for physically disable peoples. We are using two Arduino microcontroller one microcontroller is placed on transmitter and another microcontroller placed on receiver. The voice recognition and touch screen panel inputs is given to arduino microcontroller and LCD will display the commands is given by the user. We are using HM2007 IC circuit for voice recognition purpose and identify 20 words. The output of the transmitter arduino microcontroller is transmitted through the zigbee to receiver arduino microcontroller. Obstacle sensor is used to detect the object in front the robot in receiver side. Obstacle sensor is also called as IR Sensor. ULN2003 act as a relay driver and it consists of eight relays. Each relay is given to four motors. The movements of the robot is controlled by the DC motor. Motor1 and 2 controls body's movement .Motor 3 and 4 controls arm and pick operation of the robot The signal received from the transmitter then the robot perform the move forward, move backward move right, move left, up , down, close and stop operations.

### BLOCK DIAGRAM

#### *Transmitter Section*



**RECEIVER SECTION**

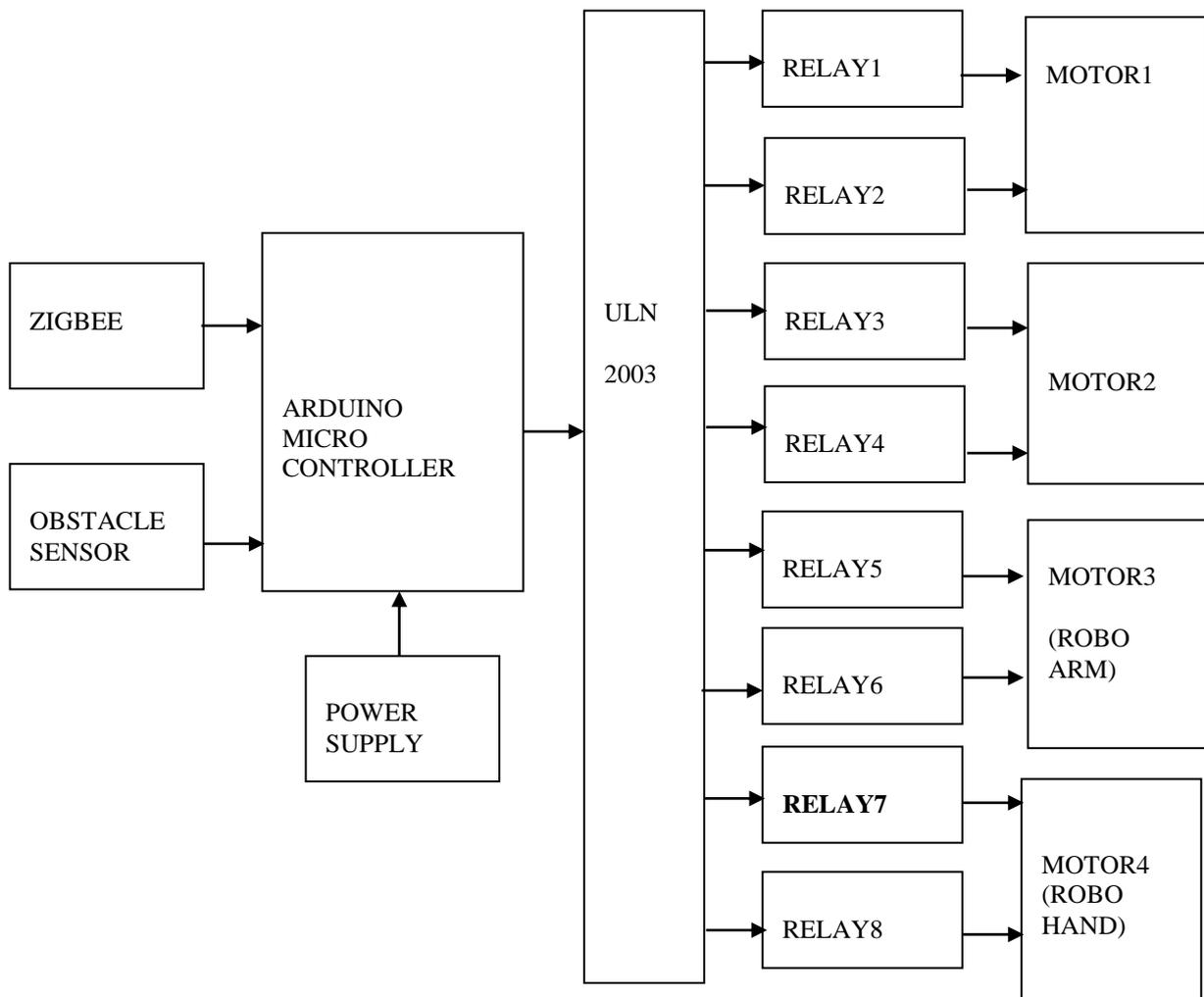


Fig 1: Overall Block Diagram of Transmitter and Receiver Section

**HARDWARE USED**

**I. VOICE RECOGNITION**

HM 2007 IC circuit was used for speech purpose and it can recognize 20 words, each word length of 1.92 sec. The speech signal is acquired by a microphone on board. The voice analog signal is converted to the text by using microphone on HM2007. Then analyzes the analog signal received compared with the data stored in external RAM and finally outputs a corresponding 8bit data. The 8 bit data is passed through an octal latch. First, speak and assigning a particular value for that word.

**II. TOUCH SCREEN PANEL**

The touch screen panel consists of eight inputs such as move right, move left, move forward, move backward, pick, place, up and down. When you touch the touch screen panel it produces the signal and that signal is given to the input of the arduino microcontroller.

### ***III. OBSTACLE SENSOR***

Obstacle sensor is also known as object detect sensor and IR sensor. It is used to detect the object in front of robot. The IR sensor emits the IR light from transmitter and incident it on an image then reflected light received from the receiver. So the robot can identify the object and indicates through the LCD.

### ***IV. ARDUINO MICRO CONTROLLER***

The arduino micro controller receive the signal from voice recognizer and touch screen panel and that signals are transmitted to through zigbee communication to another arduino micro controller in receiver. The robot was fully controlled by arduino micro controller.

### ***V. MOTOR AND ZIGBEE***

We are using four DCMOTORS .The two dc motors are used to control the movement of robot's body. Another two control the movement of the robotic arm and pick operations. The zigbee communication is used to transfer the signal from transmitter arduino microcontroller to receiver arduino microcontroller.

## **4. RESULT AND DISCUSSION**

As seen from the results obtained, it can be discussed that the voice commands and touch screen control using controlled pick and place robot were successfully executed as programmed. The total weight of receiver and maximum weight lifting is 4kg and 250 g. In this robot arm was developed 45 Degree of freedom. The aim of this work is the development of wireless control of a pick and place robot using Arduino microcontroller.

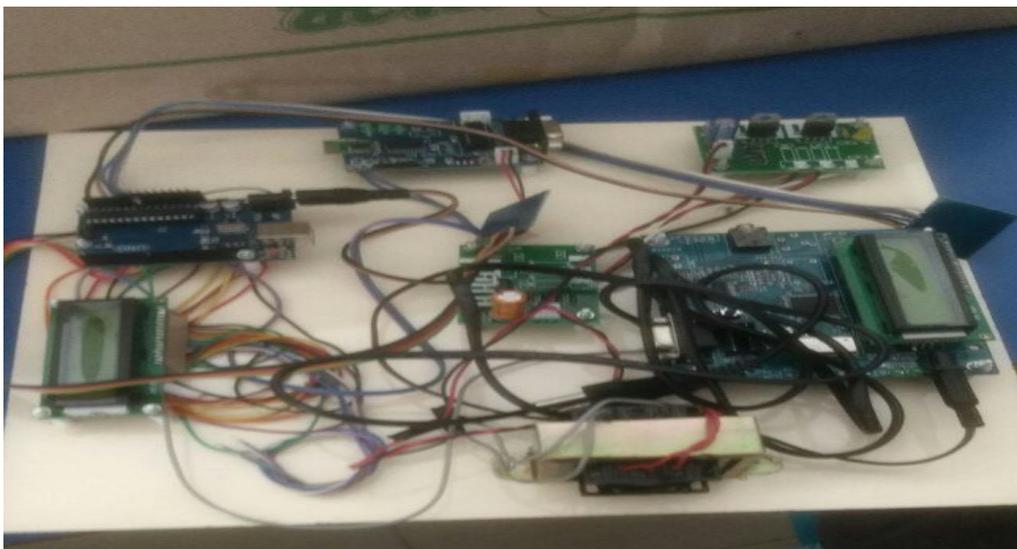


Fig 2: Snapshot of Designed module

The above snapshot shows the Transmitter side. It has arduino microcontroller, zigbee communication, and has two inputs voice recognition and touch display. The user can use the inputs according to their convenient.



Fig 3: Shows Voice Recognition Display

We are assigning the commands for particular Instruction. The above figure shows the voice recognition display for Forward and it also display the assigning command.



Fig 4 shows Touch screen display

Above the figure shows the touch screen display of the instruction. We are assigning the command for given instruction.



Fig 5: Snapshot of the Robot movement

Above the figure shows the robot movement .The robot can perform different operations when the signal received from the transmitter then the robot response these signals.



Fig 6: Snapshot of the pick and place action of the robot

Above the figure shows the performance of replacing the object one place to another place. Its the main operation of the project.

## 5. CONCLUSION

The aim of this work is the development of wireless control of a pick and place robot using Arduino microcontroller. The working domain of the Robot in the society help the people in every day's life and so it should be controlled by the human. In future work will focus on introducing more complex activities and also introducing the non recognition, like footsteps (close), footsteps (distant) etc. Humans normally use gestures such as pointing to an object or a direction with the spoken language, i.e., when the human speaks with another human about a close object or location, they normally point at the object/location by using their fingers.

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