A

REPORT OF PROJECT PHASE - I

ON

"ALYSSA-The HOUSEHOLD BOT"

Submitted in partial fulfillment of the
requirements for the degree of Production
Engineering of Semester-I of
Savitribai Phule Pune University

Submitted by

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The project phase-1 report entitled **"ALYSSA-The Household Bot"**
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in partial fulfillment of the requirements for the degree of Production
Engineering of Semester-I of Savitribai Phule Pune University, may be
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(ii)

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BHAMARE VEDANT DEEPAK-6
CHAVAN TEJAS VILAS-9
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ABSTRACT

A domestic robot is a type of service robot, an autonomous robot that is primarily used for household chores but may also be used for education, entertainment or therapy. While most domestic robots are simplistic, some are connected to Wi-Fi home networks or smart environments and are autonomous to a high degree. There were an estimated 16.3 million service robots in 2018. People began to design robots for processing materials and constructing products, especially during the Industrial Revolution in the period about 1760 to around 1840. Hence, thereafter a major significance occurs in people's living standards. One of the earliest domestic robots is called "HERO", which was sold during the 1980s. Of all the educational and personal robots created during the 1980s, the Heathkit HERO robots were by far the most successful and most popular. There were four types of Hero robots created by Heathkit. The first model is called HERO 1(It was used for educational purposes), to fulfill the customer's demand, the second model was generated which was called HERO JR(Used for personal use).The last two generations are called HERO 2000 and the Arm Trainer. Another prototype of the domestic robot was called "TOPO", which was designed by Androbat Inc. and released in 1983. By 2006 there were "3,540,000 service robots in use". This type of domestic robot does chores around and inside homes. Different kinds include: [1] Robotic vacuum cleaners and floor-washing robots that clean floors with sweeping and wet mopping functions. [2] Within the ironing robots, Dress man is a mannequin to dry and iron shirts using hot air. [3] Car litter robots are automatic self-cleaning litter boxes that filter clumps out into a built-in waste receptacle that can be lined with an ordinary plastic bag. [4] Security robots such as Knightscope have a night vision capable wide-angle camera that detects movements and intruders. It can patrol places and shoot videos of suspicious activities, too and send alerts via email or text message (SURVEILLANCE). [5] Air blower is another thing for robotic application in household core. [6] External power supply (USB cable charging, Battery Backup).[7] Sanitization is also one of the great application in the field of household robotics.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE.NO

LIST OF FIGURES

NOMENCLATURE

MCU   Micro Controller Unit

NEATO   North-East Association of Transporter Owners

IC   Integrated Circuit

LED   Light Emitting Diode

PCB   Printed Circuit Board

IDE   Integrated Development Environment

EDA   Electronic Design Automation

PIC   Peripheral Interface Controller

IOT   Internet of Things

1. INTRODUCTION

The research and development of an autonomous mobile robot and a Manual Phone Application Control prototype able to vacuum-clean a room or even an entire house is not a trivial challenge. In order to tackle such a task, so that it could be completed in six weeks (the duration of the course), some simplifications and assumptions were made to the designer's initial idea of an "ideal" autonomous /manual vacuum cleaner. In this way, some functional requirements that would improve the robot performance were not taken into account due either to their inherent complexity or to their mechanical implications.

These robots operate semi- or fully autonomously to perform services useful to the well-being of humans and equipment. With the aim of keeping our robot as simple as possible, while able to perform the initial goals, i.e an autonomous vacuum cleaner robot able to randomly navigate through a room or a house with the minimum human assistance, the following specifications were found:

- Obstacle avoidance
- Floor detection
- Collision detection
- Robot control
- Floor cleaning
- System on automatically

Floor cleaning machine and will be amazed at the simplicity and effectiveness of the idea. It's basically DC motors wired in a wheeled plastic container with a cleaning solution placed on top and a scrub attached in the bottom through one of the motors. Anybody can operate this machine easily. Hence it is very useful in hospitals, houses, etc. Definitely makes cleaning easier and merrier while enabling anyone to build something rather than buy. In modern days interior decorations are becoming an important role in our life. Cleaning of floor is a very important one for our health and reduces the man power requirement. Hence our project is very useful in our day today life.

This project deals with the designing and fabrication of Floor cleaning Machine. The aim of this work is to develop and modernized process for cleaning the floor with wet and dry. It is very useful for cleaning the floors. It can be used wet and dry. Floor cleaning system is very much useful in cleaning floors in hospitals, houses, auditorium, shops, computer centers. It is very simple in construction and easy to operate. Anybody can operate this machine easily. It consists of moisture cotton brush, the brush cleans the floor and dried with aid

of small blower. Hence it is very useful in hospitals, houses, etc. The time taken for cleaning is very less and the cost is also very less. Maintenance cost is less. Much type of machines is widely used for this purpose. But they are working under different principles and the cost is also very high. In this project a very simple drive mechanism and easy to operate any persons. The size of the machine is also portable, so we can transfer from one place to another place very easily. The floor cleaning machine is simple, modern house holding device; even children can also operate it easily with safety. It is very important one for each and every house and hospitals etc. Below are two types of robots viz indoor robots and outdoor robots.

(1) Indoor Robots

This type of domestic robot does chores around and inside homes. Different kinds include:

- Robotic vacuum cleaners and floor-washing robots that clean floors with sweeping and wet mopping functions. Some use Swiffer or other disposable cleaning cloths to dry-sweep, or reusable microfiber cloths to wet-mop.
- Within the ironing robots, Dressman is a mannequin to dry and iron shirts using hot air. Other ones also includes mannequin for down parts (pants, trousers and skirts). More advanced ones (i.e. laundry-folding machines) fold and organizes the clothes, as Laundroid or FoldiMate (using image analysis and artificial intelligence), Effie (irons 12 items of clothing at once) and FoldiMate.
- Cat litter robots are automatic self-cleaning litter boxes that filter clumps out into a built-in waste receptacle that can be lined with an ordinary plastic bag.
- Robotic kitchens include Rotimatic (which makes rotis, tortillas, out of flour in just a few minutes), Moley Robotics MK1 and Prometheus delta robot.

Security robots such as Knightscope have a night-vision-capable wide-angle camera that detects movements and intruders. It can patrol places and shoot video of suspicious activities, too, and send alerts via email or text message; the stored history of past alerts and videos are accessible via the Web. The robot can also be configured to go into action at any time of the day.

Atlas is a robot built to perform in house task such as sweeping, opening doors, climbing stairs, etc. Samsung has been presenting robot butler designs such as *Handy* and *Care*.

(2) Outdoor Robots

A robotic lawn mower is a lawn mower that is able to mow a lawn by itself after being programmed. Once programmed, this invention repeats the operation by itself according to its programming. Robotic lawn mowers come with a power unit which may be an electric motor or internal combustion engine. This provides power to the robot and allows it to move itself and its cutting blades. There is also a control unit which helps the mower move. This unit also contains a memory unit which records and memorizes its operation programming. Its memorized route includes the length of travel in a given direction and turns angles. This allows the same lawn to be

mowed repeatedly without having to reprogram. The steering unit acquires an operation signal and propels the lead wheel, which leads the mower, go guide along the programmed route.

Some models can mow complicated and uneven lawns that are up to three-quarters of an acre in size. Others can mow a lawn as large as 40,000 square feet (3,700 m^2), can handle a hill inclined up to 27 degrees.

There are also underlined automated pool cleaners that clean and maintain swimming pools autonomously by scrubbing in-ground pools from the floor to the waterline in 3 hours, cleaning and circulating more than 70 US gallons (260 l) of water per minute, and removing debris as small as 2 μm in size.

Gutter-cleaning robots such as Looj use brushes and rubber blades to remove debris from rain gutters; users operate the device using a remote.

Window cleaning robots are most commonly used to clean outdoor windows, more specifically house windows. However, it may be used on other types of windows, such as ones on tall buildings and structures. This robot contains a movement system which allows the robot to navigate itself across the window surface in a defined direction. It also has a powered agitator located by the cleaning pad. When activated, the agitator gets rid of debris and dirt from the window surface. The cleaning pad directly interacts with the window surface and is directly responsible for removing the dirt by filling itself with specialized window cleaning fluid.

A window-washing robot commonly uses two magnetic modules to navigate windows as it sprays the cleaning solution onto microfiber pads to wash them. It covers about 1,601 square feet (148.7 m^2) per charge.

2. LITERATURE REVIEW

A robotic vacuum cleaner is an autonomous electronic device that is intelligently programed to clean a specific area through a vacuum cleaning assembly. Some of the available products can brush around sharp edges and corners while others include a number of additional features such as wet mopping and UV sterilization rather than vacuuming. Some of the available products are discussed below

(1) <u>I Robot</u>

[2] in 2002, iRobot launched it's first floor vacuum cleaner robot named Roomba. Initially, iRobot decided to manufacture limited number of units but Roomba immediately became a huge consumer sensation. Due to its increased market demand, a series of following robots have been launched in the market: 1. Roomba • Launch Date: 2002 • Manufacturer: iRobot (American) • Type of Use: Dry Vacuum • Technology: IR, RF and auto-charging mechanism

About Roomba (I robot)

Roomba is a robot that cleans floors differently than the way most people clean their floors. Roomba uses its robot intelligence to efficiently clean the whole floor, under and around furniture and along walls. Roomba calculates the optimal cleaning path as it cleans and determines when to use its various cleaning behaviors:

Spiraling: Roomba uses a spiral motion to clean a concentrated area.

Wall Following: Roomba uses this technique to clean the full perimeter of the room and navigate around furniture and obstacles.

Room Crossing: Roomba crisscrosses the room to ensure full cleaning coverage.

Dirt Detection: When Roomba senses dirt, the blue Dirt Detect™ light is lit and Roomba cleans more intensely in that area.

A robotic vacuum cleaner is an autonomous electronic device that is intelligently programed to clean a specific area through a vacuum cleaning assembly. Some of the available products can brush around sharp edges and corners while others include a number of additional features such as wet mopping and UV sterilization rather than vacuuming. Some of the available products are discussed below.

A detailed comparison of previous patented robotic vacuum cleaners with CLEAR on the basis of main features of control mechanism like automatic or manual mode and cleaning expertise like dry vacuum cleaning or mopping along with additional features like bag-less container etc. [2] iRobot in 2002, iRobot launched it's first floor vacuum cleaner robot named Roomba. Initially, iRobot decided to manufacture limited number of units but Roomba immediately became a huge consumer sensation. Due to its increased market demand, a series of following robots have been launched in the market: 1. Roomba • Launch Date: 2002 • Manufacturer: iRobot (American) • Type of Use: Dry Vacuum • Technology: IR, RF and auto-charging mechanism

Virtual Walls create an invisible barrier that Roomba will not cross. This invisible barrier can be used to confine Roomba to a particular room or area, and prevent it from getting too close to electrical or computer cords, delicate objects on the floor, etc. The Virtual Walls can be set to block an opening up to seven feet long. Note that the width of the Virtual Wall's beam also increases as its length increases, creating a cone-shaped area which Roomba cannot pass. The Virtual Wall also creates a halo of protection around itself, preventing Roomba from getting too close.
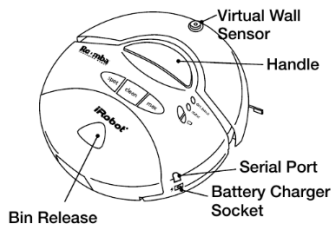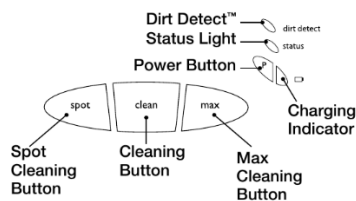
Fig.1 Anatomy of iRobot

(2) Design and Development of an Automated Floor Cleaning Robot for Domestic Application

Aishwarya Pardeshi et. al,

[1] This paper presents the look, developed and fabricated model of programmed cleaner robot. This type of robot performs automated function with extra features like choose and place mechanism and dirt container with air vacuum mechanism. This type of labor is straightforward and helpful in betterment of life variety of a mankind.

Ajith Thomas et. al,

[2] proposed an autonomous robotic for floor cleaning program. It's able to perform sucking and cleaning, detection of obstacles, and water spraying. Furthermore, it's also able to add manual method. All hardware and software functions are manipulated by Node MCU Microcontroller model.

Vaibhavi Rewatkar and **Sachin T. Bagde**

[3] provided a comprehensive overview of the technological advantages helped within the real world for the convenience of just about all of the people that are extremely busy. Consequently,

6

this has led to arriving up with a goal of constructing an automatic home appliance. The review includes computerized cleaner having components to DC

motor operated wheels, the dustbin, cleansing brush, mop cleansing and obstruction avoiding sensor. A 12V battery is employed for supplying power. Special technique of ULTRAVIOLET germicidal cleaning technology. The study has been done keeping in mind economical expense of product.

International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 Published by, www.ijert.org NCETESFT - 2020 Conference Proceedings Volume 8, Issue 14 Special Issue - 2020 67 Vinod J Thomas et. al, [4] designed a cleaner robot for domestic application. The robotic contains a cleaning module which may be used for cleaning. The Robot was created in order that it may well be capable of reach almost every space and corner of any room that it must be as compact as possible. The working robot is handled using an Android phone using Wireless Bluetooth Technology. The robot was created with an Arduino microcontroller at its core. The microcontroller is complemented with communications modules like Wireless Bluetooth motors and dirt Suction System to work accordingly.

Manya Jain et. al,

[5] discussed the event of Automatic Floor Cleaner. The project is often used for domestic and professional purpose to scrub the surface automatically and manually. When it's turned ON, it gulps within the dust particles by moving everywhere the surface (floor or the other

area) because it moves over it. The driving force control mechanism are often wont to drive the motors where robot having the ability to man oeuvre and also the also few sensors are accustomed detect and avoid the obstacles. This can be often useful in making the approach to life better for humankind. Abhishek Pandey et. al, [6] reviewed the requirement of a residence Cleaning Automatic robot. For keeping time there's a requirement of programmed system that cleans alone without person interventions. Also, they considered how precisely to help those that have physical disabilities. Because that they had to induce this done, they needed a cleaning system that may add accordance from what we are saying, thus supporting a physically someone.

Karthick.T et. al,

[7] is intended to create up an autonomous automatic robot which will move itself without constant human instruction. The autonomous cleanser robot involves low power consuming electric components and it can operate at very low power. Electric parts are the controller board, transformer IC and motor driver circuit. Mechanized part is motor unit with gearbox founded. Ultrasonic

detectors will identify obstructions in line with the program being executed. A 12V, 4.5Ah rechargeable lead acid electrical device is that the energy source for this proposed cleaning automatic robot.

3. PROBLEM STATEMENT

Nowadays, people lead a busy life. People in urban have abnormal and long working hours. In such a situation an individual will always find ways of saving time.

• For career-oriented and dealing women it's hard to handle home together with job work.

• Normally floor is cleaned with the utilization of dry mopped or wet mopped using the hand as a base tool. They need to be scrubbed hard on the surface.

• The cleaning module includes cleaning of varied surfaces like cement floors, highly polished wooden or marble floors.

The rough surface areas like cement floor, are covered with heavy dust which consumes longer in cleaning.

Therefore, our project is a solution for replacement of manual exertion to auto cleaning which does the mopping, vacuum cleaning and also has the most advance CCTV checking. We believe in having the best ever performance and battery backup.

3.1 Objectives

• Clean the dust on the surface.

• To develop an autonomous robotics system using internet of things and to design a floor cleaning robot without humans to the driving.

• By obtaining and understanding of current trends and opinions, the investigation seeks to determine how prevalent artificially intelligent household robotics have become and how prevalent they may become in future.

• Provide light in dark conditions.

• To have both operation i.e cleaning and mopping.

• To have cost-effective and reliable solution to minimize human efforts.

• To design and develop a robot for floor cleaning.

4. METHODOLOGY

4.1 Methodology Overview

A number of software and hardware implementation techniques were used to design and develop the system. Fig 3.1 shows the block diagram of the system. We used a 12V DC motor, L293D IC, Different Sensors, Vacuum mechanism and Arduino to develop our system. The operation of the robotic vacuum is going to be based on retrieving data from an array of inputs that will tell the condition of the floor space around the vacuum. These inputs include sonar, touch sensors, and a digital compass. Each of these parts will be described in further detail later in the documentation. The data from these inputs will be fed into the chip(s) which through its software program will decide which direction the vacuum should move by sending the control signals out to the drive motors.
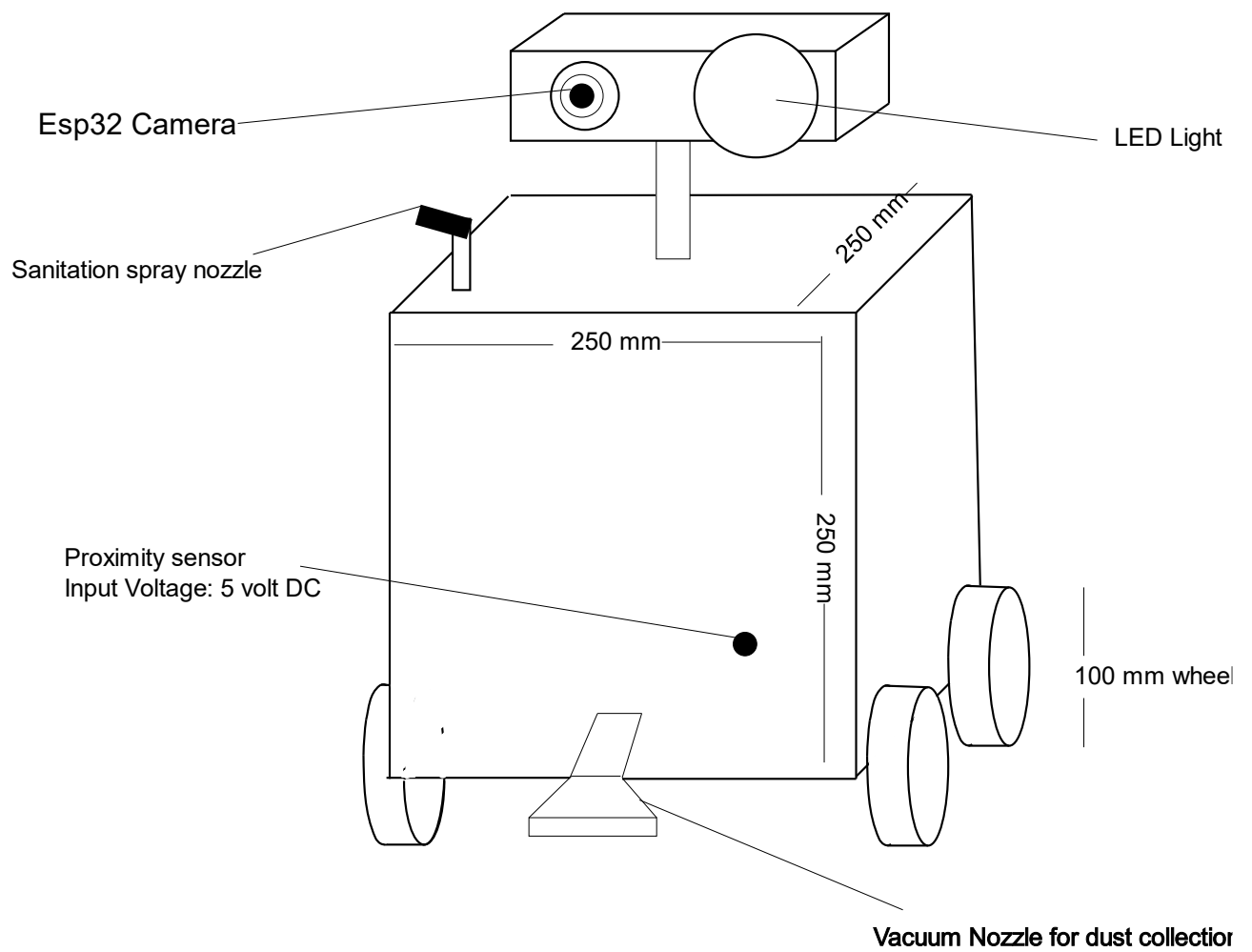
Esp32 Camera

LED Light

Sanitation spray nozzle

250 mm

250 mm

250 mm

Proximity sensor
Input Voltage: 5 volt DC

100 mm wheel

Vacuum Nozzle for dust collection

Fig 4.1(a) 3-Dimensional view of "ALYSSA"

Easy removable safety panel
To remove dust from vacuum cleaner

Fan for cooling

Portion for Electric
Circuit power supply
(motor driver, Relay,
Node mcu)

Battery
Power supply

Vacuum cleaner
12 volt high power
Portable Vacuum
cleaner

Johnson motor chass
material type- MS

Mini submersible water Pump
3-6 Volts Dc pump

E18-D80NK Infrared Proximity Sensor
Input Voltage: 5 volt DC
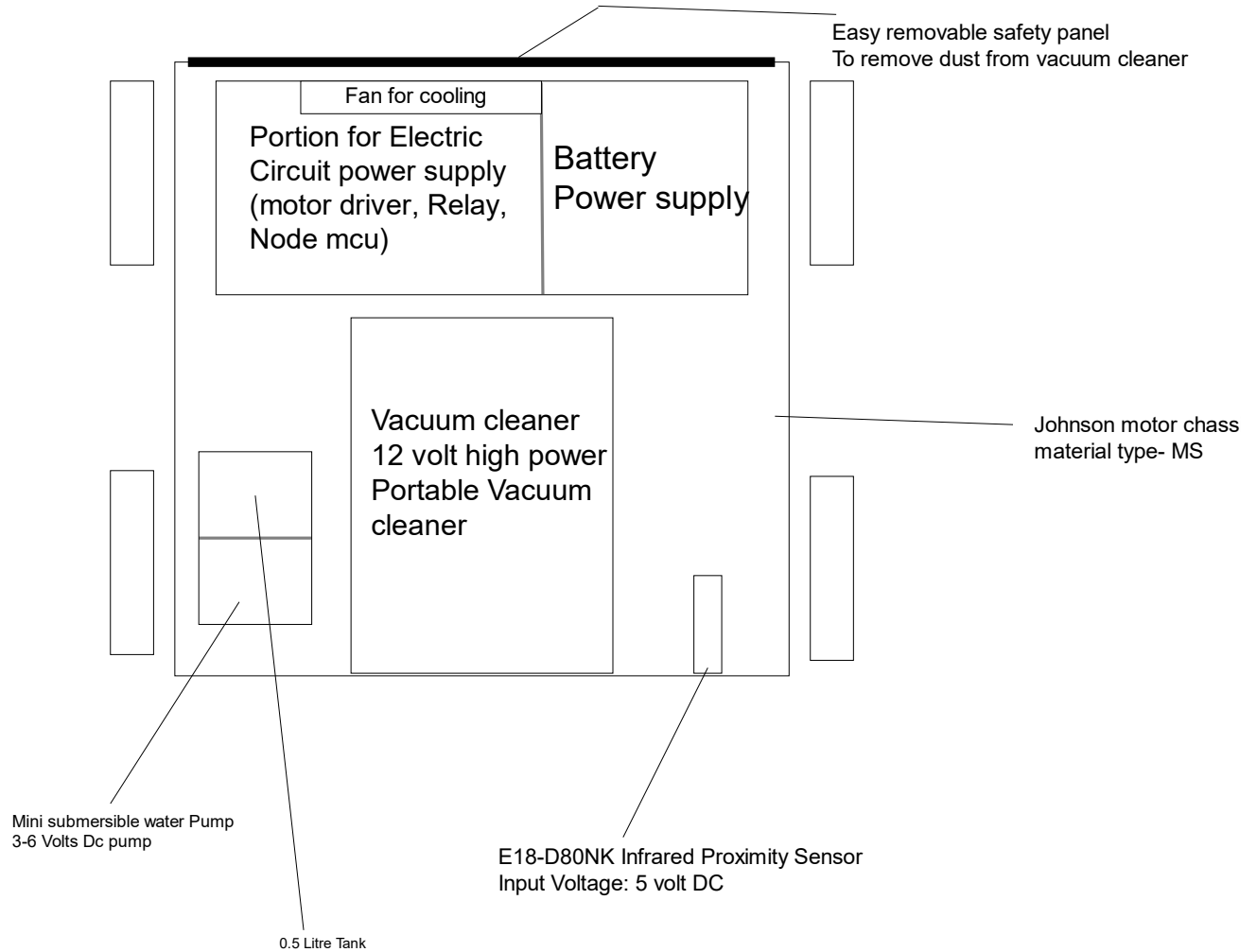
0.5 Litre Tank

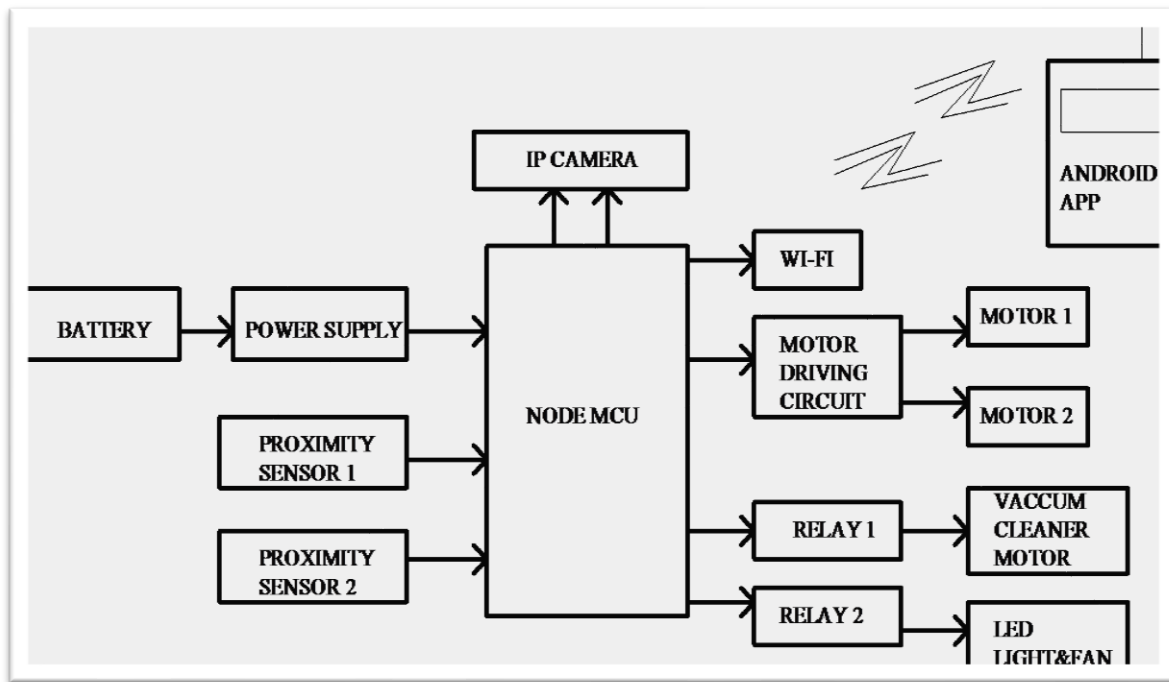*Fig 4.1(b) Internal anatomy of system*

Fig 4.1(c) Block Diagram of System

- The operation of the robotic vacuum is going to be based on retrieving data from an array of inputs that will tell the condition of the floor space around the vacuum. These inputs include sonar, touch sensors, and a digital compass & etc.
- DC motor is used to change direction of wheels which is connected to the platform.
- We are using ESP32 microcontroller for controlling the robot with the help of motor driver.
- For controlling the robot, we are using 12 V DC gear motor with a 10 cm wheel.
- For security purposes, we are using a V380 Camera. with 10 Days backup, which can rotate in "X" as well as "Y" Direction.
- It will boost home security such as access control and alarm systems.
- For ventilation purposes, we are using 12 V fan, and For Lighting we are using 12 V LED lights.
- We are also developing Android application, that can move the robot in the left and right direction.

- It can have a complete view of the floor then the camera takes the images of the floor.
- We are using vacuum motor, It is operated on 12 V DC supply for cleaning purpose, cleaning dust bag is also attached with the motor.

4.2 Introduction to PCB

Printed circuit boards may be covered in two topics; technology and design. Printed circuit boards are called PCB in short. Printed circuit consists of a conductive circuit pattern applied to one or both sides of an insulation base, depending upon that, it is called single side PCB or double-sided PCB (SSB and DSB). Conductor materials like silver, brass, aluminum and copper are most widely used. The thickness of the conducting material depends upon the current carrying capacity of the circuit. Thus, a thicker copper layer will have a more current carrying capacity.

The printed circuit board usually serves three distinct functions:

1)   It provides mechanical support for the components mounted on it.

2)   It provides necessary electrical interconnections.

3)   It acts as a heat sink that is it provides a conduction path leading to the removal of most of the heat generated in the circuit.

❖ **Properties of PCB :**

- Insulation resistance
- Volume resistivity
- Dielectric strength
- Dielectric constant
- Dielectric factor
- Arc resistance
- Flexural strength

❖ **Advantages of PCB :**

- Good moisture resistance
- Good electric properties
- No effect of weak acid
- Slight effect of strong acid

- Slight effect of organic solvent

- Provides mechanical support

- Occupies less space

- Good electrical property

4.3 Hardware Requirement

(a) Node MCU

Node MCU is an IoT Module based on Wi-Fi Module. Node MCU uses Lau Scripting language and is an open-source Internet of Things (IoT) platform. This module has CH340g USB to TTL IC.
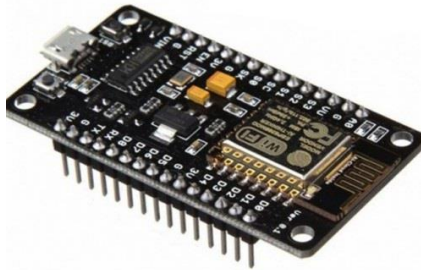

Fig 4.3(a) Node MCU

❖ **Features :**

- Open-source IoT Platform
- Easily Programmable
- Low cost & Simple to Implement
- WI-FI enabled

(b) Relay

Relays are output devices that are used to control or operate some external devices. This is a 5V isolated relay module which means that there is an optocoupler used in between your control circuit and the relay thus protecting your circuit in case of any short circuit issues on the relay

15

side. The relay is driven safely by a BC547 transistor which is triggered via an Opt coupler IC which serves as an isolator between your microcontroller and the relay. This Relay module is perfect if your complete circuit is running on 5 volts.

Fig 4.3(b) Relay

❖ **Features :**

- Operating Voltage: 5 V
- Max Current: 20 mA
- SPDT Configuration

(c) Motor Driver

We have added a few special features to this shield. Motor power polarity protection, also fast test or manual control buttons for each channel of the motor. Adding LSS05 (Auto-calibration line sensor) to Arduino will be easy as this shield comes with the socket for it. The speed control is achieved through conventional PWM which can be obtained from Arduino's PWM output pin 5 and 6. The enable/disable of the motor driver is controlled by Arduino pin 4 and 7, this is labelled as Signed magnitude control. You have the option to configure it to become Locked Anti-phase which uses a PWM signal to decide direction, speed, and also start/stop of the motor. The control modes can be configured from jumpers and also programs.
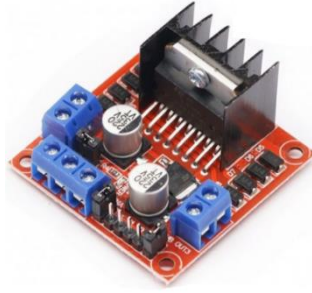
Fig 4.3(c) Motor Driver

(**d**) **Vacuum Cleaner**

Handled air vacuum cleaner. The large capacity clear canister allows you to see how much pet hair, dust & dirt you've vacuumed, visually notifying you when it's time to empty it. Storage Bag to keep all accessories and vacuum cleaner in an organized manner. Easily removable and washable. Pure copper motor, turbocharger turbine motor.

Fig 4.3(d) Vacuum Cleaner

 (**e**) **Proximity Sensor**

The E18 Sensor works as a proximity switch i.e the output is digital (High when no obstacle & LOW when obstacle is detected) thus making it easy to interface with any 5 volts digital circuit. The E18-D80 IR proximity sensor has very little interference by visible light and can even work quite well even in sunlight. The sensor works on modulated IR so the sensor can also work in daylight.

The infrared proximity switch module is a reflection-type photoelectric sensor that integrates transmitting and receiving infrared-beams function. Infrared proximity switches work by sending out beams of invisible infrared light. A photo-detector on the proximity switch detects any reflections of this light. These reflections allow infrared proximity switches to determine whether there is an object nearby.

Fig 4.3(e) Proximity Sensor

❖ **Features :**

- Power Supply : 5 V DC
- Supply Current DC < 25 mA
- Maximum Load Current : 100 mA (Open-collector NPN pull down output)
- Response time < 2 ms
- Diameter : 17 mm

(**f) Submersible pump**

Mini Submersible Water Pump
3 - 6 Volts Mini Submersible water Pump
This DC submersible pump is small is size and is low cost. This pump can operate at as low as 3 volts. The DC submersible pumps can take up to 120 litre. This is submersible DC pump which are very commonly used in small decorative fountains. These pumps are very simple to use and work on wide voltage from 3 volts to 6 volts. These mini DC submersible pumps are also being extensively used in low cost Automatic Hand Sanitizer machines.
Just connect tube pipe to the motor outlet, submerge it in water and power it. Make sure the pump is always submerged in the water or it may get heated up or damaged permanently.

Submersible Water Pump

Fig 4.3(f) submersible pump

❖ **Features :**
- Voltage : 3 - 5 Volts
- Current : 100 - 300 ma
- Head: 0.3 - 0.8 meter
- Flow Rate: 1.2 to 1.6 Litres/min
- Application of Mini Submersible water Pump
- Mini Fountain
- DIY Projects
- Cooling Projects
- Automatic Soap dispense project
- Small Gardening projects.

(e) Easymech warrior chassis

The EasyMech Warrior Chassis is also known as Johnson motor chassis which are very fewer; some chassis are available but they are not that much flexibility in design. Hence EasyMech Provides you a great "EasyMech Warrior chassis " which is Johnson motor compatible and most importantly is known for Flexibility and roughness.

This Warrior chassis designed for an indoor and outdoor operation for which requirement of great ground clearance and faster maneuverability. The Warrior chassis is shock resistant chassis, and compact design ensures its better survivability in any kind of environment.

EasyMech Warrior Chassis is a simple yet versatile robot chassis design specifically for students and hobbyists. Featuring a heavy-duty Powder coated 1mm MS chassis designed with large internal volume, numerous holes, and mounting points, providing plenty of space to carry a PCB board and any additional components that you choose.

Note: This EasyMech Warrior Chassis is only compatible with Johnson Geared Motors, to buy them click below
Johnson Geared Motor

Fig 4.3(g) Easymech warrior chassis

❖ **Features :**
- Features :
- The UNO Compatible design.
- L298N Motor Driver Compatible Design.
- The main purpose of Johnson Motor chassis.
- Flexible and shock-resistant design.
- The Compact and Attractive Design.
- Wireless or Wired operated Chassis.

(h) Esp32 Camera

The ESP32-CAM Development Board(with camera) Module
The ESP32-CAM has a very competitive small-size camera module that can operate independently as a minimum system with a footprint of only 27*40.5*4.5mm and a deep sleep current of up to 6mA.
The ESP32-CAM is an Ai-Thinker's Original ESP32 CAM WiFi+Bluetooth with OV2640 Camera Module based on the ESP32 chip with the additional facility of using a camera. It is ideal for various IoT applications. The ESP32-CAM has a very competitive small-sized camera module that can operate independently as a minimum system.
Ai-Thinker ESP32 CAM can be widely used in various IoT applications. It is suitable for home smart devices, industrial wireless control, wireless monitoring, QR wireless identification, wireless positioning system signals and other IoT applications. It is an ideal solution for IoT applications.

Fig 4.3(h) Esp32 Camera

❖ **Features :**
- Supports UART/SPI/I2C/PWM/ADC/DAC
- Support OV2640 and OV7670 cameras,Built-in Flash lamp
- Support image WiFI upload
- Supports multiple sleep modes
- Support TF card
- The smallest 802.11b/g/n Wi-Fi BT SoC Module
- Low power 32-bit CPU,can also serve the application processor

(**i) Battery**

Fig 4.3(i) Battery

Operating Voltage: 12 V

Battery backup : 8 Hrs in one charging

Battery life : 1 Year

4.4 Software Requirement

(a) ARDUINO IDE

The Arduino Uno can be programmed with the Arduino software. It communicates using the original STK500 protocol. The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards.

Fig 4.4(a) Arduino IDE

(b) OrCAD

OrCAD is a proprietary software tool suite used primarily for electronic design automation (EDA). The software is used mainly by electronic design engineers and electronic technicians to create electronic schematics and electronic prints for manufacturing printed circuit boards. The name OrCAD is a portmanteau, reflecting the company and its software's origins: Oregon + CAD. OrCAD PCB Designer is a printed circuit board designer application, and part of the OrCAD circuit design suite. PCB Designer includes various automation features for PCB design, board-level analysis and design rule checks (DRC). The PCB design may be accomplished by manually tracing PCB tracks, or using the Auto-Router provided. Such designs may include curved PCB tracks, geometric shapes, and ground planes. PCB Designer integrates with OrCAD

Capture, using the component information system (CIS) to store information about a certain circuit symbol and its matching PCB footprint.
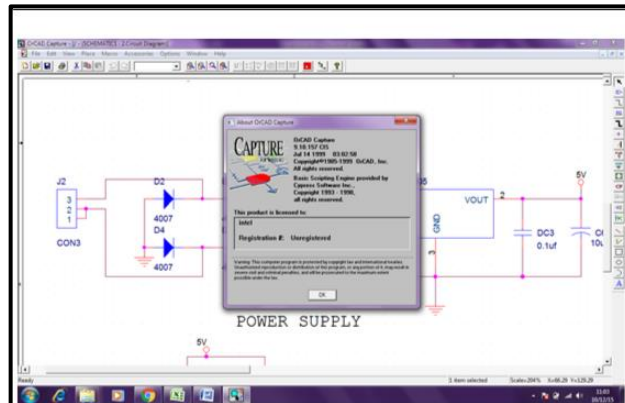

Fig 4.4(b) OrCAD

5. FUTURE PLANS

Features of this robot can be enhanced with the addition of mapping and high suction. As it has a scheduling feature that can be operated with computer only, android and windows app can be made to make it little more user-friendly. The target audience with all the features in the middle and upper class of the Pakistani community. It can also be used for industries where cleaning with the help of humans is toxic, vacuum cleaner can easily be used.

- There is immense scope of domestic household robotics in nearby future for ex, robotic pool cleaners, robotic vacuum cleaners, robotic sewer cleaners that can perform different household tasks.
- Home automation or domotics is building automation for a home called a smart home or house. It will monitor & /or control home attributes such as lighting, climate control, entertainment system and appliances.
- It will boost home security such as access control and alarm systems.
- Robotic technology can give a tremendous update in Artificial Intelligence.

6. CONCLUSION

We have successfully studied the requirement of Robot for floor cleaning and mopping purposes. The main motive of the project is to cover the aspects of cleanliness in the society. In this project, we will be developing a robot that uses PIC Microcontroller. We will have 2 modes which are automatic mode and manual mode. In manual mode, the robot will be monitored using a Bluetooth module connected to it. In Automatic mode, whenever an obstacle is detected in front of the robot, it will automatically stop and turn in the provided direction. It will be capable of performing both dry cleaning and wet cleaning. This semi-automatic system is designed using DC gear motor and Bluetooth module. The brushes used in the system are removable and can be replaced whenever required. This semi-automatic system will not be able to clean remote places. If this characteristic is modified then it will work with more efficiency. Manual Sweeping done by man might not be that effective as it will not be picking up everything in as it is not in sight but using the floor cleaner it can be done easily. This cleaner is an alternative concept for avoiding such problems. This floor cleaning machine is an alternative for automated floor cleaning machines during power crisis. Over all the concept is very much helpful and there is the scope of a lot of development in mechanical parts. The optimization will continue till achieving the best one. A cheaper and user-friendly Vacuum Cleaner robot can be developed with two different modes of controlling (Manual and Autonomous mode) using an Arduino Board with more electronics functionality. Battery monitoring, self-charging, lighter bodyweight and to setting alarm on/off time manually are the future scope of this project.

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