

Design and Fabrication of Pick and Place Robot to Be Used in Library

Anusha Ronanki ¹, M. Kranthi ²

P.G. Student, Department of Mechanical Engineering, VNR Vignana Jyothi Institute of Engineering & Technology,
Bachupally, Nizampet, Telangana, India¹

Assistant Professor, Department of Mechanical Engineering, VNR Vignana Jyothi Institute of Engineering &
Technology, Bachupally, Nizampet, Telangana , India²

ABSTRACT: The use of robots in library is becoming more popular in recent years. The trend seems to continue as long as the robotics technology meets diverse and challenging needs in educational purpose. The prototype consists of robotic arm along with grippers capable of moving in the three axes and an ATMEGA 8 microcontroller. Software such as AVR Studio is used for programming, PROTESUS is used for simulation and PROGISP is used for dumping the program. RFID is used for identifying the books and it has two IR Sensors for detecting the path. This robot is about 4 kg in weight and it is capable of picking and placing a book of weight one kg.s.

KEYWORDS: design, Fabrication, robot and library.

I. INTRODUCTION

The pick and place processes are the primary requisite for many of the industrial and house hold application for such applications there is a need to automate the pick and place process basically comprising of picking the intended objects , possibly performing certain tasks and placing them to desired location . The automated pick and place robot mainly uses sensors and robotic arms .in this prototype robotic arm pick and place system utilizes dc motor, grippers ,ATMEGA8 microcontroller and software's such as AVR studio for programming , PROTESUS for simulation, and PROGISP for dumping the program.

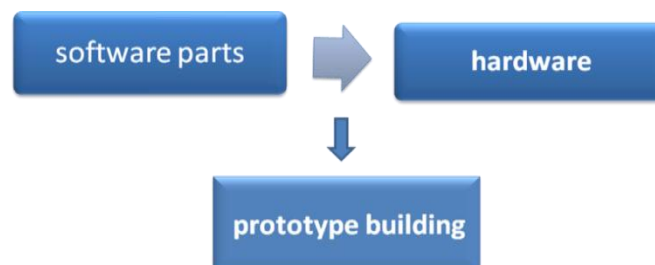


FIG 1. FLOW DIAGRAM

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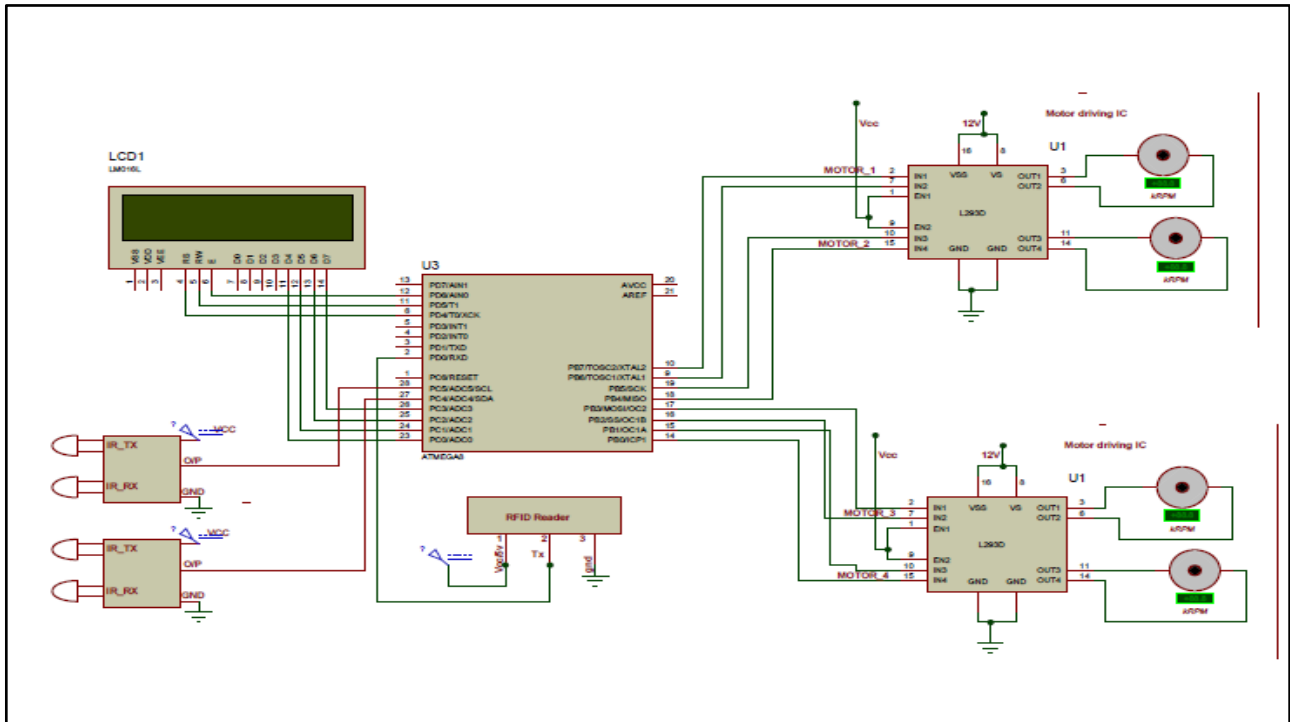


FIG 2. CIRCUIT DIAGRAM

II. RELATED WORK

The main concept of this research is to deliver the book to the students using a robot in a library. This study is essential in order to increase the efficiency of delivering books to the student in library. In other words, it decreases the waiting time during peak hours. The robot uses a ATMEGA microcontroller to run a program with a combination of RFID technology, IR sensors for detecting the path, a simple gripper. The RFID reader is fixed on the robot itself, and reads the RFID tag which is placed on the Robot. The robot will deliver respective book to the student based on the tag. The main difference in the design of this serving robot as compared to the previous research is the application of RFID technology. The RFID application allows the robot to identify the right book that is to be served.

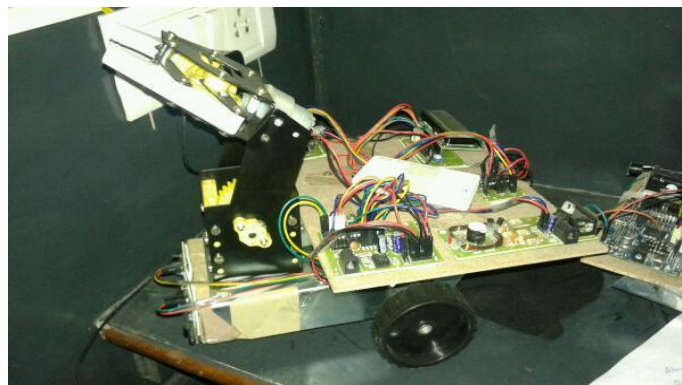


FIG. 3 PROTOTYPE OF ROBOT

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III. SCOPE OF RESEARCH

In a library, each book has RFID tag so when student need a book he should place a respective RFID tag on the RFID reader. Then the robot identifies the RFID tag from the RFID reader and it displays the name of the book on LCD, each RFID tag has its own path. So the robot detects the respective path the by using IR sensors which placed on the robot and it follows the path and it fetches the respective book and delivers it to the student.

IV. PROPOSED METHODOLOGY AND DISCUSSION

When we enter in library first we have to enter the name of book which we want to issue. The input is give through the switch. This information provides to the microcontroller AT mega 8. According to the information motor is moved and because of motor movement whole robotic structure is moved. RFID tag placed before the robot . RFID reader read the information of book saved in RFID tag. This information is sent to the microcontroller AT mega 8. Microcontroller again send this information to the motor through motor driver IC L293D. Robotic arm picks the book and carries the book to the issue counter.

Below images are used in the robot,

1. Microcontroller

A microcontroller (sometimes abbreviated μC , uC or MCU) is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems. By reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to digitally control even more devices and processes. Hence here the ATMEGA-8 Micro controller is used. Generally these microcontrollers are used to write the program.

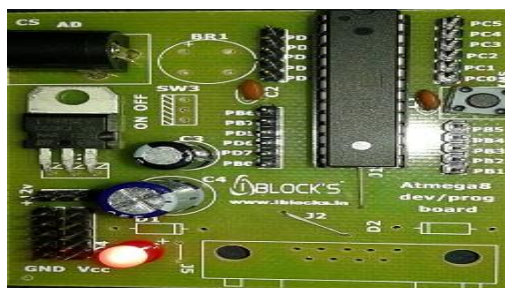


Fig 4. Micro controller

2. L293D

The L293 and L293D are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. These are used to remove back EMF

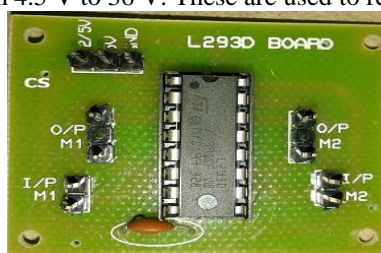


Fig 5. L293D

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3. RFID TAG

Radio Frequency identification (RFID) is the wireless use of magnetic fields, to transfer the data, for the purpose of automatically identifying and tracking tags. RFID is a tracking system that uses intelligent bar codes to track the items in a store. In this project these are used to track the book and the path.



Fig 6. RFID tag

4. RFID READER

RFID reader is device which is used to read the data that is present in the RFID tag and it decodes the data and the process it to controller. The technology of RFID is that it allows the data to be transmitted through radio frequency, from tag to the reader. The basic concept of RFID uses the principle of electromagnetism.



Fig 7. RFID card reader

5. DC MOTOR

An electric motor is an electromechanical device that converts electrical energy into mechanical energy. DC motors can be used to drive the Robot. Here the motor requires 12v geared dc motor in order to hold the book and also for movement of arm i.e., up and down. It gives movement to the robot.



Fig 8. DC motor

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6. LCD BOARD

Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal. It is used to display the book to be lifted.



Fig 9. LCD screen

V. FUTURE SCOPE

There are several future recommendations that should be considered. Obstacle avoidance should be included in the robot, so that collision with things around the robot will not happen. The RFID used in the project is read-only reader. Thus, new robot should include RFID reader that is able to write data onto the tag, so that more applications can be applied to society. The new implementation of robot should be independent of line following module. This is because IR sensor sets produce a lot of noise.

VI. CONCLUSION

In conclusion, the robot is able to read data from RFID tag and deliver to the student. The robot moves itself to fetch the respective book by following the line on the ground. The gripper mechanism is simple in design and properly handles the book. The same ideas can be generalized for other application, such as food-serving robot, tagging robot, etc.

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BIOGRAPHY



Anusha Ronanki received her B.TECH degree in Mechanical Engineering from VBIT college of Engineering and Technology, Ghatkesar, Rangareddy (Dist), affiliated to JNTUH. She is currently pursuing M.Tech Automation in VNR vignana jyothi college of Engineering and Technology (Autonomous), Bachupally, Rangareddy (Dist), affiliated to JNTUH.



M.Kranthi received her B.tech degree in Mechanical Engineering from Syed Hassim college in 2006 and received her M.Tech degree from Osmania University in Mechanical Engineering in the year 2008. She has 5 years of teaching experience working as Assistant professor in the department of Mechanical in VNR vignana jyothi college of Engineering and Technology (Autonomous), Bachupally, Rangareddy (Dist), affiliated to JNTUH.