POLITEKNIK

SULTAN SALAHUDDIN ABDUL AZIZ SHAH

WIRELESS AUTONOMOUS CARYYING ROBOT

NAME: NURUL ASDAQ BIN ABDUL HALIM

REGISTRATION NO : 08DJK20F2025

JABATAN KEJURUTERAAN ELEKTRIK

SESI 2 2022/2023

WIRELESS AUTONOMOUS CARRYING ROBOT

NAME : NURUL ASDAQ BIN ABDUH HALIM

REGISTRATION NO : 08DJK20F2025

This report submitted to the Electrical Engineering Department in fulfillment of the requirement for a Diploma in Electrical Engineering

JABATAN KEJURUTERAAN ELEKTRIK

SESI 2 2022/2023

CONFIRMATION OF THE PROJECT

The project report titled "WIRELESS AUTONOMOUS CARRYING ROBOT" has been submitted, reviewed, and verified as to fulfill the conditions and requirements of the Project Writing

Checked by:

Supervisor's name : WAN MOHD ZAMRI BIN WAN AB.RAHMAN

Supervisor's signature:

Date : 2/6/2023

Verified by:

Project Coordinator name :

Signature of Coordinator :

Date

"I acknowledge this work is my own work except the excerpts I have already explained to our source"

1. Signature : ASDAQ

Name : NURUL ASDAQ

Registration Number : 08DJK20F2025

Date : 2/6/2023

DECLARATION OF ORIGINALITY AND OWNERSHIP

TITLE : WIRELESS AUTONOMOUS CARRYING ROBOT

SESSION: SESI 2 2022/2023

1. I, **1.** Click here to enter text.

   is a final year student of **Diploma in Electronic Engineering (Control), Department of Electrical, Politeknik Sultan Salahuddin Abdul Aziz Shah**, which is located at **Persiaran Usahawan, 40150 Shah Alam, Selangor**. (Hereinafter referred to as 'the Polytechnic').

2. I acknowledge that 'The Project above' and the intellectual property therein is the result of our original creation /creations without taking or impersonating any intellectual property from the other parties.

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Made and in truth that is recognized by;
a) NURUL ASDAQ BIN ABDUL HALIM)
(Identification card No: - 020113-14-0199) ....
) NURUL ASDAQ BIN ABDUL HALIM

In front of me, SIR WAN MOHD ZAMRI BIN WAN AB.RAHMAN (810730035657)) ....
As a project supervisor, on the date:) WAN MOHD ZAMRI BIN WAN AB.RAHMAN

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ABSTRACT

This project focuses on a straightforward solution for autonomous carrying robots that makes use of a NODE MCU ESP32 as a microcontroller board and an ultrasonic sensor to reduce collisions between static and moving objects. The ESP32 is the ESP8266's successor. It includes an additional CPU core, faster Wi-Fi, more GPIOs, and Bluetooth 4.2 and Bluetooth low energy capabilities. Moreover, the ESP32 includes touch-sensitive pins that may be used to rouse the ESP32 from deep sleep. People usually have to go to the supermarket and wholesale supermarket to get basics and culinary supplies. In this manner, people are obliged to carry a large number of plastic bags and heavy things, making housewives and senior citizens feel burdened with items transported to the parking lot This robot will prevent spinal cord damage in the elderly by relieving the strain of transporting huge and heavy goods. These projects incorporated a weight sensor with a maximum load of 5KG, allowing the user to easily define how much weight load was carried by displaying the total weight on the robot in the BLYNK app on their phone. Furthermore, if the maximum weight load surpasses 5KG, a buzzer will ring to alert the user that the item has exceeded the maximum level. The user must then connect to a Wi-Fi phone in order to activate this robot, and the robot will automatically follow the user's phone without the need for human control by utilizing the BYLNK app.

ABSTRAK

Projek ini memberi tumpuan kepada penyelesaian mudah untuk robot pembawa autonomi yang menggunakan NODE MCU ESP32 sebagai papan mikropengawal dan sensor ultrasonik untuk mengurangkan perlanggaran antara objek statik dan bergerak. ESP32 ialah pengganti ESP8266. Ia termasuk teras CPU tambahan, Wi-Fi yang lebih pantas, lebih banyak GPIO dan Bluetooth 4.2 dan keupayaan tenaga rendah Bluetooth. Selain itu, ESP32 termasuk pin sensitif sentuhan yang boleh digunakan untuk membangkitkan ESP32 daripada tidur nyenyak. Orang ramai biasanya perlu pergi ke pasar raya dan pasar raya borong untuk mendapatkan bekalan asas dan masakan. Dengan cara ini, orang ramai diwajibkan membawa beg plastik dan barang berat dalam jumlah yang banyak, membuatkan suri rumah dan warga emas berasa terbeban dengan barang yang diangkut ke tempat letak kereta. Robot ini akan mengurangkan kerosakan saraf tunjang pada orang tua dengan melegakan ketegangan mengangkut barangan yang besar dan berat. Projek-projek ini menggabungkan penderia berat dengan beban maksimum 5KG, membolehkan pengguna menentukan dengan mudah berapa banyak beban berat yang dibawa dengan memaparkan jumlah berat pada robot dalam apl BLYNK pada telefon mereka. Tambahan pula, jika beban berat maksimum melebihi 5KG, buzzer akan berbunyi untuk memaklumkan pengguna bahawa item tersebut telah melebihi tahap maksimum. Pengguna kemudiannya mesti menyambung ke telefon wifi untuk mengaktifkan robot ini, dan robot akan secara automatik mengikut telefon pengguna tanpa memerlukan kawalan manusia dengan menggunakan aplikasi BYLNK.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Autonomous Things (AuT) or the Internet of Autonomous Things (IoAT) are devices that employ AI algorithms to do certain tasks autonomously and without human involvement. These technologies include robotics, automobiles, and drones, self-driving smart home devices, and self-driving software. An autonomous robot is one that is built and engineered to interact with its surroundings on its own and function for lengthy periods of time without human involvement. Autonomous robots frequently include advanced characteristics that allow them to understand their physical surroundings and automate elements of their maintenance and guidance that were previously done by human hands. Autonomous cleaning robots such as Roomba, medical delivery robots, and other robots that move freely throughout a physical place without being physically led by humans are examples of autonomous robots. Many people associate robots with manufacturing robots or others at a fixed workstation, or those controlled by a human user. Unless human involvement is necessary as part of the activity, autonomous robots normally go about their work without any human engagement.

Many of these robots feature sensors and other functional gear that allow them to notice impediments in their path or navigate rooms, hallways, or other types of environments. Complex delivery robots may be designed to operate elevators and navigate a multi-story building autonomously. However, autonomous robots require physical maintenance. The goal of this project was to create a carrying robot with autonomous locomotion that conveys objects for users linked to it via a smartphone. This Robot can avoid colliding with obstacles while following along with the user while carrying heavy items, and it can also monitor the weight capacity things and it's easy connect with smartphone because it uses the NODEMCU ESP32 Microcontroller, which includes a WIFI and by the time multiple users can connect with this Robot. This helps to reduce the use of plastic bags in supermarkets. As well as reducing plastic pollution in our nature, we may be able to save more flora and wildlife that are on the edge of extinction which causes global warming. The Internet of Things (IoT) is used by many smarter cities to improve people's lives. Likewise, robots were used. These robots reduce the number of smart bins needed and can clean the bins on time, minimizing stench. This approach can improve people's quality of life and allow them to live cheerfully and free of illness.

1.2 Background Research

According to what has been studied based on this project, most autonomous machine robots are widely applied in industry for heavy carrying goods or delivering to another department in the same warehouse, and this robot does not yet exist in the market for home usage, which is for housewives and the elderly. Involving this robot in the home has many advantages and will change the way plastic bags and supermarket trolleys are used when consumers buy food and necessities at the supermarket. The goal of this idea focuses on carrying items with autonomous movement and measuring the weight carried, making it practical and feasible for usage at home and at the supermarket. This project was created using a Wi-Fi microcontroller and two sensors, an ultrasonic sensor and a load cell weight sensor, which will allow the robot to move automatically by following the user and measuring the weight accurately. This will save and make it easier for supermarkets when their customers bring their own trolleys, and the use of plastic bags will be reduced efficiently, because of this, plastic pollution on the surface of the earth may be prevented, and the problem of global warming can be solved rapidly.

1.3 Problem Statement

Climate change has recently been increasingly serious if we look at our neighbor's nation, where Jakarta City is sinking owing to rising global warming, which is exacerbated by a thin ozone layer caused by smoke created by automobiles and factories. Plastic pollution affects aquatic life as well as flora and fauna as a result of irresponsible consumers' wasteful use of plastic. Due to the mass production of plastic bags, most consumers who buy goods are more inclined to use plastic bags because they are cheap and easily available in any store and supermarket.

As a result, the effect on sea water and aquatic life in the sea and river is also polluted from small particles that have been dissolved from plastic bags, according to a study conducted at the Plymouth Marine Laboratory in the United Kingdom, which discovered Microplastics in the organs of aquatic life, primarily fish and sea turtles. Lindeque's team employed mesh sizes of 100 microns (0.1mm), 333 microns, and 500 microns in their study, which was published in the journal Environmental Pollution. They discovered 2.5 times more particles in the smallest mesh than in the 333-micron mesh, which is commonly used to filter microplastics, and 10 times more particles in the 500-micron mesh.

1.4 Research Objectives

The major objective of this project is to implement one robot that can be used at home and for housewives who don't have to buy or bring plastic bags while going to the supermarket, as well as to develop a user-friendly robot for consumers that can move heavy items and measure weight products. Not to mention that this robot can avoid slide disc damage to the spine, and that this autonomous machine can assist patients with spinal discomfort and the elderly in carrying heavy goods without danger of serious injury.

1.5 Scope of the Project

This electronic mechanism concentrating on hardware and software has been used to this robot because of its ability to function autonomously by following the user while carrying things and measuring the weight of goods. Because NODEMCU has designed integrated Wi-Fi network support, a smaller board footprint, and reduced energy consumption, this ESP32 38pin offers more GPIO and supports Bluetooth 4.2 and Bluetooth Low Energy. Furthermore, the ESP32 includes touch-sensing pins that may be used to rouse the ESP32 from deep sleep.

One of the difficult things to apply to this robot is an autonomous system. As a result, an ultrasonic sensor must be included in this project to detect the user body to keep this robot follow the user, which must be calibrated during the development programmed. Load Cell Weight Sensor was added to this project to gather readings and monitor the weight of the objects carried by this robot in order to inform the user that this robot has a maximum load capacity. Because this robot must carry a huge burden, motor selection was critical in this project. The DC Geared Motor was ideal for this project because it allows the robot to move smoothly and without difficulty, and it has a high torque and additional gear mechanism. Moto driver L298N is the ideal combination for this DC Geared motor to move back and forth. This moto driver can also adjust the speed of the DC motor by using the ENA and ENB pins, which must be declared in programming. This robot's power consumption is quite high, especially to the 18650 3.7V Rechargeable battery that has been employed for supplying all of its electronic components and this battery has appropriate current to deliver enough energy to the DC Geared motor. The weight of this robot was below 1.3KG due to the usage of light material for this robot, but it was tough to manage the heavy stuff.

1.6 Contribution of Project

Since considering the existence of the internet on the face of the planet, this project must be aligned with the criteria of the Industrial Revolution 4.0 and have a system that is simple for users to adapt to human everyday usage. Due to the importance of the internet in human everyday life, this project is a robot model that can monitor the weight carried by connecting the WIFI signal through the robot and is also one of the alternatives for people to limit the usage of plastic bags while purchasing groceries.

In short, this robot can carry heavy goods by moving autonomously. Because there is no existing robot model that moves autonomously that can be used at home and in supermarkets, this project model is one of the starting points to a model with a greater variety of facilities and abilities that gives reference in the future when the era of AI systems that are being developed by every major a software developer.

1.7 Summary

This chapter is the most significant element of the report because it introduces the project, the problem background, the problem statement, and by declaring that the research study has helped to develop this project as stated that it can overcome the common challenges experienced by individuals and the report organization. Although the major purpose of this effort is to meet the objectives, the project has also included the relevance of technology in production. The introductory section provides a general overview of the overall project's concept. This is because technological innovation allows to produce more and better assets in a more efficient manner.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter intends to employ Internet results and study to focus on how correctly designed a weighing scale and autonomous robot movement should be function. A review of the literature supports the conclusion on how the Load Cell weigh sensor was developed to assess the weight of objects to avoid the robot from becoming overweight. According to study, preparation before beginning to pick the appropriate component and tool to use with this robot will be right and each part will be more secure. The review also seeks to investigate the current Autonomous robot by improving its qualities to make it fit and useful for human everyday life.

Then, explore how to make this project fully functional with an IOT system by connecting it to the BLYNK application, which must have a strong reference to make this robot perform without issue, as well as gain and learn how to troubleshoot errors when designing the programmed and testing its operation.

2.2 History

Autonomous robots can learn about their surroundings and work for extended periods of timewithout the need for human interaction. These robots include everything from autonomous helicopters to robot vacuum cleaners. These self-sufficient robots can navigate the operation without human aid and avoid circumstances that are hazardous to themselves, other people, orproperty. Autonomous robots may also adapt to changing environments. Better and easier autonomous robots perceive obstacles using infrared or ultrasound sensors, allowing them to maneuver past them without human intervention. More advanced robots see their environs through stereo vision; cameras provide depth perception, and software allows them to locate and classify items in real time. Autonomous robots are advantageous in busy environments such as hospitals.

Instead of employees leaving their positions, an autonomous robot can quickly deliver lab results and patient samples. These robots can navigate hospital corridors without traditional guidance and can even locate alternate paths when one is blocked. They willmake stops at pick-up points to collect samples for the lab. Another application for autonomousrobots is in our natural environment. Virginia Tech researchers created an autonomous roboticjellyfish in 2013 with the goal of one day conducting undersea military surveillance or environmental monitoring. The 5-foot 7-inch jellyfish has a lengthy lifespan and operating range. The interaction between humans and robots is changing as developing technologies gainprominence. Autonomous robots, such as a cognitive virtual assistant serving as an automated customer agent, can replace people. Autonomous robots can even understand the emotion in ahuman's speech. These trends toward robotic engagement in industry operations will enable businesses to increase efficiency and customer satisfaction while gaining a competitive advantage.

Simpler autonomous robots recognize obstacles with infrared or ultra-sound sen-sors, allowing them to navigate around them without human con-trol. To view their surroundings, more advanced robots employ stereo vision; cameras provide depth per-cep-tion, and software allows them to find and classify items in real time. Autonomous robots are useful in congested areas such as hospitals. An autonomous robot can deliver lab findings and patient samples more quickly than employees. These robots can navigate hospital halls without traditional guid-ance and can even locate alternate paths when one is blocked. They will make pick-up stops and collect samples to bring to the lab.

2.3 Previous Research on WIRELESS AUTONOMOUS CARYYING ROBOT

- **Robot with Sonar Obstacle Detection and Follow-Me**

Figure 2.3.1: Robot with Sonar Obstacle Detection and Follow-Me

In summary, this robot will follow any thing that comes within 20-50 cm of it, and if none is discovered, it will use the ultrasonic module to try to find missing objects on the right and left sides. If it doesn't work, turn right and try to latch onto an object nearby. I'd like to do more with it, such as allowing the car work out how to drive around the barrier, but for now I'm content with the fact that the car can find an item under certain conditions.

Using this knowledge, we can programme our robot to turn in the appropriate direction to avoid losing the target item. I didn't know whether someone has done something similar before. I was simply attempting to modify the example codes given by the SmartCar maker with the package. The method I was using the sonar sensor produced jamming (I was very sure it was a timing problem), which I was able to overcome.

- **Autonomous "Follow Me" Cooler**

Figure 2.3.2 : Autonomous "Follow Me" Cooler

In this project, we utilise an Arduino Uno to create a self-contained "follow me" cooler. The robot cooler communicates with a smartphone through Bluetooth and navigates via GPS. All of the electronics will be contained in the base, allowing other things to be transported as well. The sensors, Bluetooth, and control logic were powered by an Arduino Uno and a 5v battery. To power the motors, a 3s LiPo battery was utilised.To improve range, an HC-05 Bluetooth module was installed in front of the platform. The remaining components, which included an L298N motor driver, PAM-7Q GPS, and HMC6883L compass, were put inside and linked to the Arduino through the breadboard. Because the compass uses I2C, we wired the SLC and SDA pins to A5 and A4, respectively. The remaining pins were linked through digital I/O. More details on how we connected the cables may be found here.

- **ESP8266 NodeMCU with Load Cell and HX711 Amplifier (Digital Scale)**

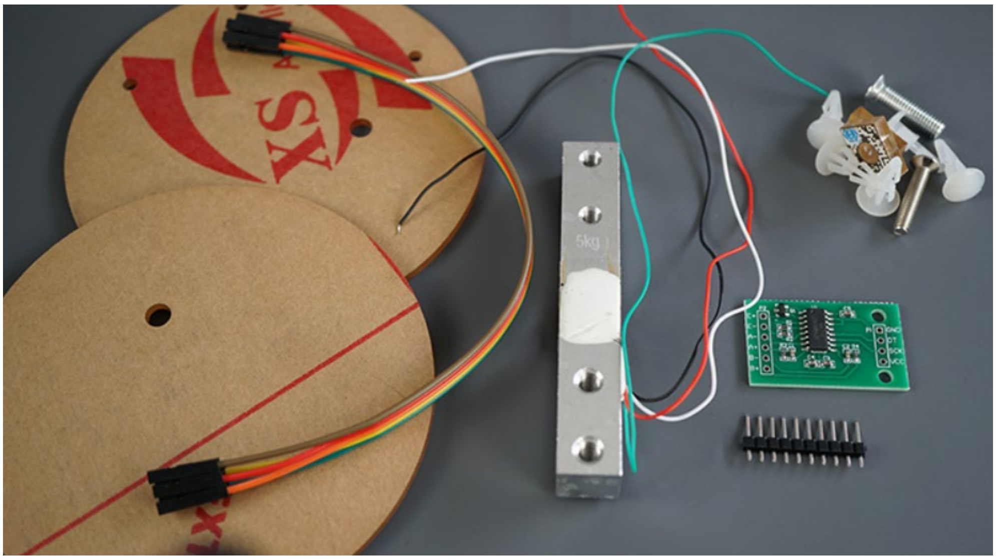


Figure 2.3.3: ESP8266 NodeMCU with Load Cell and HX711 Amplifier (Digital Scale)

In this article, students learned how to use the HX711 amplifier to connect a strain gauge load cell to the ESP8266. The load cell's output is proportional to the force exerted. As a result, you may calibrate it to be used in g, kg, ib, or any other unit that makes sense for your project.A load cell turns a force into an electrical signal that can be measured. The electrical signal varies proportionately to the applied force. Load cells are classified into three types: strain gauges, pneumatic, and hydraulic. This tutorial will go over strain gauge load cells. Strain gauge load cells are made out of a metal bar with strain gauges connected (behind the white glue in the photo above). A strain gauge is an electrical sensor that detects the force or strain on an item.

In summary, you learnt how to calibrate the scale and calculate the weight of things. You also learnt how to make a basic digital scale with the ESP8266 by utilising an OLED display to show the measurements and a pushbutton to tare the scale. Aside from measuring the weight of items, it may also be used to identify the presence of an object, estimate the amount of liquid in a tank, calculate the evaporation rate of water, check if food is in your pet's bowl and so on. Because of the ESP8266's wi-fi capabilities, you can create an IoT scale that uses a web server to display the results on your browser's smartphone, save the readings on the Firebase database and access them from anywhere, send a notification when the weight falls below a certain value (via email or Telegram, for example), and so on.

- **Microcontrollers and Multiplexing Weight Sensors**

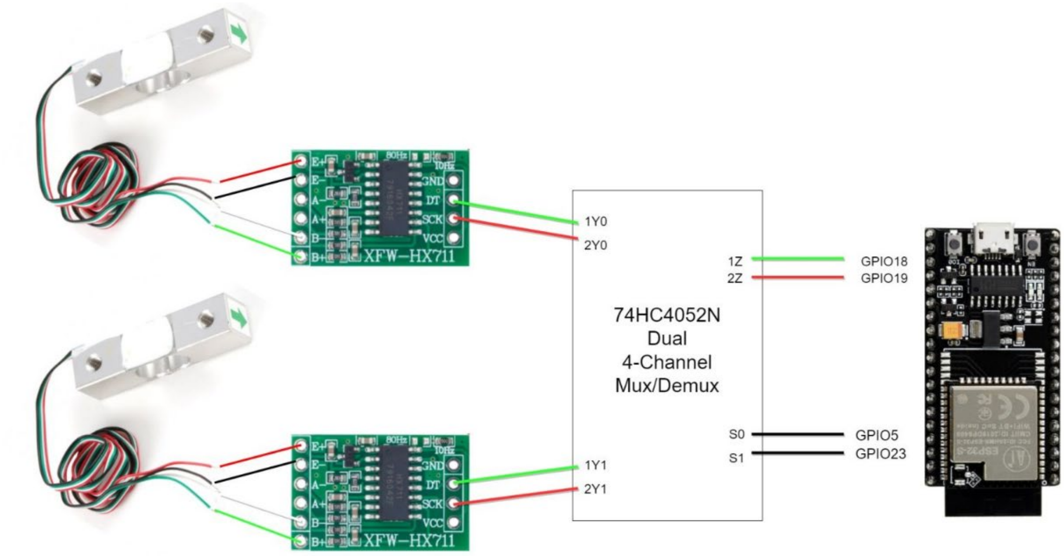


FIGURE 2.3.4: Microcontrollers and Multiplexing Weight Sensors

In my quest for an automated garden, I decided to try weighing plants to determine when they required watering. The notion is that when the plant transpires, it becomes lighter. Some water, coupled with minerals, is needed to develop the plant, while the remainder evaporates. When the water supply is depleted, the plant will lose weight, and the gardener should be notified so that the plant may be watered. The HX711 employs a Wheatstone Bridge with a 24-bit ADC to correctly detect the resistance of the load cell and provide it to our microcontroller. The MC reads the ADC value using the HX711's Clock and Data pins. All of this is buried under an abstraction layer of function (or method) calls.

The integrated circuit has two electrically separate four-way switches. Each switch has a "common" pin that is attached to one of four different pins. Switch one has the common pin 1Z marked on it and may be linked to one of the pins 1Y0, 1Y1, 1Y2, or 1Y3. Switch two has a common pin of 2Z that may be linked to one of 2Y0, 2Y1, 2Y2, or 2Y3. These chips are bidirectional, which means they can both send and receive data. Furthermore, they may be "switched" on the fly by setting pins S0 and S1 according to the table.Both switches are controlled by the same set of S0 and S1 address pins. The S0 and S1 pins are linked to our microprocessor's GPIO pins, allowing us to control the switch's routing. An HX711 is a two-pin IC designed to communicate with microcontrollers. Furthermore, the HX711 may be multiplexed using a 74HC4052N dual-4-way mux/demux, potentially freeing up GPIO pins.A microcontroller-driven weigh-scale application may be easily built for minimal money. We may retain historical data and operate a web server for setup or reporting by using a Wifi enabled microcontroller such as the ESP32.Whatever your weight requirements are, a load cell equipped with a HX711 is a good choice. And now that you understand how to utilise one with a multiplexer, you can easily link many HX711s with the potential to scale up if necessary.

- **ESP32 with DC Motor and L298N Motor Driver – Control Speed and Direction**

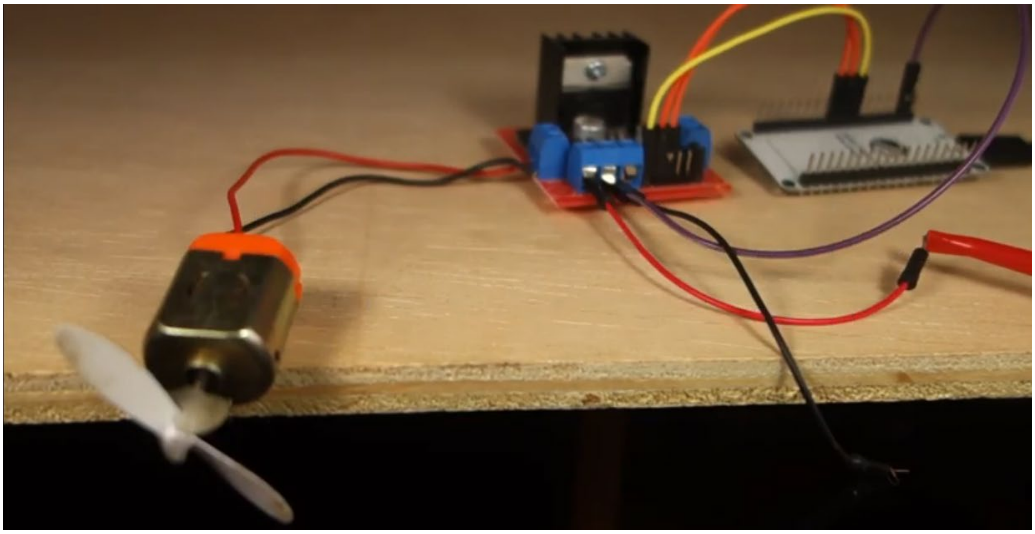


Figure 2.3.5: ESP32 with DC Motor and L298N Motor Driver – Control Speed and Direction

The content of this piece demonstrates how to control the direction and speed of a DC motor with an ESP32 and the L298N Motor Driver. First, we'll take a short look at how the L298N motor driver works. Then, we'll show you how to control the speed and direction of a DC motor using the ESP32 with Arduino IDE and the L298N motor driver.The input 1 and input 2 pins are used to regulate the direction of the DC motor. To regulate the speed of the DC motor, a PWM signal on the enable pin is used. The duty cycle determines the speed of the direct current motor.

If you wish to create a robot vehicle using two DC motors, they should rotate in specified orientations to make the robot travel left, right, forward, or backward. To turn the robot in one direction, spin the opposite motor quicker. To have the robot turn right, for example, enable the left motor and inhibit the right motor. The state combinations of the input pins for the robot directions are shown in the table below. The input pins govern the way the motors spin. Inputs 1 and 2 control motor A, whereas inputs 3 and 4 control motor B. It's crucial to note that, despite the +12V terminal name, you may supply any voltage between 6V and 12V with the arrangement we'll use here (with the jumper in place). In this lesson, four AA 1.5V batteries with a total output of around 6V will be used, but any other acceptable power supply can be used. To test, for example, you can utilise a bench power supply.

- **DIY Arduino Human Following Robot**

Figure 2.3.6: DIY Arduino Human Following Robot

This time, let me introduce you to the Arduino Robot, which tracks an item using a mix of ultrasonic and infrared sensors. Because the gadget is both simple to create and effective, it has been featured on the Internet multiple times. In most of these presentations, a servo motor is employed to move the ultrasonic sensor. This servo motor has no part in the operation of the Robot, save for the aesthetic one at the start, and complicates things needlessly. To simplify my project, I eliminated this servo. To create it, we just need one rectangular plate, on which the engines should be fastened on the lower side and other parts installed on the upper surface. You may use the discontinued L293D motor driver shield, as I did, or the Adafruit motor shield as shown on the schematic picture.

The object detection and monitoring principle is based on data accepted by both sensors. Within specified boundaries, such as 10 to 30 centimetres, the ultrasonic sensor recognises the existence of an item in front of it. If there is no item in this space (for example, our hand), all four engines are idle. When an item arrives in this region, the data from the infrared sensors is read, and orders are issued to the motors, causing the robot to move in the desired direction. A tiny trimming potentiometer controls the distance to which the infrared sensors respond. This distance should be changed such that it is slightly greater than the minimum distance at which the ultrasonic sensor is configured to respond, which in our instance is more than 10 centimetres.

2.4 Summary

In simple terms, the Wireless Autonomous Carrying Robot has been developed to be useful in daily life while also being inexpensive to acquire. To make it easier for consumers to use and without having a common problem to this robot while using it, we focused on frequent challenges encountered by consumers and improved several aspects in this project by creating a survey form for consumers. To begin, there is an issue with excessive consumption of plastic bags, which causes pollution in the sea, and mass manufacture of plastic bags, which causes environmental devastation of aquatic life due to the buildup of plastic trash. Even with containment, micro plastic in the water is rising, resulting in the demise of numerous aquatic creatures. Furthermore, health concerns caused by lifting up objects that are too heavy and not using the proper technique result in spine damage, which leads to paralysis in the patient and the possibility of slip disc in the long term. Next, to demonstrate that this project is up to date in terms of the Internet of Things (IoT) aspect, a Wireless Autonomous Carrying robot has been designed that consists of a microcontroller and two sensors, is compact, and is very practical when carrying goods constantly, and can monitor the weight using a smartphone application that is user friendly.

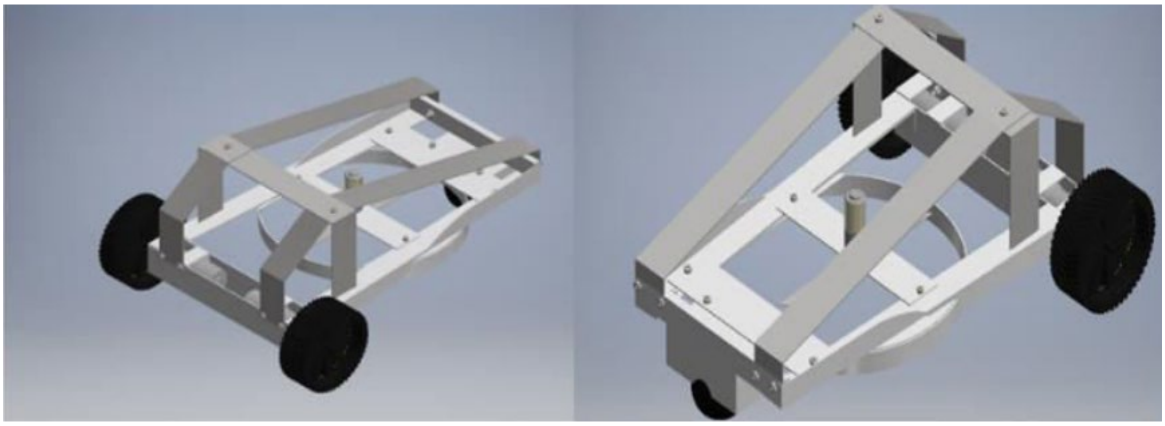
CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter goes over the tools necessary for completing this project as well as the functions of each component put in this project. A very complete procedure is being undertaken to realize this Project as a ready-to-use product with safety characteristics. A step-by-step approach is followed so that the project may be completed on time, and every error in this project is explained as to how to handle it. This includes the project's cutting, sanding, and painting processes, as well as verifying the function of each component. This chapter will also include the budget for this project, as well as the creation of programming for this project.

3.2 Project Design and Sketch



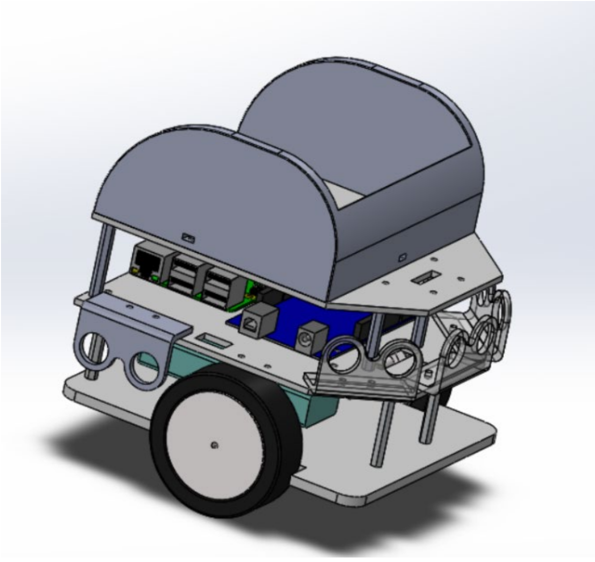


Figure 3.2.1: Design And Sketch

This project design was created in AUTOCAD software using a 2D drawing to serve as a reference for developing the robot's framework and deciding where to place the electronic components. This robot just has two wheels that will be powered by a Geared DC Motor, and it will be balanced using a bearing roller.

3.3 Block Diagram of the Project

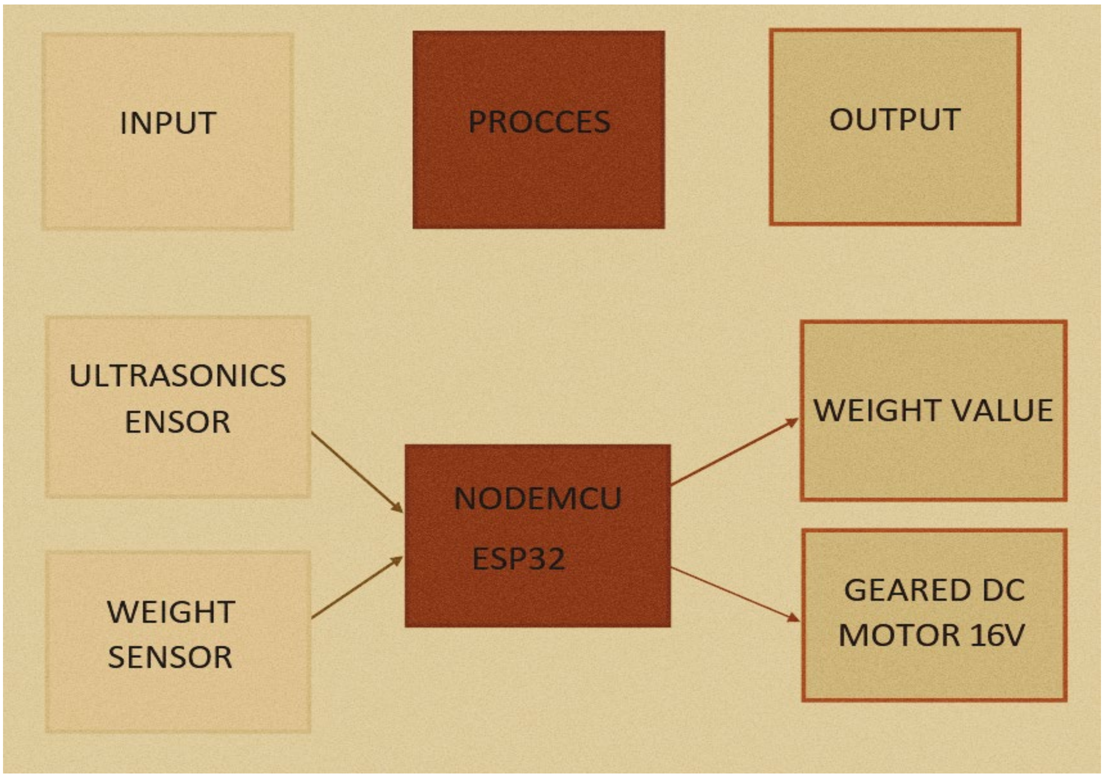


Figure 3.3.1: Block Diagram

3.4 FLOWCHART

The flow chart below supports students in completing the development of the programmed Autonomous Wireless Carrying Robot by having two sensors, Ultrasonic and Load Cell Weight sensor, which define as input to this project.

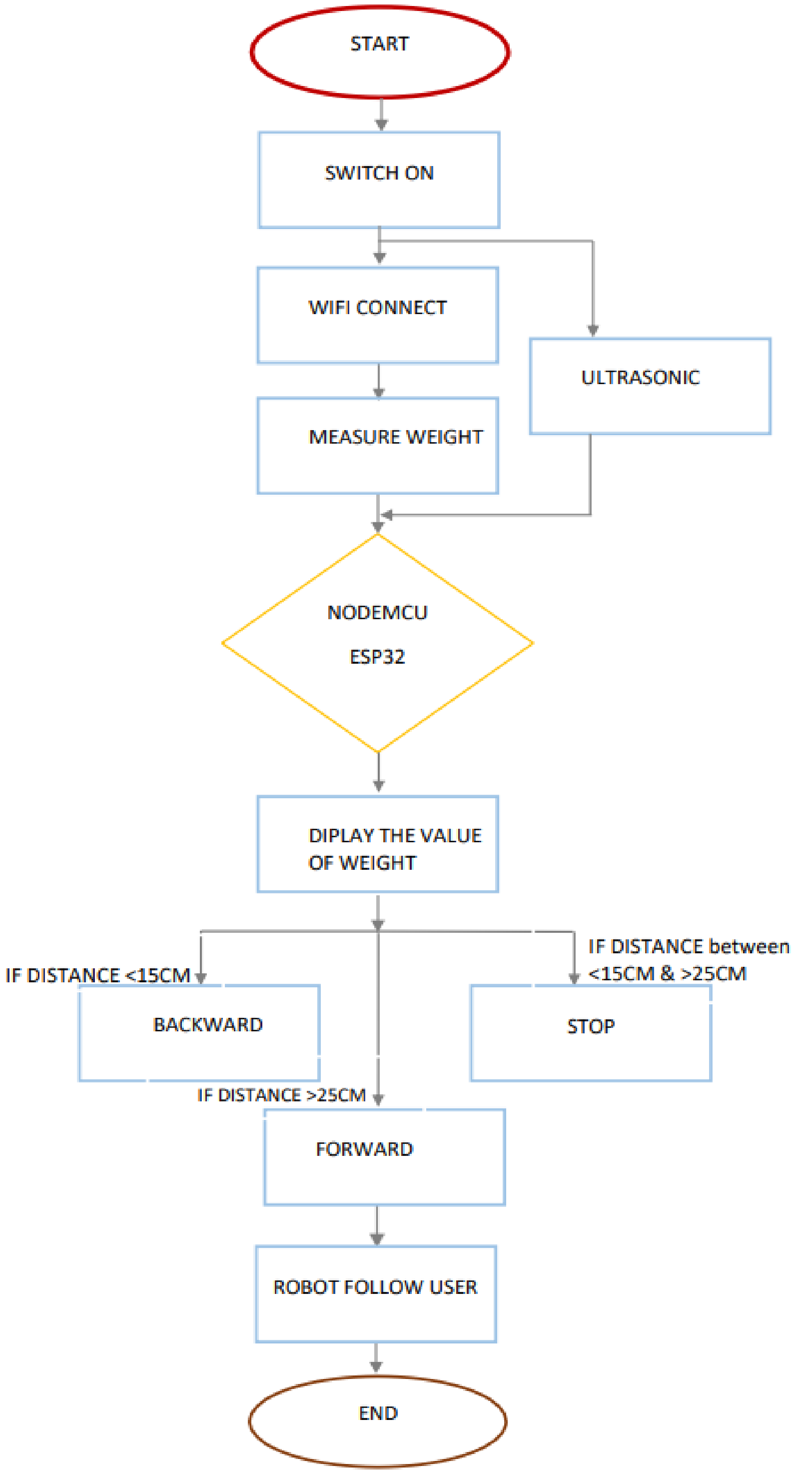


Figure 3.4.1: Flowchart

3.5 Project Description

The Autonomous Wireless Carrying Robot Using IoT is a project that aims to keep follow the user if the user always near with Ultrasonic sensor and measure the weight of goods carried by the robot in real-time, particularly for home usage or at the supermarket. The system consists of two sensors, an ultrasonic sensor, and a load cell weight sensor, which are linked to an IoT device, such as a NODEMCU ESP32 with a WIFI module attached. The IoT device displays the weight value on the robot, where the customer put the products inside the basket has been attached with the Load Cell Weight sensor, whereby that basket had good enough storage to carry kitchen items or tools. The Ultrasonic Sensor detects the obstacle which human body to keep following the consumer when walking by having a certain distance which if the consumer was more than 25cm the robot will move forward and when Ultrasonic Sensor detect the distance human body below then 15cm the robot will move backward this is because on this distance sometime user will turn over and if the user on distance between 15 cm and 25cm the robot will stop from moving. This sensor is a one of major components for the robot's autonomous mobility to function properly.

The Load Cell Weight Sensor functions to measure the weight of goods when the user places the items inside the basket that has been attached to this sensor, and this sensor must be calibrated first when developing the coding programmed to get the accurate value for the maximum load at this sensor, because the basket has weight, which can cause the value of weight to be inaccurate. This sensor will assist the user in avoiding putting items in excess of the maximum, which may cause the robot not working properly, and will monitor the weight of the goods by displaying it on the phone via the BLYNK application. This sensor is linked to the BLYNK app so that the user can readily monitor their weight and prevent the robot from serious damage on certain part. Because this robot is carrying a few heavy load products, a high torque Geared DC motor must be used to maintain the robot going smoothly without any problems, which causes one of the two DC motors to burn because the motor has been run at full force to keep the robot moving. This Geared DC motor has an extended gear to increase torque and adapt to heavy loads; it has a maximum torque of 9KG and an appropriate speed of 1300RPM, so the motor is not too slow.

3.6 Project Hardware

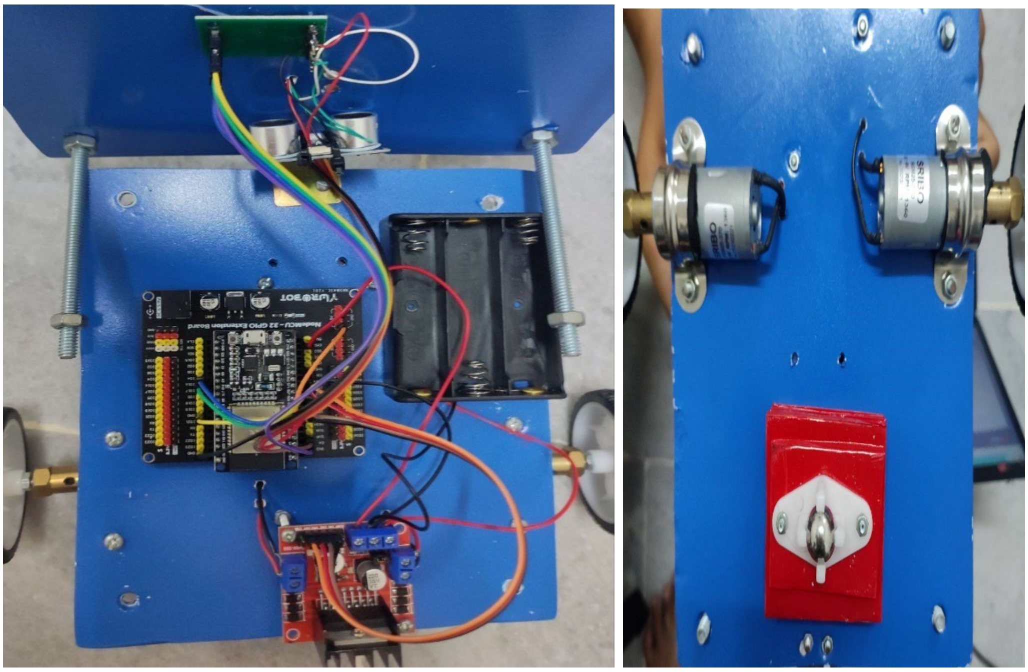


Figure 3.6.1: Connection Wireless Autonomous Carrying Robot

According to figure 3.5.1, the Wireless Autonomous Carrying Robot is attached to the base robot and includes a DC Geared Motor at the bottom base that has been tied with a bracket. From that figure, we can see the connection of the DC Motor with moto driver L298N, Ultrasonic Sensor, and Load Cell Weight Sensor that has HX711 amplifier and a breakout board that is connected into NODEMCU ESP 32 38PIN.NODEMCU ESP-32S 38PIN is attached with Base Board NodeMCU-ESP32S 38PIN, this hardware is one of the new components on the market, and this baseboard is meant to make prototyping with the NodeMCU-32S board easier. It expands the NODEMCU's GPIO to header pins which additionally contain the Vin, VUSB, 5V, 3.3V, and GND. You may also utilize these pins for prototyping by connecting them using male-to-female jumper wires. With the inbuilt voltage regulator, you can now power the NODEMCU and the entire system through a DC connection, with a voltage range of 6V to 9VDC. The board also has a power supply. The hardware power supply for this robot used three 18560 3.7V batteries, totaling 11.1V for this connection. The power output 5V from the moto driver was then connected to VIN ESP 32S, because the ESP32's limit voltage input was 5V and the ESP32S is more secure from overvoltage.

3.7 Schematic Diagram and Circuit Diagram

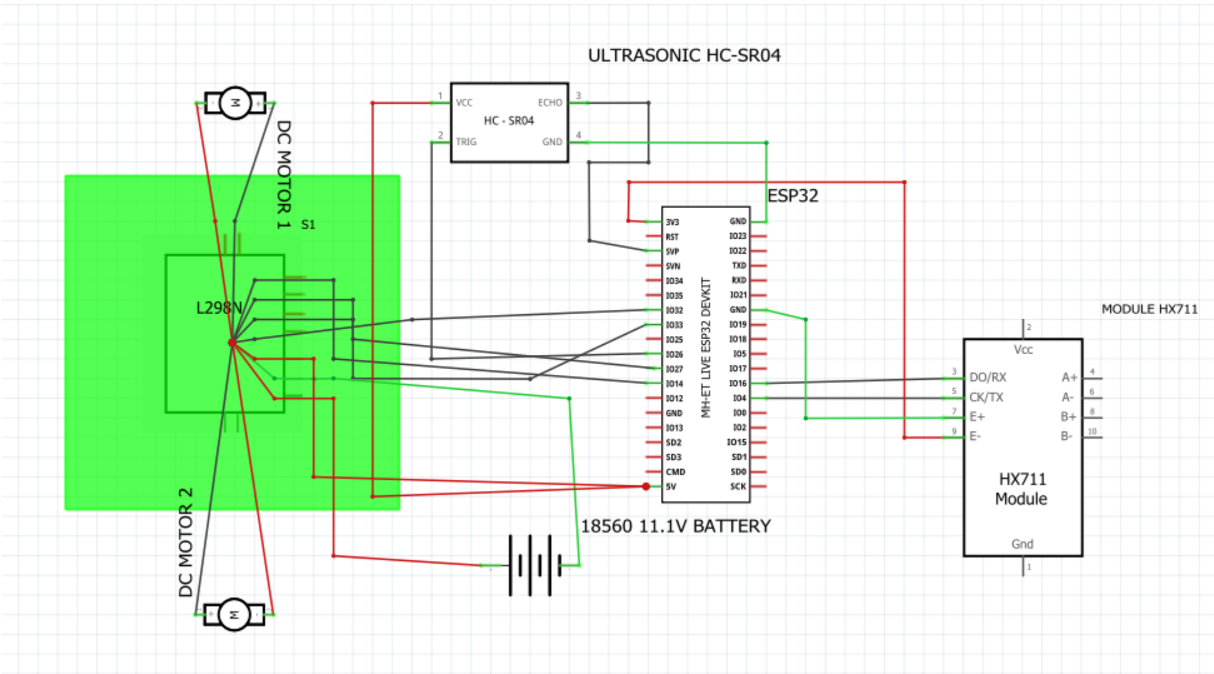


Figure 7.1: Schematic Diagram

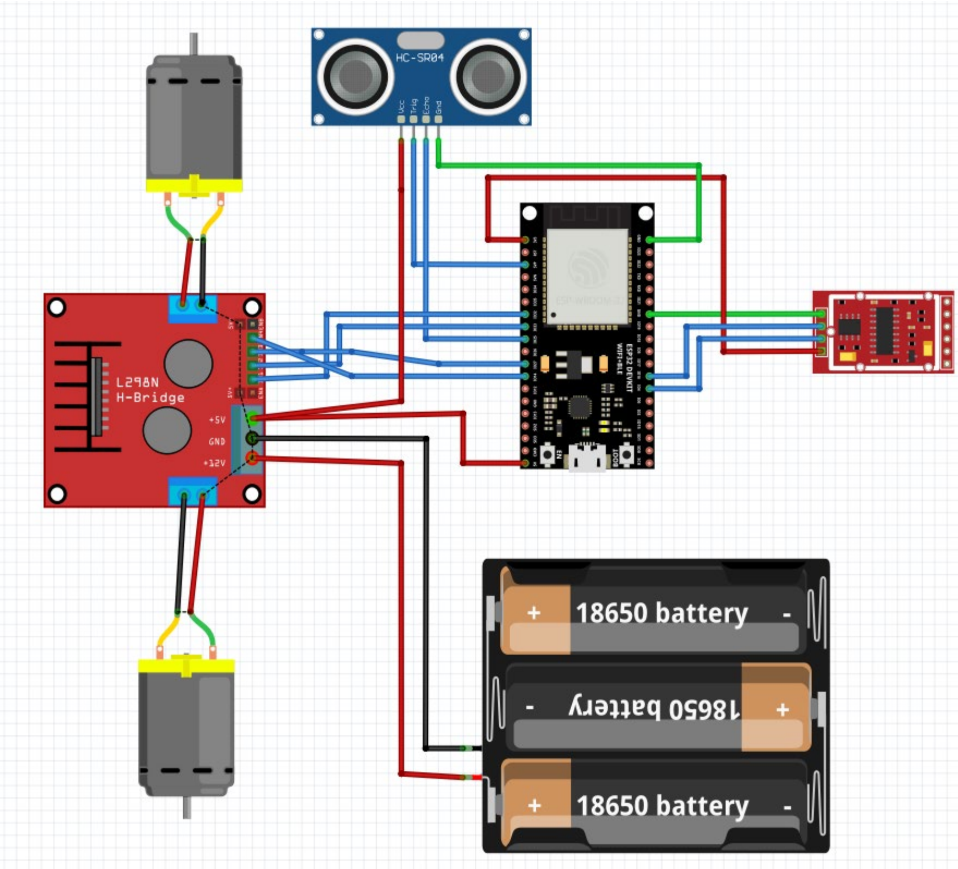


Figure 3.7.2: Circuit Diagram

3.8 Description of Main Component

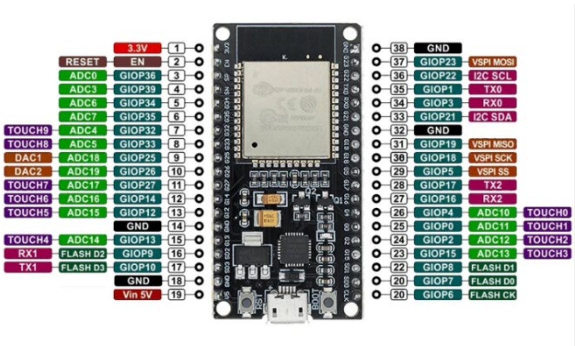


Figure 3.8.1: Nodemcu 32s 38pin

The Espressif SMD ESP32-WROOM-32 microcontroller is included on the 38-pin ESP32 development board. This board enables the efficient and cost-effective control of various types of sensors, modules, and actuators through WIFI and BLUETOOTH for Internet of Things ("IoT") projects. It contains a micro USB Type B port for charging and programming the ESP32, and it also has a USB controller integrated inside the UART CP2102. The module features a voltage regulator that allows you to input 5V through the USB port, as well as power it with 3.3V in the 3.3V and gnd pins; nevertheless, this board must be used with caution because entering 5V into the ESP32's 3.3V pin will destroy it." Similarly, it has the CP2102 chip, which is in charge of USB-serial communication.It may be written using a wide range of applications, programming languages, frameworks, libraries, code/examples, and other resources.

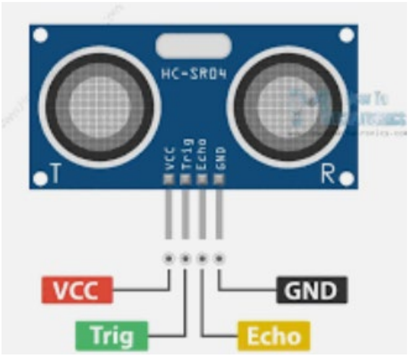


Figure 3.8.2: Ultrasonic Hr-Sc04

The HC-SR04 ultrasonic distance sensor is made up of two ultrasonic transducers. One operates as a transmitter, converting the electrical signal into ultrasonic sound pulses at 40 KHz. The other serves as a receiver, listening for sent pulses. When the receiver receives these pulses, it generates an output pulse whose width is proportionate to the distance between the receiver and the item in front of it. With an accuracy of 3 mm, this sensor delivers excellent non-contact range detection between 2 cm and 400 cm (13 feet). Because it runs on 5 volts, it may be immediately linked to an Arduino or any other 5V logic microcontroller.

Figure 3.8.3: Load Cell Weight Sensor

A load cell is an electro-mechanical sensor that measures force or weight. It features a basic yet effective design that is based on the well-known transmission between an applied force, material deformation, and the flow of electricity. They are extremely adaptable devices that provide precise and strong performance across a wide variety of applications. It's no wonder that they've become vital to numerous industrial and commercial activities, from automating automobile manufacture to weighing your groceries at the checkout.

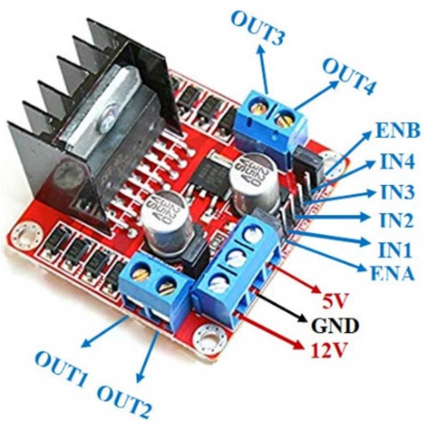


Figure 3.8.4: Moto Driver L298n

This L298N Motor Driver Module is a high power motor driver module for driving DC and Stepper Motors. This module is made up of an L298 motor driver IC and a 78M05 5V regulator. The L298N Module can control up to four DC motors or two DC motors with directional and speed control. The L298N Motor Driver module is made up of an integrated circuit that includes an L298 Motor Driver IC, 78M05 Voltage

Regulator, resistors, capacitor, Power LED, and a 5V jumper. ENA and ENB pins regulate the speed of Motor A and Motor B, respectively, whereas IN1& IN2 and IN3& IN4 control the direction of Motor A and Motor B.

Figure 3.8.5: Geared Dc Motor 6v

A gear motor is an all-in-one combination of a motor and gearbox. The addition of a gearbox to a motor reduces the speed while increasing the torque output. The most important parameters in regard to gear motors are speed (rpm), torque (lb-in) and efficiency (%). In order to select the most suitable gear motor for your application, you must first compute the load, speed and torque requirements for your application. Such gears for electric motors are often used in modern machines and mechanisms, it is universal for many types of equipment. Some hybrid models combine practicality and durability.

Figure 3.8.6: 18650 3.7v Battery

An 18650 battery is a type of rechargeable lithium-ion battery. The digits "18650" correspond to the measurements of the battery, which is 18mm in diameter and 65mm in length. 18650 batteries are widely used in electronic equipment such as laptop computers and flashlights, as well as electric cars and other high-power applications. They are distinguished by their high energy density, extended lifespan, and low self-discharge rate. Some 18650s have been modified to have a button top and/or an inbuilt protective circuit. This can expand the physical length of a "18650" battery from 65mm to 70mm, or even longer in some situations.

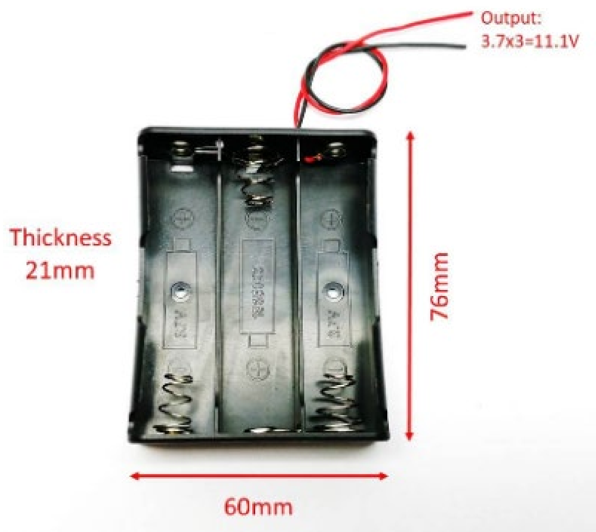


Figure 3.8.7: Battery Holder 18650 3.7v

A battery holder's principal role is to retain cells safely and securely in place while transmitting power from the batteries to the device in question. Contacts with pins, surface mount feet, soldered lugs, or a set of wire leads are commonly used to make external connections on battery holders.Battery holders are commonly offered as external compartments or attachments, although they are often designed to be included into the body of an electrical device.

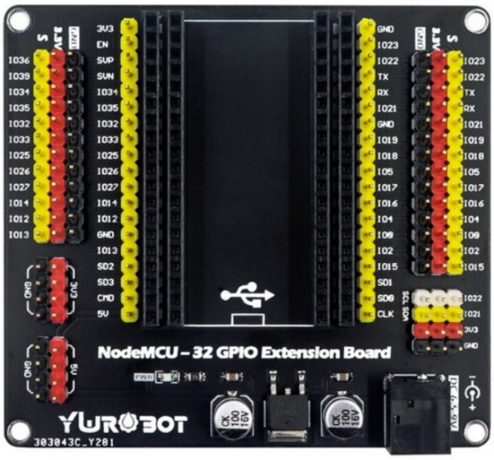


Figure 3.8.8: Base Board NODEMCU-ESP32S 38 PIN

This baseboard was developed for assisting prototyping with the NodeMCU-32S board. It expands NodeMCU's GPIO to header pins, which additionally include Vin, VUSB, 5V, 3.3V, and GND. You may also utilise these pins for prototyping with male-to-female jumper wires. With the inbuilt voltage regulator, you can now power the NodeMCU and the entire system through a DC connection with a voltage range of 6V to 9VDC. The board also has a power indication. The extension headers provide access to all of the I/O pins on the ESP32-S module.

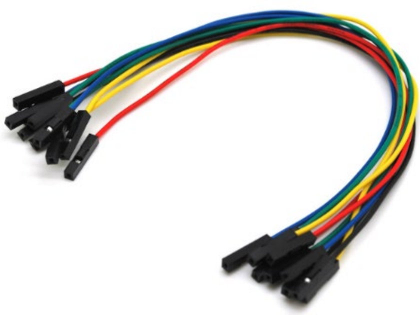


Figure 3.8.9: Female to Female Jumper Wire

Jumper wires are short wire ducts that may be used to connect components on bread boards or elsewhere. This product's female and female heads, which include plastic heads, can enable a simpler connection without the need for soldering.A highly flexible and readily detachable cable to the number of wires you desire. It features a 1Pin female to 1Pin female header on both ends. It is also compatible with 2.54MM spacing pin headers, making it ideal for breadboards, Arduino, and NODEMCU headers.

Figure 3.8.10: Hex Copper Brass DC Motor Wheel Coupling

This is an extremely small and practical rubber wheel coupling. Couple and connect the motor to the rubber wheel. The connection brass has two screws to fasten the wheel and motor. There are several size variations depending on the size of the DC Motor, such as 4mm, 5mm, 6mm, and so on.

3.9 Project Execution

3.9.1 Project Structure Building

i. CUTTING AND DRILLING

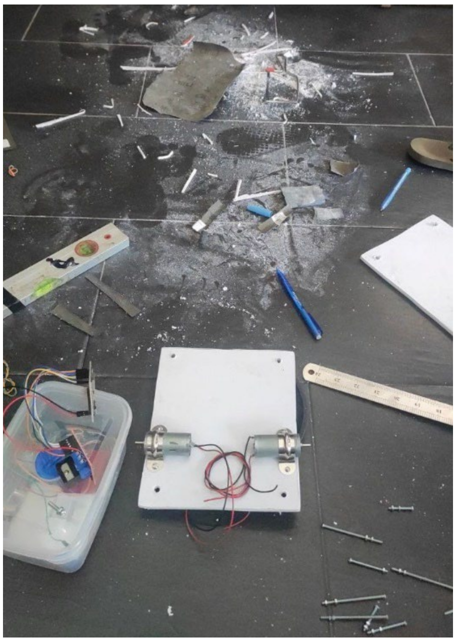


Figure 3.9.1.1: Cutting Process

This process must begin with measuring the length and marking the values that will be used with the cordless drill and Snap-Off knife to cut this Paper Board Foam as the base for this robot. Basically, I received this Paper Foam Board from a buddy, and I just recycled it. It's also a quite durable material to use as a base board.

ii. SANDING

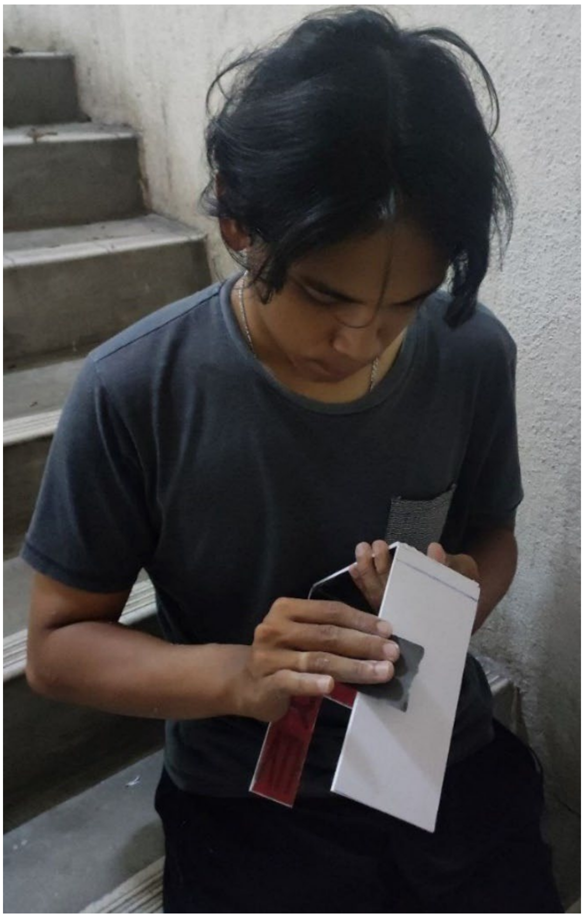


Figure 3.9.1.2: Sanding Process

Before proceeding with the painting process, the part that was cut must be sanded using two types of sandpaper, 180 and 500 grit, to achieve a flat surface and a nice finish after the painting process is completed. This type of material, Paper Foam Board, is the easiest to sand and the surface is not too rough.

iii. PAINTING

Figure 3.9.1.3: Painting Process

Painting is a simple process that uses a coral blue color to make it seem appealing and easy to notice the component parts that do not match in the colors, and the color is not too dark, as this color finishing is only a light smooth hue. This foundation board received a three-layer spray to get a nice finishing color.

iv. SCREW MOUNTING AND INSTALL COMPONENT

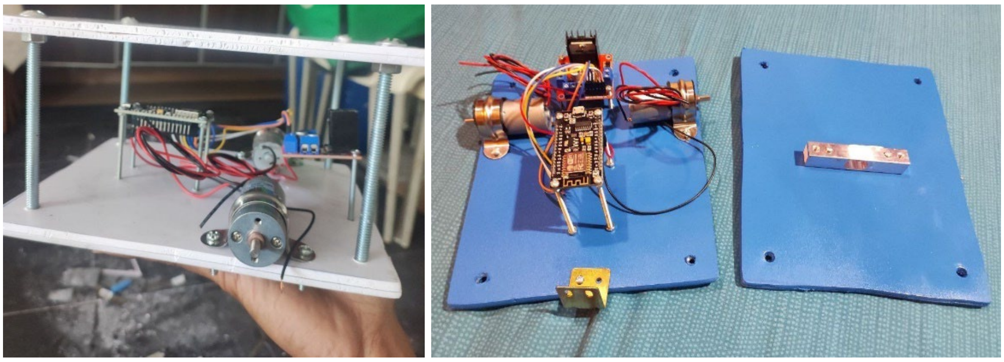


Figure 3.9.1.4:Screw Mounting And Intsall Component

This procedure must be followed both before and after painting to ensure that the screw hole is not too tiny and loose while mounting the screw and electrical component. The figure shows the moto driver hanging with the placed screws to prevent any metallic material that conducts electric current from getting into touch with the moto driver base and causing a short circuit with the moto driver and other components. This is due to the fact that this connection uses a jumper wire as well as a standard wire from the DC motor to the motor driver, which increases the danger and necessitates the use of caution because any fault with this connection will result in total component destruction.

v. FIXING

Figure 3.9.1.5: Fixing

This project has a few issues, one of which is that the ESP32 overvoltage caused the IC in the ESP32 to burn, causing the ESP32 to stop operating properly. The second issue is that the Load Cell Weight Sensor was positioned incorrectly, causing the sensor to not show the output. Due to overvoltage on the ESP32, the connection should be made by using the 5V output pin on the Moto Driver by connecting the wire with the VIN pin 5V. As a result, the

ESP32 should be replaced because it doesn't works anymore. The second issue is a misplaced Load Cell Weight Sensor, which causes the sensor to fail to detect the weight value since it was not put on a level surface. This sensor must apply force to the body of the load cell, which bends somewhat under strain. This is comparable to what occurs to a fishing pole when a fish gets hooked. The sensor will then function properly as a result of this procedure. To fix this problem, just use a tiny screw and secure it with a nut below and above a bracket to keep the basket from falling and the screw from breaking into pieces. Following that, the sensor may be calibrated.

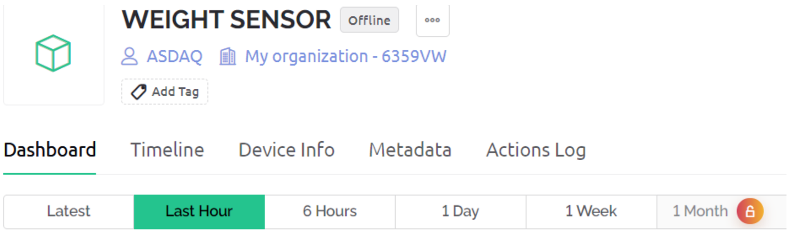
3.10 Project Moving Mechanism

i. AUTONOMOUS MOVEMENT

Figure 3.10.1.**:** Autonomous Movement

According to observations from this robot's operation, the user must remain properly in front of the Ultrasonic sensor to keep this robot following the user because when the robot detects another obstacle, it will automatically detect that obstacle and stop the robot forever, so how to fix it, the user must be close to that obstacle until the robot sees detect the user and that robot will move backwards and the user must move obstacle a little bit until the Ultrasonic does not detect the user. Furthermore, this robot's speed motor needs to be adjusted since it is excessively fast, causing items in the basket to fall out. This problem was easily solved by adding a few programmed commands which mean analogue write and enable the pin ENA and ENB to activate the speed motor control in the moto driver with connect input pin on ESP32.

ii. WEIGHT VALUE IN BLYNK APP



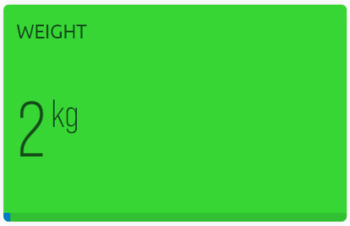


Figure 3.10.2: Weight Value In Blynk App

Given that this sensor will display the output value of items, it has been subjected to several tests, including observations with maximum load and comparisons with real weight value and measured weight value. The sensor was successfully operated when the sensor was bent if anything was placed in the basket and BLYNK displayed it with precise value event though got a bit different value like just mistake 20 grams, this issues just fix with the calibration in coding design which is the basket have more 20 grams then just divide the value of reading when calibrate the sensor with 5025. In addition, the base robot, which is the second base, must be changed to a more durable material, since the Paper Board Foam is not sturdy for two screws, causing the screw to settle and wobble owing to the screw hole being loose; to solve this, just use the play wood as a base robot because lite weight and has a dense and strong mass.

Observation made via BYLNK app, when the weight is increased to maximum load, the color for display will turn on into red and if the good inside the basket is more than 5KG which the maximum sensor can read, the display in BLYNK app will appear 5KG only event though the item was 7 KG as an example, this is because the specification maximum load for this sensor was 5KG and these sensor can be replaced to another higher maximum if the robot still can move smoothly while carrying a some stuff below than 10 KG without damage the base robot .

3.11 Coding and Programming

This project must be developed by referring to the flowchart, which is the necessity to utilize a few instructions in this programming to make the component move properly and without errors. Because of this project, WIFI was connected to meet the needs of IOT in this project, which connects the smartphone's WIFI hotspot to the ESP32, which has a WIFI module, and the function of this connection is to display the production weight value of the Load Cell Weight Sensor, which weighs the goods carried by this robot. This robot has two inputs and two outputs, which are the Ultrasonic and Load Cell Weight Sensor. Each component has a distinct function and declaration to calibrate the component prior to testing. To implement the function, I have to choose the input and output pin signal from the ESP32 board, which has 38 pin out including input pin, for the Load Cell Weight Sensor HX711 module, which breakout board that allows you to easily read load cells to measure weight by having two pin out which are DOUT with pins 16 and SCK with pin 4 to receive input signal from Load Weight Cell sensor, which will calibrate when I get the accurate reading. This sensor must declare the pin out and work with the BLYNK app by configuring the Virtual Pin DataStream on Void Setup and the Void Loop, which must insert the reading scale and will display the reading of weight in BLYNK application.

The other sensor that was sent the signal input to the ESP32 was ultrasonic, which the sensor was transmitting the soundwave and sending the reading if the soundwave was being set has been blocked with obstacle, this sensor was using two ADC output pins which trig with pin 25 and echo with pin 36, this coding has designed with moto driver because to make the Autonomous system which keeps following the user if the sensor detects human as an obstacle greater than 25cm the robot will move forward and 25cm the robot will move forward and if the sensor detect less than 15 cm the motor will move back ward from this function should be set up in void loop which declare the function as digital Write and delay Microsecond to link with moto driver. The only component that separates the output signal to DC motor 1 and DC motor 2 is the moto driver, which uses four ADC pins out since each DC motor has two output pins, which means that pin IN1 and IN2 for DC motor 1 and IN3 and IN4 for DC motor 2, and these four pins are connected with ADC pin out 32, 33, 27, and

14. This H bridge circuit has been mentioned link with Ultrasonic sensor, which is if the Ultrasonic sensor detect the obstacle with a certain distance the robot will move and to operate the robot forward using high low for motor 1 and 2, also just change the function to low high to go backward and to stop the robot from move just declare low for both dc motor in coding. Arduino is an open-source platform for creating electrical creations. Arduino is made up of a physical programmable circuit board (also known as a microcontroller) and a piece of software, or IDE (Integrated Development Environment),that runs on your computer and is used to create and upload computer code to the physical board. Furthermore, the Arduino IDE employs a simplified form of C++, making programming simpler to learn. Finally, Arduino provides a standard form factor that separates the microcontroller's operations into a more manageable packaging.

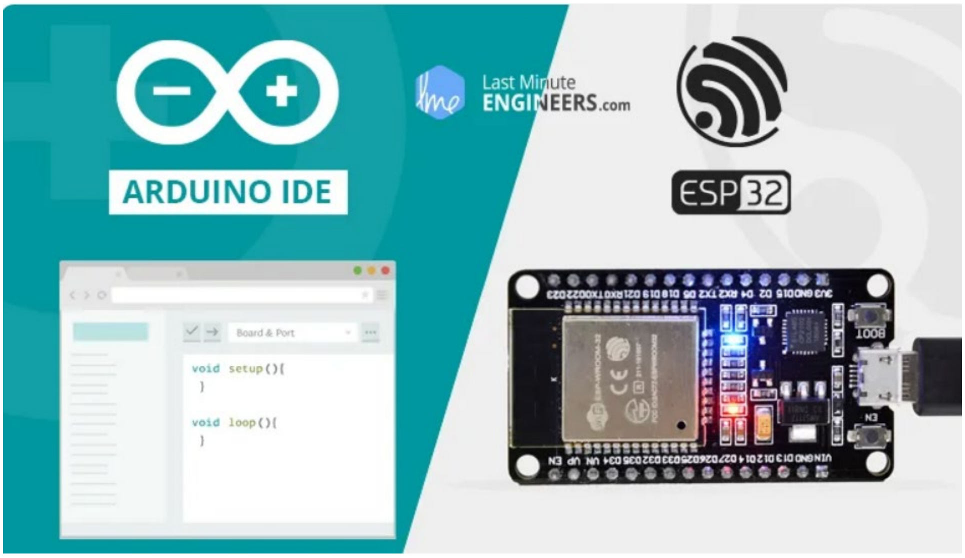


Figure 3.11.1: Arduino Software

```
#define BLYNK_PRINT Serial
#define BLYNK_TEMPLATE_ID "TMPL6vdbGovPO"
#define BLYNK_TEMPLATE_NAME "HAAAA"

#include <WiFi.h>
#include <WiFiClient.h>
#include <BlynkSimpleEsp32.h>

#include <Arduino.h>
#include "HX711.h"
#include "soc/rtc.h"

// HX711 circuit wiring
const int LOADCELL_DOUT_PIN = 16;
const int LOADCELL_SCK_PIN = 4;

/*VARIABLES*/
//MOTOR 1
int M1IN1 = 32;
int M1IN2 = 33;

//MOTOR 2
int M2IN3= 27;
int M2IN4 = 14;

//ULTRASONIC SENSOR
int trig = 25;
int echo = 36;
long duration;
int distance;

HX711 scale;

```

```
// You should get Auth Token in the Blynk App.
// Go to the Project Settings (nut icon).
char auth[] = "kUBjgu5wLAw2A786DrFAISigmtyHQw6u";

// Your WiFi credentials.
// Set password to "" for open networks.
char ssid[] = "GORILLA";
char pass[] = "sedapsedap";

void setup() {
  Serial.begin(115200);
//rtc_clk_cpu_freq_set(RTC_CPU_FREQ_80M);

  Serial.println("HX711 Demo");

  Serial.println("Initializing the scale");

  scale.begin(LOADCELL_DOUT_PIN, LOADCELL_SCK_PIN);

  Serial.println("Before setting up the scale:");
  Serial.print("read: \t\t");
  Serial.println(scale.read());      // print a raw reading from the ADC

  Serial.print("read average: \t\t");
  Serial.println(scale.read_average(20));   // print the average of 20 readings from the ADC

  Serial.print("get value: \t\t");
  Serial.println(scale.get_value(5));   // print the average of 5 readings from the ADC minus the tare weight (not set yet)

  Serial.print("get units: \t\t");
  Serial.println(scale.get_units(5), 1);  // print the average of 5 readings from the ADC minus tare weight (not set) divided
            // by the SCALE parameter (not set yet)

  scale.set_scale(-32.791);
  //scale.set_scale(-471.497);                      // this value is obtained by calibrating the scale with known weights; see the README for details
  scale.tare();               // reset the scale to 0

  Serial.println("After setting up the scale:");

  Serial.print("read: \t\t");
  Serial.println(scale.read());                 // print a raw reading from the ADC

  Serial.print("read average: \t\t");
  Serial.println(scale.read_average(20));       // print the average of 20 readings from the ADC

  Serial.print("get value: \t\t");
  Serial.println(scale.get_value(5));   // print the average of 5 readings from the ADC minus the tare weight, set with tare()

  Serial.print("get units: \t\t");
  Serial.println(scale.get_units(5), 1);        // print the average of 5 readings from the ADC minus tare weight, divided
            // by the SCALE parameter set with set_scale

  Serial.println("Readings:");
  Blynk.begin(auth, ssid, pass);

  // put your setup code here, to run once:
  pinMode(M1IN1,  OUTPUT);
  pinMode(M1IN2,  OUTPUT);
  pinMode(M2IN3,  OUTPUT);
  pinMode(M2IN4,  OUTPUT);
  pinMode(trig,   OUTPUT);
  pinMode(echo,   INPUT);

}
```

```

  scale.set_scale(-32.791);
  //scale.set_scale(-471.497);                      // this value is obtained by calibrating the scale with known weights; see the README for details
  scale.tare();               // reset the scale to 0

  Serial.println("After setting up the scale:");

  Serial.print("read: \t\t");
  Serial.println(scale.read());                 // print a raw reading from the ADC

  Serial.print("read average: \t\t");
  Serial.println(scale.read_average(20));       // print the average of 20 readings from the ADC

  Serial.print("get value: \t\t");
  Serial.println(scale.get_value(5));   // print the average of 5 readings from the ADC minus the tare weight, set with tare()

  Serial.print("get units: \t\t");
  Serial.println(scale.get_units(5), 1);        // print the average of 5 readings from the ADC minus tare weight, divided
            // by the SCALE parameter set with set_scale

  Serial.println("Readings:");
  Blynk.begin(auth, ssid, pass);

  // put your setup code here, to run once:
  pinMode(M1IN1,  OUTPUT);
  pinMode(M1IN2,  OUTPUT);
  pinMode(M2IN3,  OUTPUT);
  pinMode(M2IN4,  OUTPUT);
  pinMode(trig,   OUTPUT);
  pinMode(echo,   INPUT);

}

```

```
void loop() {
  Blynk.run();
  Serial.print("one reading:\t");
  Serial.print(scale.get_units(), 1);
  Blynk.virtualWrite(V0, scale.get_units());
  Serial.print("\t| average:\t");
  Serial.println(scale.get_units(10), 5);
  Blynk.virtualWrite(V1, scale.get_units(10));

  scale.power_down();              // put the ADC in sleep mode
  delay(5000);
  scale.power_up();

  // put your main code here, to run repeatedly:
  digitalWrite(trig, LOW);
  delayMicroseconds(2);
  digitalWrite(trig, HIGH);
  delayMicroseconds(10);
  digitalWrite(trig, LOW);
  duration = pulseIn(echo, HIGH);
  distance = duration * 0.034 / 2;
  Serial.print("Distance: ");
  Serial.println(distance);


  if (distance > 25) {
    //forward
   ;
    digitalWrite(M1IN1, LOW);
    digitalWrite(M1IN2, HIGH);
    digitalWrite(M2IN3, LOW);
    digitalWrite(M2IN4, HIGH);
    //  delay(5000);
```

Figure 3.11.2: Programming

3.12 Application Software

BLYNK is an IoT platform for iOS and Android devices that allows you to manage Arduino, Raspberry Pi, and NODEMCU via the Internet. Blynk is a smartphone app for IoT (Internet of Things) applications that enables users to remotely manage and monitor connected devices and sensors. This program is used to develop a graphical interface or human machine interface (HMI) by compiling and delivering the required address on the available widgets. BLYNK was created for the Internet of Things. It can remotely operate hardware, show sensor data, save data, analyze it, and do a variety of other fun things. The platform is made up of three primary parts. When a user touches the Button in the Blynk program, the data is sent to the Blynk Cloud, where it miraculously finds its way to the installed hardware. Everything happens in the blink of an eye and works in the other direction. It was intended to make the process of developing IoT applications easier and to give a platform that is simple to use for users who do not have substantial programming skills. Blynk has a graphical interface for creating custom dashboards for controlling and monitoring connected devices. Users may drag and drop widgets such as buttons, sliders, graphs, and displays onto the dashboard and then link these widgets to their connected devices or sensors. After configuring the dashboard, customers may use the Blynk app to communicate with their devices from anywhere in the globe. Blynk is a no-code application builder that allows you to prototype, deploy, and manage connected electronic devices at any size, from personal projects to millions of goods used by your clients. The Blynk platform's main goal is to make developing mobile phone applications as simple as possible. As you will see in this course, creating a mobile app that can communicate with your Arduino is as simple as dragging a widget and specifying a pin. This BLYNK can additionally show the weight value that has been assigned to this project.

Figure 3.12.1: Application Software

Sketches are programmed created with the Arduino Software (IDE). These drawings are created in a text editor and saved with the. i-no file extension. The editor has functions for cutting/pasting and searching/replacing text. The message section indicates faults and provides feedback while storing and exporting. The terminal shows text output from the Arduino Software (IDE), including error warnings and other data. The configured board and serial port are shown in the bottom right corner of the window. Users may use the toolbar buttons to validate, upload programmed, create, open, and save drawings, and launch the serial monitor. The Arduino Software (IDE) employs the notion of a sketchbook, which is a common location for storing your programmed (or sketches). The sketches in your sketchbook may be accessed using the File > Sketchbook menu or the Open toolbar button. The Arduino Software (IDE) contains built-in support for the boards listed below, which are all based on the AVR Core. The Boards Manager, which is included in the standard installation, enables the addition of support for an increasing number of new boards based on various cores, such as the Arduino Due, Arduino Zero, Edison, Galileo, and so on.

Third-party hardware support may be added to your sketchbook's hardware directory. Platforms that may be installed include board definitions (which display in the board menu), core libraries, bootloaders, and programmer definitions. Create the hardware directory first, then unzip the third-party platform into its own sub-directory. (If you use "Arduino" as the sub-directory name, user will override the Arduino platform.) Simply remove its directory to uninstall it. This displays serial data delivered from the Arduino board through USB or serial cable. Enter text and hit enter or click the "send" button to transmit data to the board. Choose the baud rate from the drop-down option that corresponds to the rate provided to Serial. Begin with your drawing. When you connect to the serial monitor on Windows, Mac, or Linux, the board will reset (rerun your sketch). Please keep in mind that the Serial Monitor does not handle control characters; if your design requires full control of serial communication with control characters, you may use an external terminal program and link it to the COM port assigned to your Arduino board.

Figure 3.12.2: Application Software

Fritzing is an open-source hardware effort that makes electronics available as a creative material to anybody. We provide a software tool, a community website, and services in the spirit of Processing and Arduino, enabling a creative ecosystem that allows users to document their prototypes, share them with others, teach electronics in a classroom, and layout and build professional PCBs. The software, which was inspired by the Processing programming language and the Arduino microcontroller, allows a designer, artist, researcher, or enthusiast to document their Arduino-based prototype and build a PCB layout for manufacture. The related website allows users to exchange and discuss draughts and experiences, as well as cut production costs. The ideal tool for designers, innovators, amateurs, and educators to create prototypes or even PCBs. You may have seen what it looks like in practice if you looked through some of our lessons or attended one of our seminars. In most cases, the standard components are provided in the default program. However, there are frequently missing components. These components are then made by the electronic industry. Fritzing is an excellent open-source platform for teaching, sharing, and prototyping electrical creations! It enables you to create a schematic and therefore a part, which can later be integrated into extremely professional-looking wiring diagrams. Users may even design their own PCBs and have them manufactured from the files you create.

A Fritzing diagram is a visual representation of a circuit diagram. Traditionally, people use symbols and wires to depict a component of a circuit. However, it is difficult for a newbie to grasp any circuit and adequately document his work in a traditional manner. Fritzing makes things simple. All the components have a realistic appearance, making it very straightforward for novices to grasp.

FIGURE 3.12.3: Application Software

AutoCAD is the original CAD program, and it is used by millions of people all around the world. It may be used to make exact 2D and 3D drawings and models, as well as electrical diagrams, building plans, and other documents. AutoCAD is a computer-aided design (CAD) program used for exact 3D and CAD design and modelling using solids, surfaces, mesh objects, documentation features, and more. If you have no prior expertise with computer-aided design, you may find AutoCAD more difficult to use than someone who has. That is not to argue that learning AutoCAD would be impossible. On the contrary, anyone can master programming; all it needs is time and practice**.** AutoCAD is a valuable talent to have if you want to work in architecture, interior design, drawing, mechanical, electrical, or civil engineering. Learning AutoCAD will provide you with a firm basis for mastering other design programs; the interface of all other CAD software is modelled after its. Although AutoCAD is primarily intended for architects and designers, mechanical engineers utilize it regularly to create visualizations that help in their job. Mechanical engineers use AutoCAD to create customized models and drawings for various goods. AutoDesk created the program to help novice to intermediate users improve their AutoCAD abilities so they may seek a career as an AutoCAD certified professional. AutoDesk certified professional: Candidates with exceptional AutoCAD abilities can pursue certification as an AutoDesk certified professional.

The software is remarkable because it was the first CAD program developed in the 1980s for PC usage (rather than industrial computers). Autodesk, the firm behind AutoCAD, intended to make CAD more accessible to more people as computer technology became more sophisticated. Because it is constantly updated, AutoCAD has remained the leading program in many design sectors. Every year, a new edition is produced, and new features are constantly being added. A big portion of its success may be attributed to the software's support for a wide range of design tasks. Throughout the rest of this post, we'll go through the software suite's most crucial features and applications.

Figure 3.12.4: Application Software

3.13 Finshing Project

Figure 3.13.1**:** Project's Final Look

This is the final look for the Wireless Autonomous Carrying Robot after it has been created and researched what components should be used on this robot and what materials to use with this basic robot. According to figure 3.6.1, the robot's grey-colored casing can be opened and installed using a sliding method, making it simple to troubleshoot wire errors or other problems in this connection, as well as to protect components from moisture, which can damage components due to the growth of fungi, causing various component functions to fail.

3.14 Project Cost

Items	Units	Price (per unit)
NODEMCU ESP32S	1 Unit	RM 40
ULTRASONIC SENSOR	1 Unit	RM 8
LOAD CELL WEIGHT SENSOR	1 Unit	RM 16
18650 3.7 BATTERY	3 Pieces	RM 9
BATTERY HOLDER 18560	1 Piece	RM 6
BASE BOARD NODEMCU ESP32 38 PIN	1 Unit	RM 45
TYRE	2 Pieces	RM 5
HEX COPPER BRASS DC MOTOR WHEEL COUPLING	2 Pieces	RM 4
MOTOR DRIVER L298N	1 Unit	RM 14
GEARED DC MOTOR 6V	2 Unit	RM 25
BASKET	1 Piece	RM 12
SPRAY PAINT	1 Unit	RM 10
WIRE JUMPER FEMALE TO FEMALE	1 Bundle	RM 8
BEARING WHEEL ROLLER	1 Piece	RM 6
SHELF BRACKET	2 Pieces	RM 5
TOTAL		RM 270

3.15 Summary

At the end of this chapter, all about the process, programming, and design will be done step by step by following the sequences or referring to the Gantt chart that has been developed before constructing this Autonomous Robot, and by following this step, troubleshooting will be easy because have schematic diagram and already investigated the component from refer to related project with internet and book. This chapter is the most significant since the project has been properly planned and prepared to deal with any type of challenge, and it also implemented a lot of time to do practical work and research.

CHAPTER 4

ANALYSIS DATA

4.1 Introduction

This chapter is going to cover the significance of conducting data analysis prior to designing a project, as well as the benefits and drawbacks of doing so. According to these, some data was collected when Wireless Autonomous Carrying Robot utilizing IOT, which was applied to these projects using a WIFI connection, and the output display for these robots was displayed in the application BLYNK app. Not only that, but having a discussion based on the analyzed data is also very beneficial because it is where you can learn a lot of component functions, gain knowledge and skills, and improve your knowledge about how to determine the right materials for the project without breaking with weak materials. On the other hand, ensuring safety precautions is a critical component that must be addressed while carrying out the project.

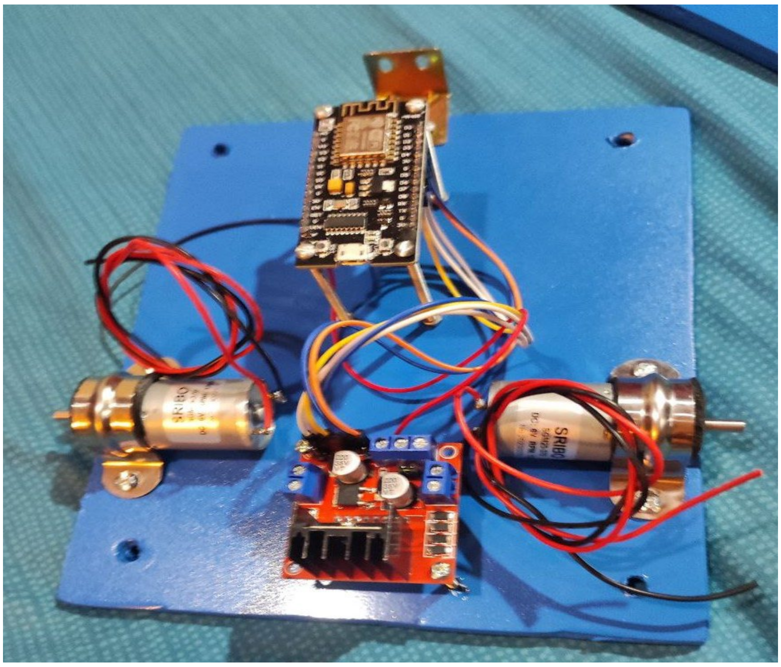


Figure 4.1.1: Project Look

According to the testing done with these projects, these projects have a common problem that requires changing the material base for the Load Cell Weight

Sensor, the problem of value of weight display in BLYNK app not being precise due to the factor of base robot material, and these Autonomous System must be improved by adding the programmed to make the robot stop without opening one of the three batteries.

4.2 Survey Form and Data Analysis

Untitled form

Nowadays, technology development has been extremely powerful, with manufacturers of electronic goods and the automated industry racing to produce new technologies such as AI and the development of 5G systems, due to a high demand for developed countries to increase national productivity and make people's daily lives easier. These projects one of the powerful tech devices will help the housewife and older at home or supermarket, this robot was a practical and realiable for human being which can carry heavy weight stuff with following human without control and also can monitor weight of good has been carried on this robot to prevent from over load until can damage the component part of robot.

This robot will reduce the consumption of plastic bags at the supermarket if humans adapt to using it when shopping for groceries so that they do not have to buy plastic bags repeatedly when the consumer forgets to bring plastic bag. With this method, we can reduce the pollution of plastic bags on nature and aquatic life, which has recently found a lot of plastic particles in aquatic life and destroys the breeding grounds of animal life. Another advantage of these robots is that they can help avoid spinal problems that cause pain, such as slipped discs, which are common in males.

Figure 4.2.1: Google Form Survey

Regarding figure 4.2.1, this is one of the methods for doing the analysis beyond the customer, which may obtain their opinion and perception about these robots. This will enhance the system of robots or mechanisms by making these robots from recycled materials and reducing the entire weight of this robot, making it light weight yet sturdy enough to carry high loads**.** Because this survey was filled with people of various ages, different types of answers and opinions can be given to assess which aspect of the robot's problem factors in relation to the use of this robot at home, and a high evaluation answer will be given attention to the problem to be addressed more regularly and efficiently**.**

These device will help the pregnant women and older when there is no husband or someone willing to help.

7 responses

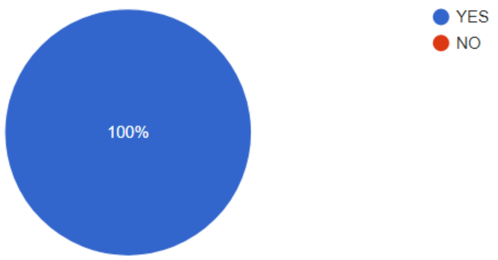


Figure 4.2.2: Data Analysis

This is one of the data that has been collected from spread this survey to consumer.

Can this robot reduce the dominant use of plastic in human daily life?

7 responses

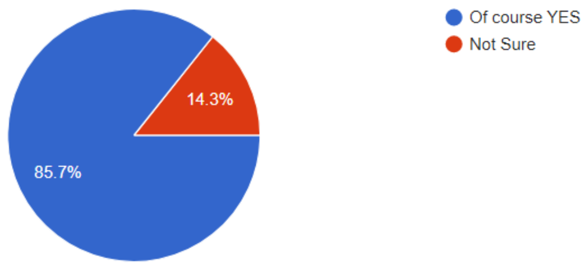


Figure 4.2.3

In your opinion, is this robot suitable and practical for home and supermarket use to help people more efficiently and orderly.

7 responses

- tong jiao bauo
- -
- In my opinion, this robot can be used in any places
- It's up to people....but for me is unnecessary
- Btollah tu
- Yes
- Indeed, robots are suitable for home and supermarket uses as it helps to increase potential customer satisfaction as they do not need to carry their hefty items back to their vehicle which can cause them aches especially in the elderly. Additionally, robots are meant to make the life of humans trouble-free. However, it would make humans more laid-back if AI intelligence conquer most parts of their life. They (humans) may get frustrated if robots can't do what they request as robots only do what they are told to do, meaning they can't do more than expected without any command.

Figure 4.2.4

According to the data collected, most consumers agreed with the existence of these robots, indicating that a lot of people trust and rely on their task to give a few of that with robots which these positive answers have demanded with market. This is because this robot has not yet been released in the market because some manufacturers still focus on these machines being utilized in the warehouse or industrial Based on the chart above, which shows that 85% of people agree that these robots can reduce the plastic that has polluted the earth's surface over three centuries, used or recycled materials can be used as the main material to make parts of this robot by using a plastic melting process such as a 3D PRINTED machine, which is widely used by large companies to deal with high costs and environmental pollution. This material application will help the disposal of plastic waste in the sea and forest can be reduced, because this plastic material is a material that is very difficult to decompose through natural processes such as carcasses.

4.3 Summary

This chapter explains the Load Cell Weight Sensor, which is a significant and accurate component in determining the weight of a good. This research also provides an autonomous system and the necessity to study consumption in daily life to consumers. In this paper, we describe a low-cost IoT-based system for Autonomous robot and weight measurement device at the same time. This system also relies on user or consumer preference data to make it more practical and feasible for daily life and home use. According to the data that has been collected, most users desire more experience from using this Autonomous movement is that it can turn left and right, allowing the robot to easily turn the opposite direction. Measuring mechanism is also a successful study using an IOT that displays the weight in application because most of this sensor, a lot of student using with actual display to see the output from sensor and these sensor was really enjoy to explore the function, this is because these sensor one of the necessities of life because this mechanism is used every day to weigh all types of goods, the volume and mass of an item or material that involves one of the safety measures These safety features also signal that the robot is not carrying more than its maximum load.

CHAPTER 5

CONCLUSSION

5.1 Introduction

In this chapter, we will evaluate the existing design of the project via the limiting aspect and update the system in the future to reach a conclusion on the project. We will also need to modify the mechanism and components from our side. The project limitation feature is to define the project's ability and durability when used outdoors; this is one of the important facts to verify that this low-cost project is capable of being utilized outside on a non-flat surface. The recommendations for improvement plans are to keep the importance and advantages of this project alive for the target users, who are housewives and elderly people, because one of these projects exists to relieve them of the burden of transporting heavy products.

5.2 Project Limitation

The Wireless Autonomous Carrying Robot Using IOT has its own set of capabilities and limitations, as well as a procedure and standard operating procedure (SOP) for correctly constructing this project and maintaining its safety. This is because, as previously said, I have installed high current components, specifically a DC motor and three 18560 3.7V batteries for my Final Year Project. These are because, to obtain a positive outcome, this project requires a safety guarantee, which requires the addition of a fuse when connecting to the power supply, because these connections have a high current, which causes a short circuit, causing the robot to burn and cease to function. These are the required limitations when using these robots:

- Avoid using these robots outside while it rains or after it rains to avoid any components from short-circuiting.
- Closed this robot while not in use to keep the components in excellent condition, which is open the battery from the battery holder when not in use for a short or long period of time to avoid the danger of harm to one of the robot's components.

- Using an official charger for this 18650 battery will preserve it in excellent condition and prevent it from draining quickly, as these batteries are prone to exploding and causing damage when subjected to excessive power.
- Keep these robots in a dry location to prevent fungal development on every electrical component, which can compromise the performance of each sensor and safety.
- Do not placed the goods more than 6KG to prevent the movement of robot slow and will broke the DC motor.

5.3 Recommendation in Future

This project has gone through several processes, and many things have been changed to improve durability when moving these robots. There are still a few issues that are expected to be resolved in the future, owing to a lack of time. One of its which these robots must change larger Load Cell weight Sensor because this robot can bring the things more than 5KG which maximum was 9KG for these robots which use the high torque DC Motor and the other thing which these robots must use the recycle material which is plastic, this idea does not really make sense but now day have 3D Printed which develop the plastic mold from recycle parts. This 3D Print machine can do well job to make base or framework for this robot because this plastic mold is strong enough to hold from break into pieces and this material can also withstand erosion and rot when this robot is used outdoors. At last, but not least add another Ultrasonic sensor which cause this robot move left and right, this is system need to develop in future to be this robot more practical in daily life.

5.4 Conclusion

According to the completion of these projects, these were successful systems that proved the Autonomous movement of a robot will keep following the user and not just theory which these system most are used in industry and car like today the Tesla has an Autonomous system in that car which is called the Autopilot Enhanced Autopilot and Full Self-Driving capabilities evolve, your car will be continuously upgraded through over-the-air software updates but these system do not really work with our system. . Measuring mechanism is also a successful study using an IOT that displays the weight in application because most of this sensor, a lot of student using with actual display to see the output from sensor and these sensor was really enjoy to explore the function, this is because these sensor one of the necessities of life because this mechanism is used every day to weigh all types of goods, the volume and mass of an item or material that involves one of the safety measures These safety features also signal that the robot is not carrying more than its maximum load.

Further improvements for these projects will be good planning and design to tackle a frequent problem for these projects in which the base robot must be changed to acquire accurate value output from Load Weight sensor and this code development must be improved to produce user friendly system. Not only that, but these projects must include a fuse in the power supply as a safety method to prevent short circuits due to high current circuits and higher power consumption; this issue must be resolved to make this robot use low energy consumption, which saves battery usage.

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APPENDICES

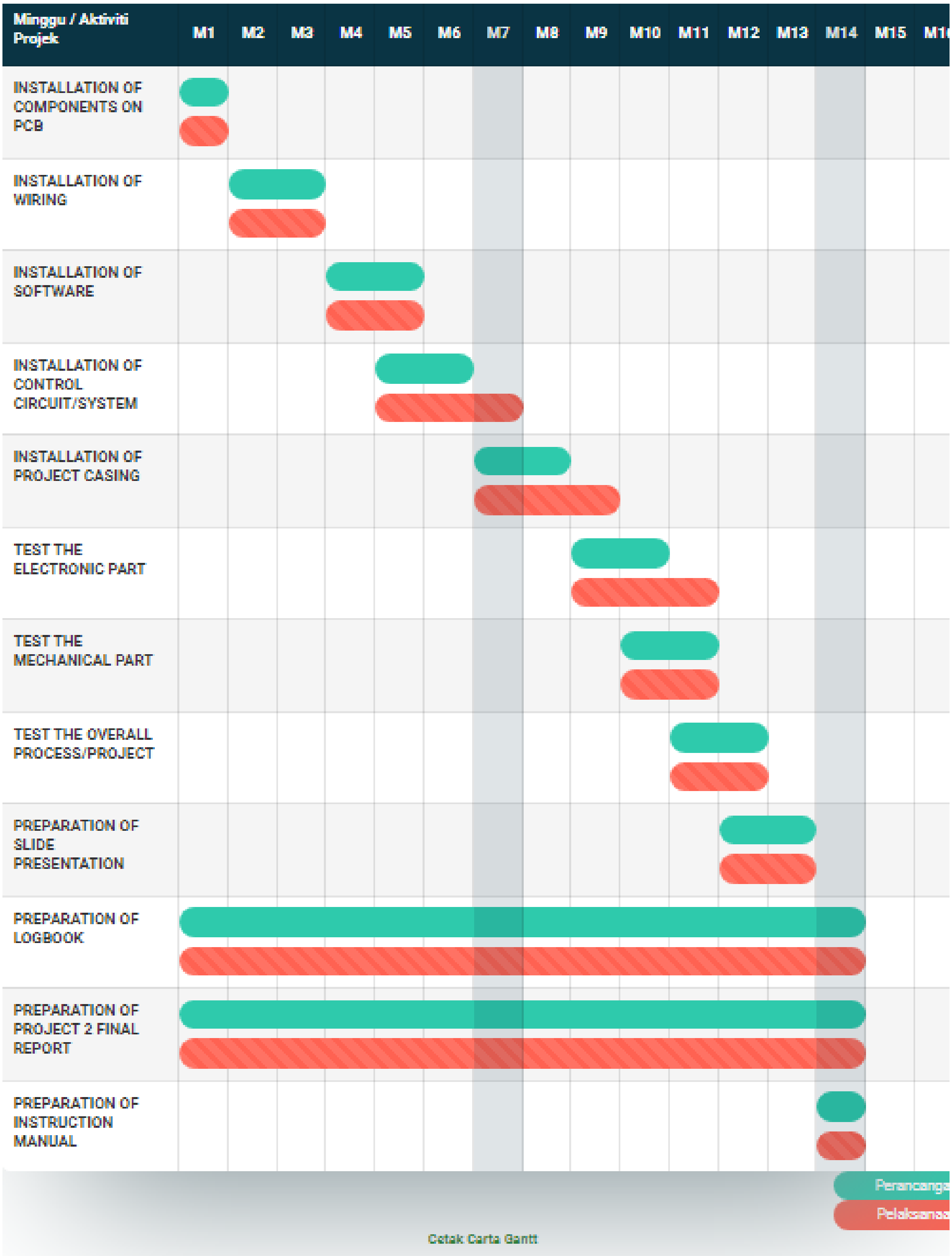
APPENDIX A- GANTT CHART

APPENDIX B- POSTER

APPENDIX C- SURVEY DATA ANALYSIS

APPENDIX D - CODING AND PROGRAMMING

APPENDIC A GANTT CHART



APPENDIX B POSTER

APPENDIX C SURVEY AND DATA ANALYSIS

Untitled form

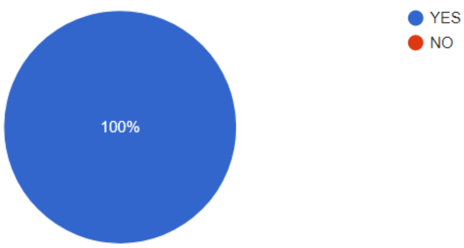
Nowadays, technology development has been extremely powerful, with manufacturers of electronic goods and the automated industry racing to produce new technologies such as AI and the development of 5G systems, due to a high demand for developed countries to increase national productivity and make people's daily lives easier. These projects one of the powerful tech devices will help the housewife and older at home or supermarket, this robot was a practical and realiable for human being which can carry heavy weight stuff with following human without control and also can monitor weight of good has been carried on this robot to prevent from over load until can damage the component part of robot.

This robot will reduce the consumption of plastic bags at the supermarket if humans adapt to using it when shopping for groceries so that they do not have to buy plastic bags repeatedly when the consumer forgets to bring plastic bag. With this method, we can reduce the pollution of plastic bags on nature and aquatic life, which has recently found a lot of plastic particles in aquatic life and destroys the breeding grounds of animal life. Another advantage of these robots is that they can help avoid spinal problems that cause pain, such as slipped discs, which are common in males.

These device will help the pregnant women and older when there is no husband or someone willing to help.

Copy

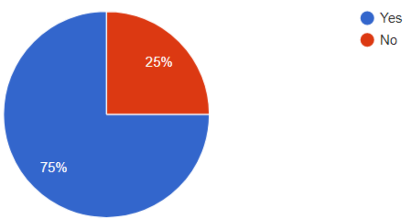
8 responses



When this robot exists, is it able to solve the problem of spinal injuries among men.

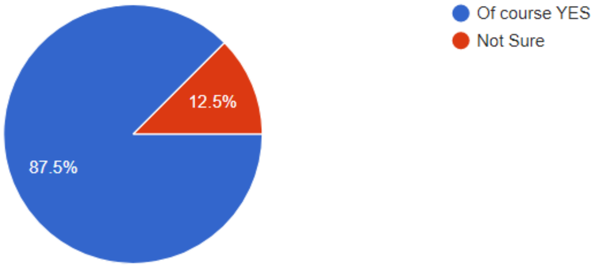
Copy

8 responses



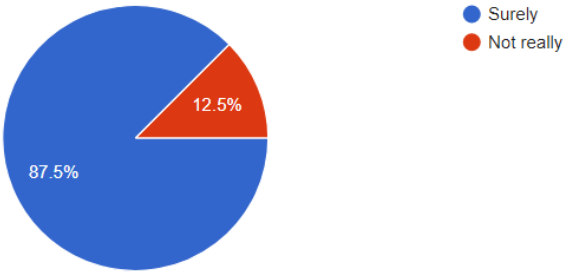
Can this robot reduce the dominant use of plastic in human daily life?

8 responses



Is this robot able to do the daily work of humans by carrying heavy items when used for home use?

8 responses



In your opinion, is this robot suitable and practical for home and supermarket use to help people more efficiently and orderly.

8 responses

tong jiao bauo

-

In my opinion, this robot can be used in any places

It's up to people....but for me is unnecessary

Btollah tu

Yes

Indeed, robots are suitable for home and supermarket uses as it helps to increase potential customer satisfaction as they do not need to carry their hefty items back to their vehicle which can cause them aches especially in the elderly. Additionally, robots are meant to make the life of humans trouble-free. However, it would make humans more laid-back if AI intelligence conquer most parts of their life. They (humans) may get frustrated if robots can't do what they request as robots only do what they are told to do, meaning they can't do more than expected without any command.

APPENDIX D PROGRAMMING

```
#define BLYNK_PRINT Serial
#define BLYNK_TEMPLATE_ID "TMPL6vdbGovPO"
#define BLYNK_TEMPLATE_NAME "HAAAA"

#include <WiFi.h>
#include <WiFiClient.h>
#include <BlynkSimpleEsp32.h>

#include <Arduino.h>
#include "HX711.h"
#include "soc/rtc.h"

// HX711 circuit wiring
const int LOADCELL_DOUT_PIN = 16;
const int LOADCELL_SCK_PIN = 4;

/*VARIABLES*/
//MOTOR 1
int M1IN1 = 32;
int M1IN2 = 33;

//MOTOR 2
int M2IN3= 27;
int M2IN4 = 14;

//ULTRASONIC SENSOR
int trig = 25;
int echo = 36;
long duration;
int distance;

HX711 scale;

// You should get Auth Token in the Blynk App.
// Go to the Project Settings (nut icon).
char auth[] = "kUBjgu5wLAw2A786DrFAISigmtyHQw6u";

// Your WiFi credentials.
// Set password to "" for open networks.
char ssid[] = "GORILLA";
char pass[] = "sedapsedap";

void setup() {
  Serial.begin(115200);
//rtc_clk_cpu_freq_set(RTC_CPU_FREQ_80M);

  Serial.println("HX711 Demo");
```

```
  Serial.println("Initializing the scale");

  scale.begin(LOADCELL_DOUT_PIN, LOADCELL_SCK_PIN);

  Serial.println("Before setting up the scale:");
  Serial.print("read: \t\t");
  Serial.println(scale.read());      // print a raw reading from the
ADC

  Serial.print("read average: \t\t");
  Serial.println(scale.read_average(20));   // print the average of 20
readings from the ADC

  Serial.print("get value: \t\t");
  Serial.println(scale.get_value(5));   // print the average of 5
readings from the ADC minus the tare weight (not set yet)

  Serial.print("get units: \t\t");
  Serial.println(scale.get_units(5), 1);  // print the average of 5
readings from the ADC minus tare weight (not set) divided
            // by the SCALE parameter (not set yet)

  scale.set_scale(-32.791);
  //scale.set_scale(-471.497);                      // this value is
obtained by calibrating the scale with known weights; see the README
for details
  scale.tare();               // reset the scale to 0

  Serial.println("After setting up the scale:");

  Serial.print("read: \t\t");
  Serial.println(scale.read());                 // print a raw reading
from the ADC

  Serial.print("read average: \t\t");
  Serial.println(scale.read_average(20));       // print the average of
20 readings from the ADC

  Serial.print("get value: \t\t");
  Serial.println(scale.get_value(5));   // print the average of 5
readings from the ADC minus the tare weight, set with tare()

  Serial.print("get units: \t\t");
  Serial.println(scale.get_units(5), 1);        // print the average of
5 readings from the ADC minus tare weight, divided
            // by the SCALE parameter set with set_scale

  Serial.println("Readings:");
```

```
  Blynk.begin(auth, ssid, pass);

  // put your setup code here, to run once:
  pinMode(M1IN1,  OUTPUT);
  pinMode(M1IN2,  OUTPUT);
  pinMode(M2IN3,  OUTPUT);
  pinMode(M2IN4,  OUTPUT);
  pinMode(trig,   OUTPUT);
  pinMode(echo,   INPUT);

}

void loop() {
  Blynk.run();
  Serial.print("one reading:\t");
  Serial.print(scale.get_units(), 1);
  Blynk.virtualWrite(V0, scale.get_units());
  Serial.print("\t| average:\t");
  Serial.println(scale.get_units(10), 5);
  Blynk.virtualWrite(V1, scale.get_units(10));

  scale.power_down();              // put the ADC in sleep mode
  delay(5000);
  scale.power_up();

  // put your main code here, to run repeatedly:
  digitalWrite(trig, LOW);
  delayMicroseconds(2);
  digitalWrite(trig, HIGH);
  delayMicroseconds(10);
  digitalWrite(trig, LOW);
  duration = pulseIn(echo, HIGH);
  distance = duration * 0.034 / 2;
  Serial.print("Distance: ");
  Serial.println(distance);


  if (distance > 25) {
    //forward
   ;
    digitalWrite(M1IN1, LOW);
    digitalWrite(M1IN2, HIGH);
    digitalWrite(M2IN3, LOW);
    digitalWrite(M2IN4, HIGH);
    //  delay(5000);
  }
  else if (distance < 15 ) {
    //backward
```

```
    digitalWrite(M1IN1, HIGH);
    digitalWrite(M1IN2, LOW);
    digitalWrite(M2IN3, HIGH);
    digitalWrite(M2IN4, LOW);
    //delay(5000);
  }
  else if (distance >= 15 && distance <= 25) {
    //stop
    digitalWrite(M1IN1, LOW);
    digitalWrite(M1IN2, LOW);
    digitalWrite(M2IN3, LOW);
    digitalWrite(M2IN4, LOW);
    //delay(5000);


  }
}
```