FANTASTIC MORSETTO ROBOT

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JUN 2017

KEMENTERIAN PENDIDIKAN TINGGI

POLITEKNIK MALAYSIA
SEBERANG PERAI

SEBERANG PERAI POLYTECHNIC

PROJECT (DEE6092)

TITLE: FANTASTIC MORSETTO ROBOT

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JUNE 2017

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APPROVAL SHEET

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DECLARATION

This project report titled "FANTASTIC MORSETTO ROBOT (Mobile Robot)"has been submitted, reviewed and confirmed as meeting the conditions and requirements of writing project as required.

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ABSTRACT

Fantastic Morsetto Robot is a robot that build to help people to carry or take any small and light item from one place to another place in a certain range. This robot is builds from a clamp and 4 tires. This robot are using remove controller to control the robot moving. The objective for doing our project, Fantastic Morsetto Robot is help disabled people or the senior citizen to carry a light item like newspaper. Besides that, this robot support eco-friendly product because the battery that we using is a recharging battery. The clamp of the project is very strong so that when it entrap the newspaper or another item, it not easily to fall down the item or newspaper.

ABSTRAK

Fantastic Morsetto Robot adalah sebuah robot yang dibina untuk menolong manusia untuk mengangkat atau membawa benda-benda bersaiz kecil dan ringan dari satu tempat ke satu tempat yang lain dalam julat tertentu. Robot ini terdiri daripada sebuah pengapit dan 4 biji roda. Robot ini menggunakan pengawal untuk mengawal pergerakan robot. Objektif bagi projek kami, Fantastic Morsetto Robot adalah membantu orang kurang upaya atau warga emas untuk mengangkat barangan ringan seperti surat khabar. Selain itu, robot ini menyokong produk mesra alam kerana bateri yang kami gunakan adalah bateri yang boleh dicas semula. Pengapit robot ini dapat memalsukan akhbar atau barang lain dengan kuat. Dengan itu, ia tidak mudah menjatuhkan barangan atau akhbar ke bawah.

ACKNOWLEDGEMENT

Firstly, In the Name of Allah, most Gracious, most merciful whom with His willing giving me the opportunity to complete this Final Year Project which is title Fantastic Morsetto Robot (Mobile Robot).This final year project report was prepared basically for student in final year to complete the undergraduate program that leads to the diploma of Engineering in Electronic(Communication) .This report is based on the methods given by polytechnic.

I would like to express my very great appreciation to Puan Liang Yuan Shin a lecturer at Seberang Perai Polytechnic (PSP)and also assign, as my supervisor who had guided be a lot of task during two semesters session December2016/June 2017.I also want to thanks the lecturers and staffs of Electrical Department for their cooperation during I complete the final year project that had given valuable information, suggestions and guidance in the compilation and preparation this final year project report.

Deepest thanks and appreciation to my parents, family, special mate of mine, and others for their cooperation, encouragement, constructive suggestion and full of support for the report completion, from beginning till the end. Also, thanks to all of my friend and everyone, that have been contribute by supporting my work and help myself during the final year project progress till it is fully completed.

CHAPTER 1

INTRODUCTION

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1.1 INTRODUCTION

In this era of advanced, robots are increasingly developing the key functions required to allow them to substitute for humans in everyday tasks. Indeed these are not just basic chores, with technological advances allowing these programmed mechanisms to accomplish superior task to their organic counterparts. Robots are commonly seen in our life from the average household appliances such as the washing machine and a blender, to the industrial robots and artillery machinery. Besides, machine are present in every aspect in our life staring from simple everyday activities, through industrial robots performing hazardous or difficult tasks for making our life easier and in the process saving us money. On the other hand, robot are widely use in medical field. With the person who was born with physical disabilities or acquires disability, a simple robot can help them on doing a simple task like taking a newspaper on table. Therefore, the gripper robots are introduced.

A robot gripper is a type of end arm tooling that is use to pick up item. The easier way to describe a griper is to think of human hand. Gripper just like a human hand enables holding, tightening, handling and releasing of an object. There are four types of robotic grippers: vacuum gripper, pneumatic gripper, hydraulic gripper and servo-electric gripper. The pneumatic gripper is popular because it`s compact size and light weight. Besides, pneumatic gripper can either opened or close, earning them the nickname "bang-bang" actuators, because of the noise created when the metal-on-metal gripper operates. Moreover, for the purpose of saving costs and environment protection, rechargeable batteries are using. When we threw always the batteries and taken to landfills, most batteries (even rechargeable) will release harmful metals such as mercury, lead and cadmium into environment. The good news is rechargeable batteries are surprisingly easy to recycle. And, because batteries can rechargeable and reuse numerous times, they contribute less waste to landfills.

Furthermore, via the Bluetooth Technology allow the robot move. Bluetooth is a wireless connection technology that allows us to several devices in our home. While, Bluetooth has certain limitations, such as a shorter ranger and lower bandwidth than

WIFI, Bluetooth can make connectivity between more reliable than over wireless alternatives.

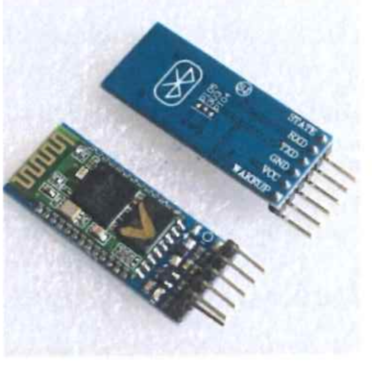

Figure 1.1 Bluetooth Module

Figure 1.2 Rechargeable Battery

Figure 1.3 Pneumatic Gripper

1.2 BACKGROUND RESEARCH

Rome was not build in a day. It all began in 1960. After much toil in the school`s machine and computer labs, Stanford University mechanical-engineering student Victor Scheinman developed his Stanford arm, an early robot that would come to be known as the first readily controllable gripper. Predecessors such as the Hydraulic Stanford arm were effective and fast, nut known for being uncontrolled ad even dangerous.

In contrast, Scheinman`s better-behaved Stanford arm was steerable by Stanford lab computer in six full degree of freedom; dc electric motors with gear reducers and harmonic drivers generated its motion.

By the early 1980s, rougher gripper design inspired by the Stanford arm (and made possible wit increasingly powerful microchips) were in mass production, and used in heavy industry.

Though many Stanford-arm feedback and control elements were copied (feedback tachometers and potentiometers sent speed and position to controllers) most early industrial arm was powered by air, and use for automotive manufacturing. Coincidentally, that legacy survives: many of the latest gripper advancements come from the field of fluid power, and the majority of grippers are still pneumatic.

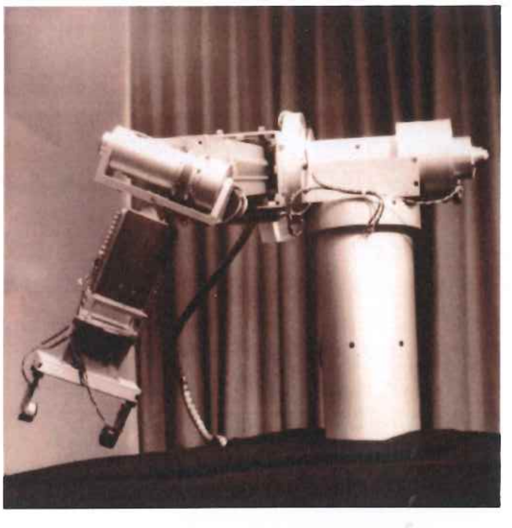

Figure 1.4 Stanford Arm

1.3 PROBLEM STATEMENT

Taking a newspaper at the table, picking up the phone or drinking a cup of tea, these are simple ordinary activities that people doing every day and often take for granted. But for individuals with physical disabilities or cognitive impairments, these can be daunting tasks. In this paper, the use of robotics is to help a disabled person to get back in the former life. Thus, they need a personal assistant that is griper robot. A gripper robot can help the persons with physical disabilities doing on basic household work. Besides, this project is made up of a robot car and a moveable griper. Robot car can move from a place to another place steadily and the moveable gripper can hold an object and release the object. Therefore, using this robot the person can work more independently.

When a small objects such as a bottle roll into under the bed, people are difficultly or incapable to take it up because the place is small and we cannot get inside. Hence, we need a small moveable object can get inside and take it out, small gripper robot are introduces. Because size of gripper robot is small and can go inside under the bed and take out effortless. In addition, although the size of the gripper robot is small but it can carry out an object bigger than their size.

1.4 PROJECT OBJECTIVE

I. This project main purpose is to help the disable persons takes their items or projects.

II. This project really easy to work and it can be function by anyone by themselves.

III. Our project will save the energy and also the time of the older people to move their items or objects from one place to another.

1.5 PROJECT SCOPE

I. Cannot take or carry the item over than 100g.

II. The range in the controller is limited, not more than 10 meters or around 30 feet (Most Bluetooth devices run on battery power are class 2 Bluetooth devices and the distance limitation of class 2 Bluetooth device is 10 meters).

III. Cannot take or carry the item at the place too high or too low, must over than 5cm and below than 40cm.

IV. Cannot take the item`s length more than 9cm

V. Only can go through the narrow place over than 20cm.

1.6 SIGNIFICANT PROJECT

Nowadays gripper robots are general use in heavy industry and rarely seen in the market. Because of the size of gripper robots that applied in heavy industry are big and their weight are heavy hence these type of gripper robot are not suitable use in home life. Herein, we propose a model of gripper robot with the small size and have a light weight. This type of gripper robot can go into a small place or a narrow place that human difficult to go inside. Hence, this type of gripper robot is suitable consumer use in home life.

With the new design, this gripper robot has a small gripper assemble at front gripper robot and has a robot car design at the bottom. With the robot car design as their bottom, this griper robot car can move flexible and when clamp an object also can move rapidly. Moreover, this gripper robot is design via Bluetooth to control their moving direction. Via Bluetooth control, consumer can control this gripper robot and moving the gripper robot as long as they want. Ultimately, the consumer can manipulate easily.

1.7 CHAPTER SUMMARY

In the recent year, robots are not only use in heavy industry for business purpose but also can become an assistive device. Furthermore, robots also widely uses in medical field to help some physical disabilities people can work independently. While, in the most of the assistive robots gripper robot is one of them. The invention of gripper robots had brought into a new era. Our new design Fantastic Morsetto Robot (gripper robot car) is combine a robot car and a gripper. Our hope is to be keep working on this project until a suitable design can be implemented and then be places on the market.

CHAPTER 2

LITERATURE REVIEW

Chapter 2

Literature Review

2.1 Introduction

Robots are uniquely designed in order to effectively complete specific tasks. The task-specific design of robots has made them an invaluable component in the industrial production environment. Robots are now entering the consumer market and, once again, their task-specific design makes them beneficial in performing common household tasks. Devices specific to a robot's end use are incorporated into design to complete defined tasks. End-effectors are one such device. These are mechanical devices mounted on some part of a robot, usually at the end of a robot's arm. End-effectors, more commonly referred to as grippers, act as an important interface between the robot and its environment. The sole task of a gripper is to grasp and release objects during robotic manipulation (Guo et al, 1992).

Robotic grippers are end-of-arm devices that are most commonly used for material handling in industrial situations. Grippers are designed to grasp and release specific objects. Grippers range from match-box size devices to industrial machines capable of several thousand pounds of force (Spencer, 2005). Obviously, the design of robotic grippers depends on the specific grasping task. "The challenge to the gripper designer is to address these requirements while at the same time, create a cost-effective mechanism that is lightweight, satisfies packing requirements, and can be manufactured and scaled to create a product family (Spencer 2005)."

Robotic grippers are often classified by the shape of their gripping mechanism. Gripper types include angular, parallel, collet, vacuum, magnetic, needle and expansion (Spencer, 2005). Gripping of most objects requires that the object be centered in the grip. This is called synchronous gripping, while asynchronous gripping refers to gripping that does not require object centering. Collet grippers have a round shape and use a sliding taper that tightens around and grips the object. Collet grippers can accommodate a size window of objects. This window is based on the stroke length of the collet. Collet grippers are one of the best grippers for part centering (Spencer, 2005).

At present the majority of industrial robotic grippers are designed for one specific purpose and their gripper design must be retooled for different uses (Hardin, 2005). Shape specific grippers allow the gripper only to grasp very specific object geometry. Some shape specific grippers can be swapped out to accommodate grasping a variety of different object geometries by a single robot. However, gripper swapping requires significant time away from production. Most grippers must be modified by the gripper manufacturer to accommodate new object geometries.

There is a growing focus on multi-use design for robotic grippers. Hard stops and sensors allow engineers to design multi-use flexibility into their devices. Hard stops can customize the stroke length of a gripper in order to provide for a multi-use application without requiring a specially designed tool on the effector. Also, a robot with multiple fingers can grasp and move a variety of items that fit within their grip length and grasp specifications. Multi-use grippers allow robots to grip multiple geometries, allowing grippers to be used for a single application within a family of possible object geometries to grip.

The concept of robots with effective gripper mechanisms to assist the elderly population with daily life has received increasing attention in recent years. An article in the Pittsburgh Post-Gazette in April, 2004 states that the population of people over age 85 will increase by 38% in the next decade. At the same time, the ratio of adults to support the elderly will decrease from today's ratio of 5:1 to a ratio of only 3:1 (Rotstein, 2004). The number of elderly in need of some sort of assistance with day-to-day living can be predicted to double over the next twenty years.

Innovative solutions must be developed in order to care for the growing elder population. Several technology firms have already begun initiatives to address this market. Intel has an effort called Proactive Health Research and Microsoft has created an Assistive Technologies Group (Maney, 2004). Mitsubishi, Honda, and the Korean Institute of Science are working on technologies to move elderly and disabled people from room-to-room and to perform tasks such as fetching objects, operating basic appliances, and calling the doctor (Technology Quarterly, 2004). It is predicted that technology solutions, such as assistive care robots, will become essential to the care of the elderly population (Rotstein, 2004).

Elder care robots, as well as future domestic robots, must have the ability to move about unstructured settings such as home and care facilities (Technology Quarterly, 2004). These robots need to be able to move from room-to-room, including movement through closed door areas. Closed doors prevent a robot from carrying out its duty in the blocked space; therefore, closed door limitations must be effectively addressed.

A simple robot gripper is can to grip something such as newspaper, remove control or another. This robot is can to easy the work of the human and to save the time of the human.

Complex robot grippers, such as anthropomorphic hands and multi-fingered grippers are able to do many tasks including to take the heavy item of anything/ Numerous robot grippers have been designed to do a very specific task, such as fruit picking or spot welding.

2.2 Description of components

2.2.1 Arduino

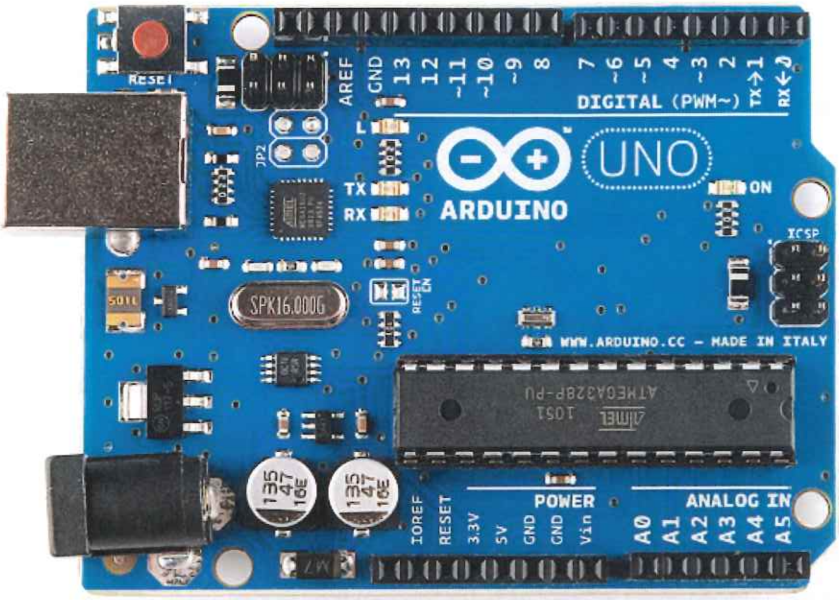

FIGURE 2.2.1 ARDUINO

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Over the years, Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software, too, is open-source, and it is growing through the contributions of users worldwide.

Due to its simple and accessible user experience, Arduino has been used in thousands of different projects and applications. The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users. It runs on Mac, Windows, and Linux. Teachers and students use it to build low cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics. Designers and architects build interactive prototypes, musicians and artists use it for installations and to experiment with new musical instruments. Makers, of course, use it to build many of the projects exhibited at the Maker Faire, for example. Arduino is a key tool to learn new things. Anyone - children, hobbyists, artists, programmers - can start tinkering just following the step by step instructions of a kit, or sharing ideas online with other members of the Arduino community.

There are many other microcontrollers and microcontroller platforms available for physical computing. Parallax Basic Stamp, Netmedia's BX-24, Phidgets, MIT's Handyboard, and many others offer similar functionality. All of these tools take the messy details of microcontroller programming and wrap it up in an easy-to-use package. Arduino also simplifies the process of working with microcontrollers, but it offers some advantage for teachers, students, and interested amateurs over other systems:

- Inexpensive - Arduino boards are relatively inexpensive compared to other microcontroller platforms. The least expensive version of the Arduino module can be assembled by hand.
- Cross-platform - The Arduino Software (IDE) runs on Windows, Macintosh OSX, and Linux operating systems. Most microcontroller systems are limited to Windows.
- Simple, clear programming environment - The Arduino Software (IDE) is easy-to-use for beginners, yet flexible enough for advanced users to take advantage of as well. For teachers, it's conveniently based on the Processing programming environment, so students learning to program in that environment will be familiar with how the Arduino IDE works.

- Open source and extensible software - The Arduino software is published as open source tools, available for extension by experienced programmers. The language can be expanded through C++ libraries, and people wanting to understand the technical details can make the leap from Arduino to the AVR C programming language on which it's based. Similarly, you can add AVR-C code directly into your Arduino programs if you want to.
- Open source and extensible hardware - The plans of the Arduino boards are published under a Creative Commons license, so experienced circuit designers can make their own version of the module, extending it and improving it. Even relatively inexperienced users can build the breadboard version of the module in order to understand how it works and save money.

However, the Arduino board that we use in this grass cutter robot is Arduino/Genuino Uno. Arduino is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worring too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

2.2.2 L293D Motor Device IC

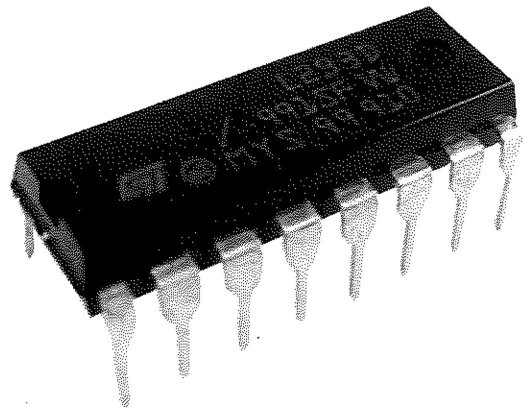

FIGURE 2.2.2 L293D 1C

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motors with a single L293D IC. [Dual H-bridge Motor Driver integrated circuit (IC)]

It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in either direction. As you know voltage need to change its direction for being able to rotate the motor in clockwise or anticlockwise direction, Hence H-bridge IC are ideal for driving a DC motor.

In a single L293D chip there are two h-Bridge circuit inside the IC which can rotate two DC motor independently. Due its size it is very much used in robotic application for controlling DC motors. Given below is the pin diagram of a L293D motor controller.

There are two Enable pins on l293d. Pin 1 and pin 9, for being able to drive the motor, the pin 1 and 9 need to be high. For driving the motor with left H-bridge you need to enable pin 1 to high. And for right H-Bridge you need to make the pin 9 to high. If anyone of the either pin1 or pin9 goes low then the motor in the corresponding section will suspend working. It's like a switch.

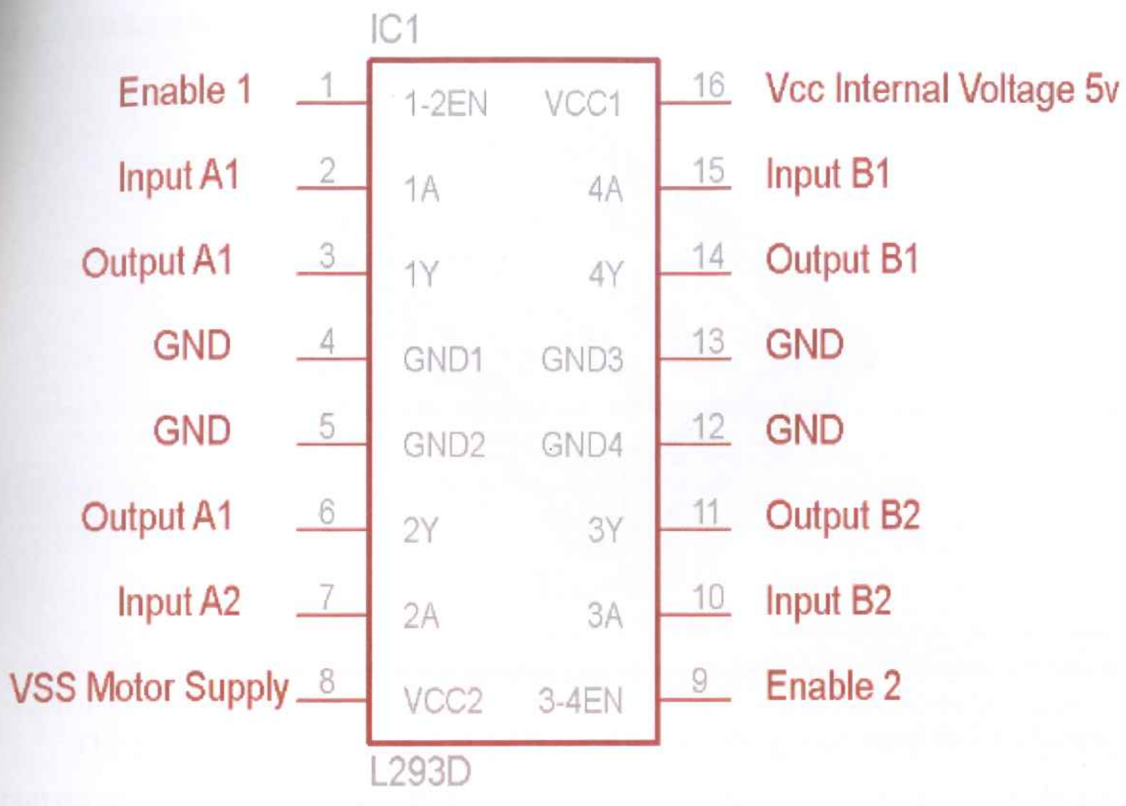

FIGURE 2.2.3: L293D PIN DIAGRAM

There are 4 input pins for l293d, pin 2.7 on the left and pin 15 and 10 on the right as shown on the pin diagram. Left input pins will regulate the rotation of motor connected across left side and right input for motor on the right hand side. The motors are rotated on the basis of the inputs provided across the input pins as LOGIC 0 or LOGIC 1.

VCC is the voltage that it needs for its own internal operation 5v; L293D will not use this voltage for driving the motor. For driving the motors it has a separate provision to provide motor supply VSS (V supply). L293d will use this to drive the motor. It means if you want to operate a motor at 9V then you need to provide a Supply of 9V across VSS Motor supply.

The maximum voltage for VSS motor supply is 36V. It can supply a max current of 600mA per channel. Since it can drive motors Up to 36v hence you can drive pretty big motors with this l293d. VCC pin 16 is the voltage for its own internal Operation. The maximum voltage ranges from 5v and up to 36v.

2.2.3 Recharging Battery

FIGURE 2.2.4 RECHARGING BATTERY

The power from the current at home or from the plug, can store theirs electric current or power into the recharging battery. The recharging battery is very suitable for this project, and can save money. A rechargeable battery, storage battery, or accumulator is a type of electrical battery. It comprises of one or more electrochemical cells, and is a type of energy accumulator. It is known as a secondary cell because its electrochemical reactions are electrically reversible.

Rechargeable batteries come in many different shapes and sizes, ranging from button cells to megawatt systems connected to stabilize an electrical distribution network. Several different combinations of chemicals are commonly used, including: lead–acid, nickel cadmium (NiCd), nickel metal hydride (NiMH), lithium ion (Li-ion), and lithium ion polymer (Li-ion polymer).

2.2.4 Robot Arm

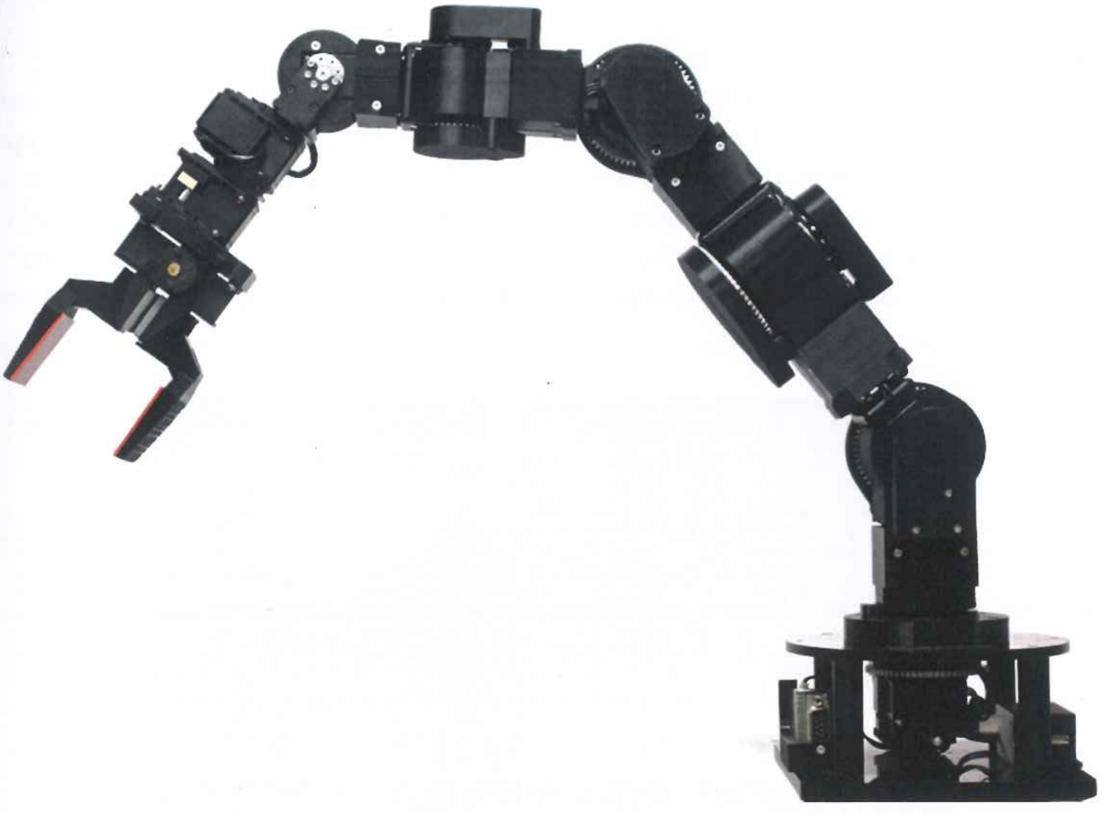

FIGURE 2.2.5 ROBOTIC ARM

A robotic arm is a type of mechanical arm, usually programmable, with similar functions to a human arm; the arm may be the sum total of the mechanism or may be part of a more complex robot. The links of such a manipulator are connected by joints allowing either rotational motion (such as in an articulated robot) or translational (linear) displacement. The links of the manipulator can be considered to form a kinematic chain. The terminus of the kinematic chain of the manipulator is called the end effector and it is analogous to the human hand.

We use this robot arm is because that we want to take something from the higher place and to take something in front it and it can move to take it easily.

2.3 Previous Research

It all started with one simple finger. A cardboard finger that was able to adapt itself to different situations. In other words, depending on where the pressure point was applied, the finger reacted differently. Based on a human finger, the cardboard finger developed at Laval University made pretty much the same motions as a human finger which is: flexible when closing, being straight when open. At that time, the lab was simply developing mechanisms and was not completely into robotic applications. So the finger was developed, but wasn't actually attached to anything yet.

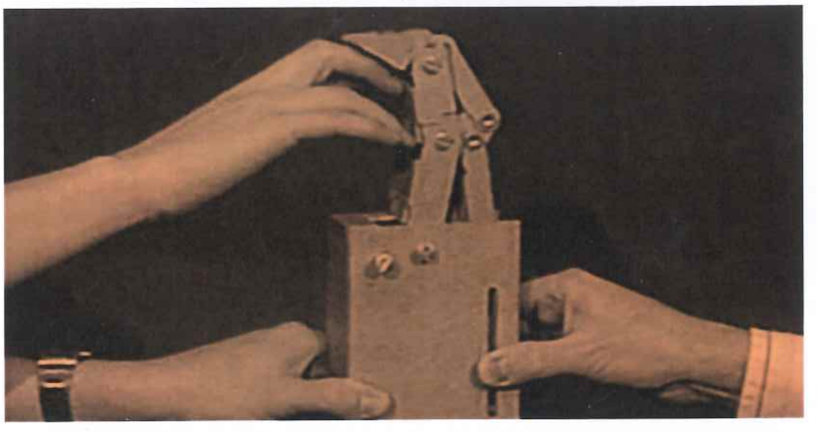

FIGURE 2.3.1 FIRST ADAPTIVE GRIPPER <u>MARS</u>

(MAIN ARTICULÉ ROBUSTE SOUS-ACTIONNÉE)

It was only a couple years later that the first Adaptive Gripper, called <u>MARS</u> (Main Articulé Robuste Sous-actionnée), was designed and assembled. This gripper was gigantic (way bigger than a human hand). It was designed to be fully adaptive and had 3 independently rotating fingers. This meant that a lot of different objects could be grasped. However, even if it was versatile, it wasn't very tough. Perhaps, it was following Isaac Asimov's, 1st Rule of Robotics, *"A robot may not injure a human being or, through inaction, allow a human being to come to harm"*. The hand was manufactured in less than optimal materials and was not mature enough to be used in any kind of real industrial application. It was more of a proof of concept.

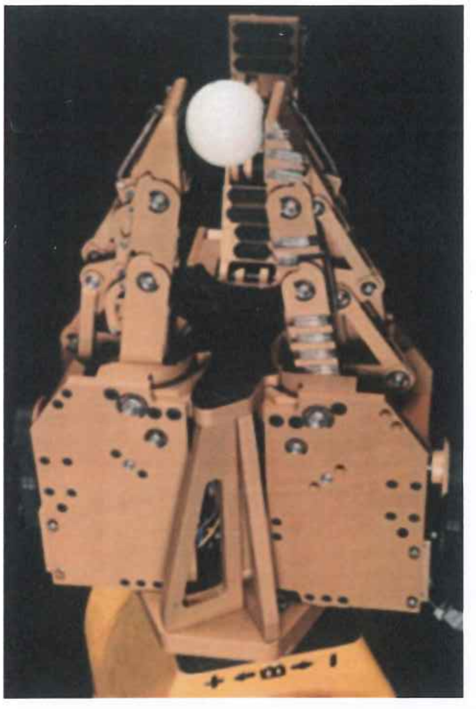

FIGURE 2.3.2 SARAH

(SELF ADAPTIVE ROBOT AUXILIARY HAND)

With a couple of iterations, MARS became SARAH (Self Adaptive Robot Auxiliary Hand) and made a bigger leap in the direction of industrial applications. SARAH was made out of aluminum parts and was built tough. It was actioned by electrical and air pressure principles that still allowed the 3 fingers to rotate and to close. The SARAH gripper was a proof of concept for the Canadarm (Dextre) of the International Space Station (ISS). Unfortunately due to technical incompatibilities, this model was not chosen by the Canadian Space Agency to fly on the space shuttle. But a second version of SARAH was manufactured and was used in the UK for radioactive debris removal.