



Group 07 - IT

PET ROBOT CAR LUIGI

IN 1901- Microcontroller Based Application
Development Project



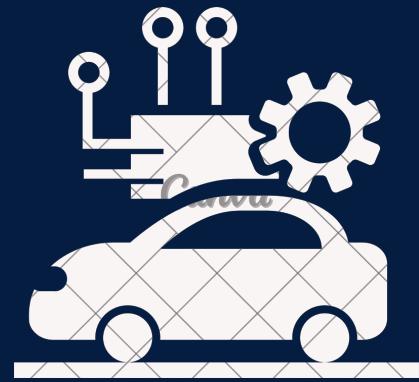
OVERVIEW

- 01
- 02
- 03
- 04
- 05
- 06
- 07
- 08
- 09

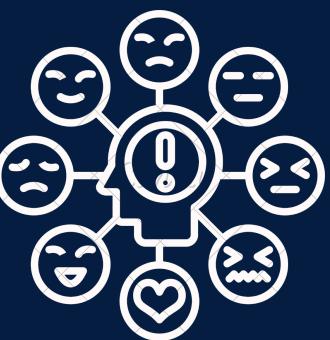


- Introduction
- Our Team
- Problem in brief
- Aims and objective
- Solution and significance
- Design
- Individual Contribution
- Budget
- Q & A

INTRODUCTION



A fun pet robot car that can go anywhere and has a screen that shows emotions like happy or sad. This robot isn't just a car—it's also a friend that plays games with you to keep you entertained.



You can control it from far away, and it will show how it feels through its screen, making it a cool and interactive buddy for everyone to enjoy. It's not just about driving; it's about having fun and feeling connected with a smart and playful companion.



OUR
TEAM



T.U.D.
GUNWARDENE



G.G.P.T.
GAMAGE



R.D.S.
NIMHAN



J.K.A.V.
KUMARI



M.C.
KAHANDA

MEMBER

MEMBER

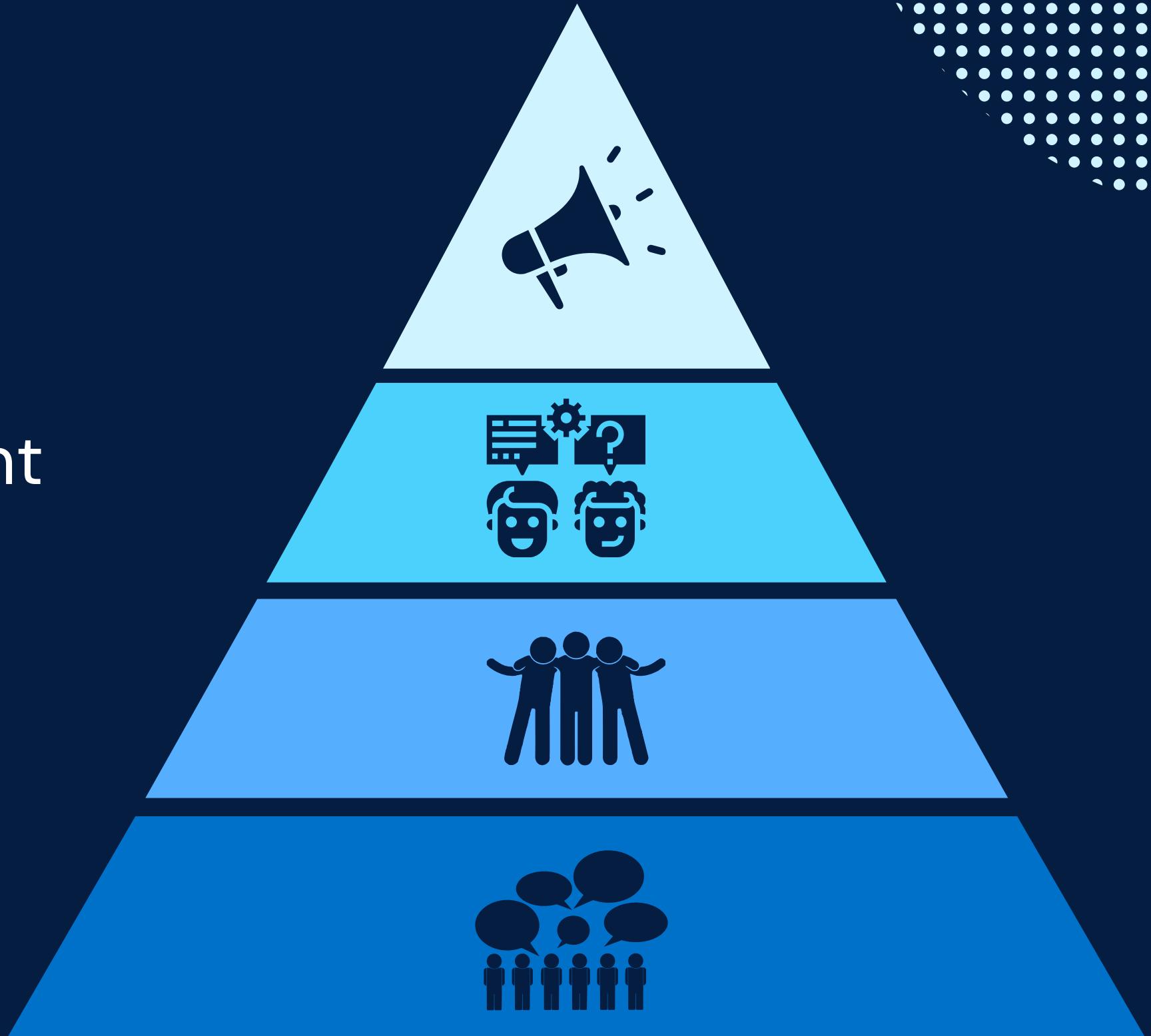
LEADER

MEMBER

MEMBER

PROBLEM IN BRIEF

Every day, many people feel bored, which can make them feel lonely, disconnected, and affect their mental health. Current entertainment options often fail to connect emotionally, keep people engaged, or be easy to access.



AIMS AND OBJECTIVES

AIMS

- Creating a bond between humans and robots using modern technology.
- Simulate the experience of having a living being in our working environment or home.
- Creates a comforting environment by providing personalized companionship and assistance tailored to the user's needs and preferences.
- Improve mental health by providing companionship, support, and interactive activities tailored to promote well-being and relieve stress.

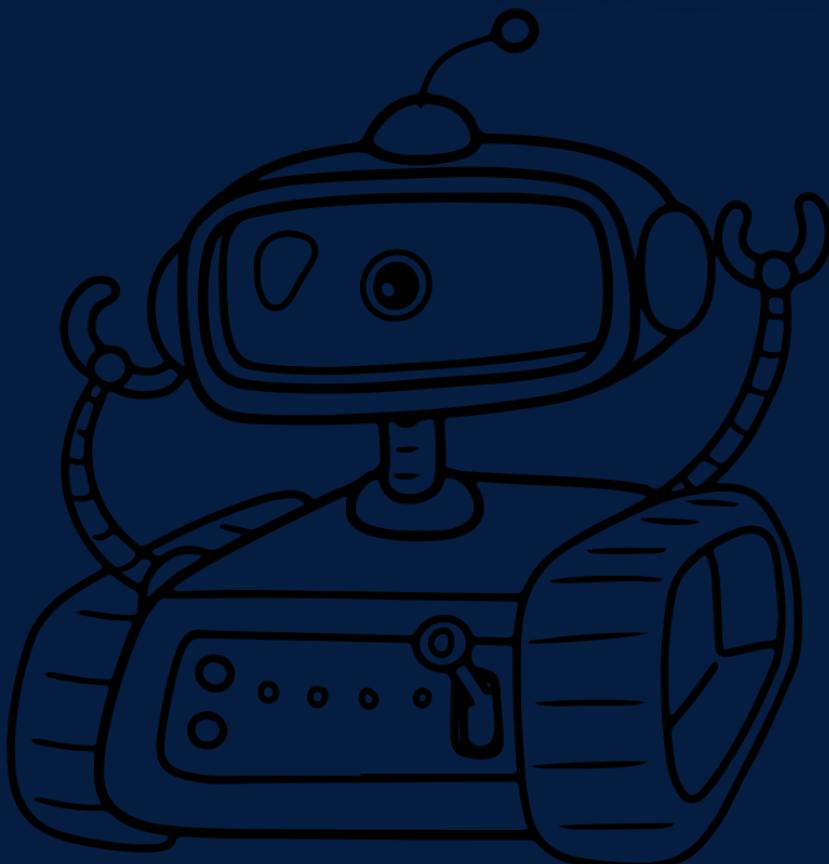
OBJECTIVES

- Designing a Mechanical Robot car for an Immersive, Lifelike Interaction Experience.
- Reduce stress and provide emotional support.
- Enhance leisure time with interactive games.

PROPOSED SOLUTION

- 'LUIGI', a pet, using cutting-edge technical components.
- Its sleek design fits perfectly on a desk, instantly adding coziness to the surroundings.
- Incorporated interactive games to deepen the bond between you and your robotic pet in real-time. Plus, control Luigi's movements seamlessly with our specially designed controller.
- When interacted with, through touch or movement, LUIGI responds with expressive emotions and unique sounds.

DESIGN



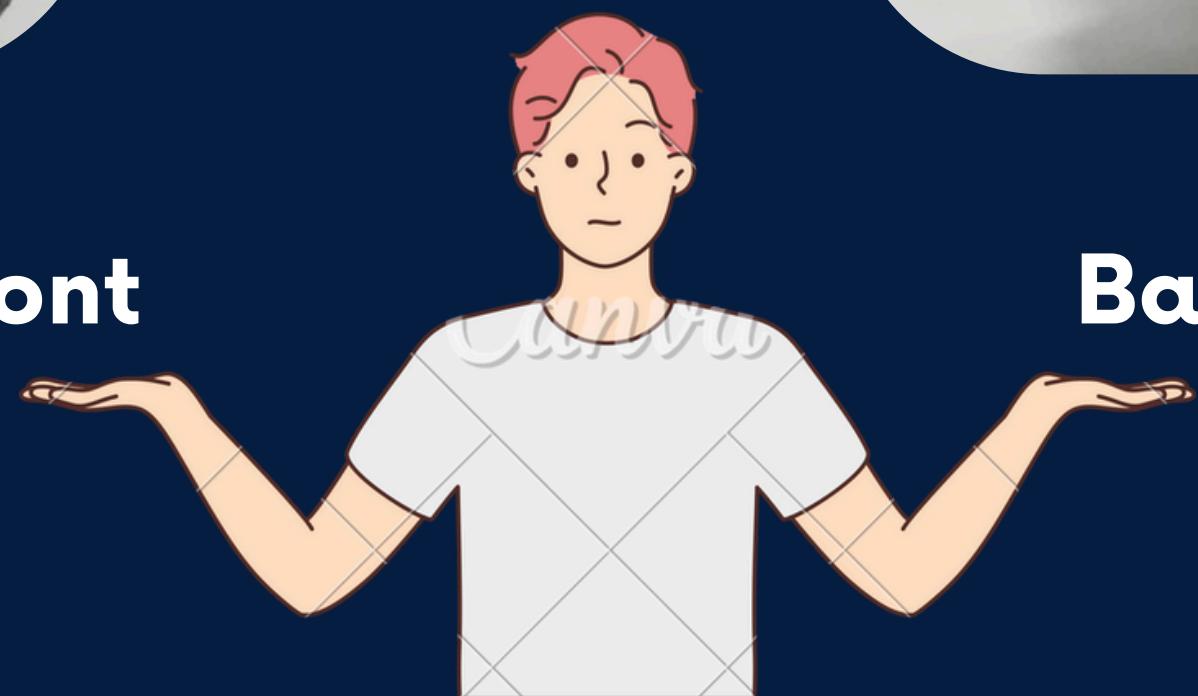
LUIGI



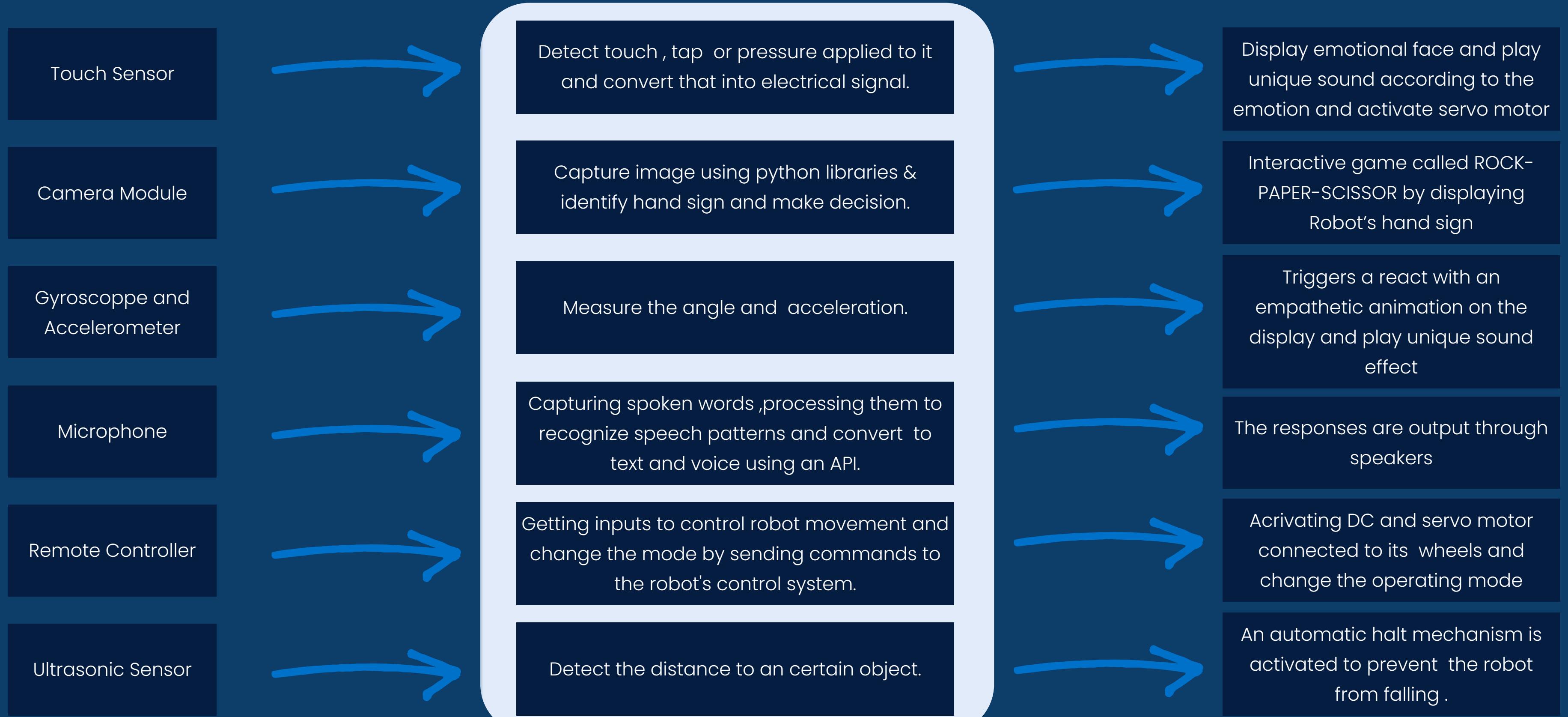
Front



Back



SYSTEM DIAGRAM



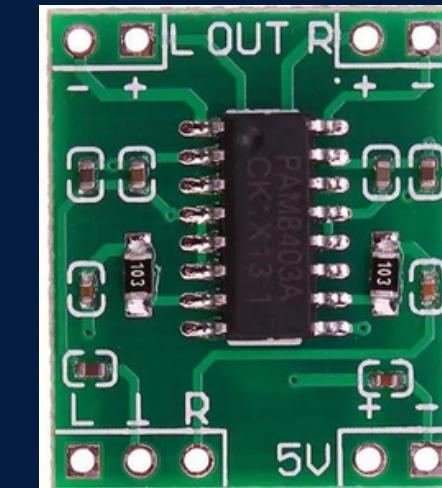
INDIVIDUAL CONTRIBUTIONS

224135V

NIMHAN R.D.S

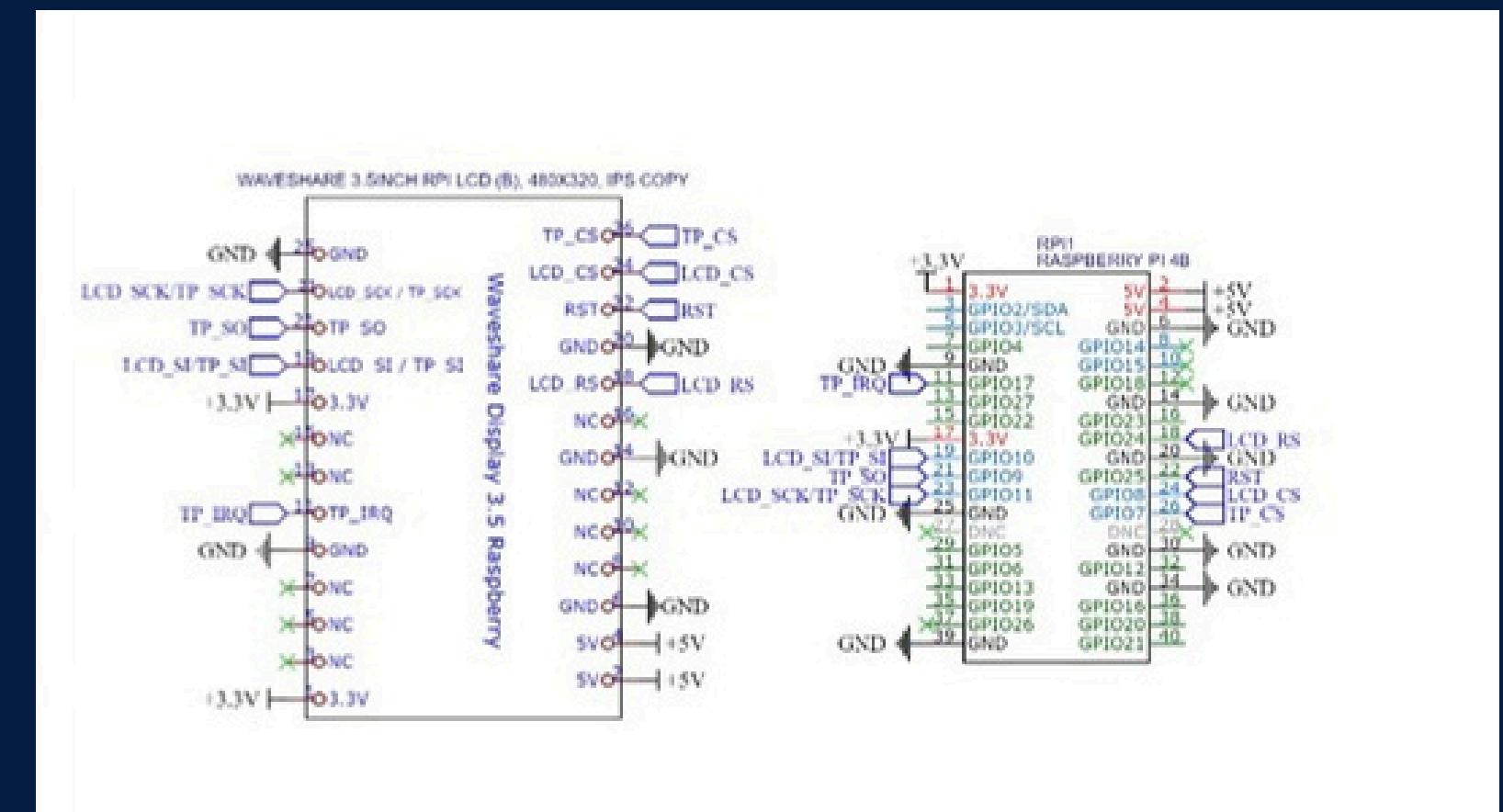
- Emotions for soft touch

Using touch sensors can detect the users' touch or tap and according to the command, the display outputs a unique emotion.



- Sound output for display

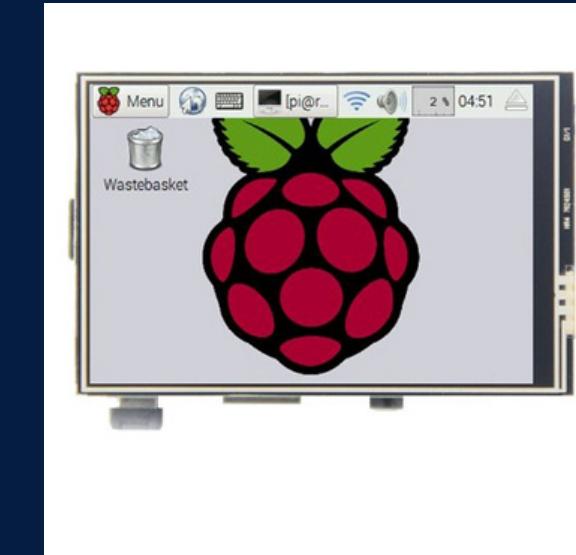
According to the displayed emotion, speakers give a sound output.



224063X

GUNAWARDENA T.U.D

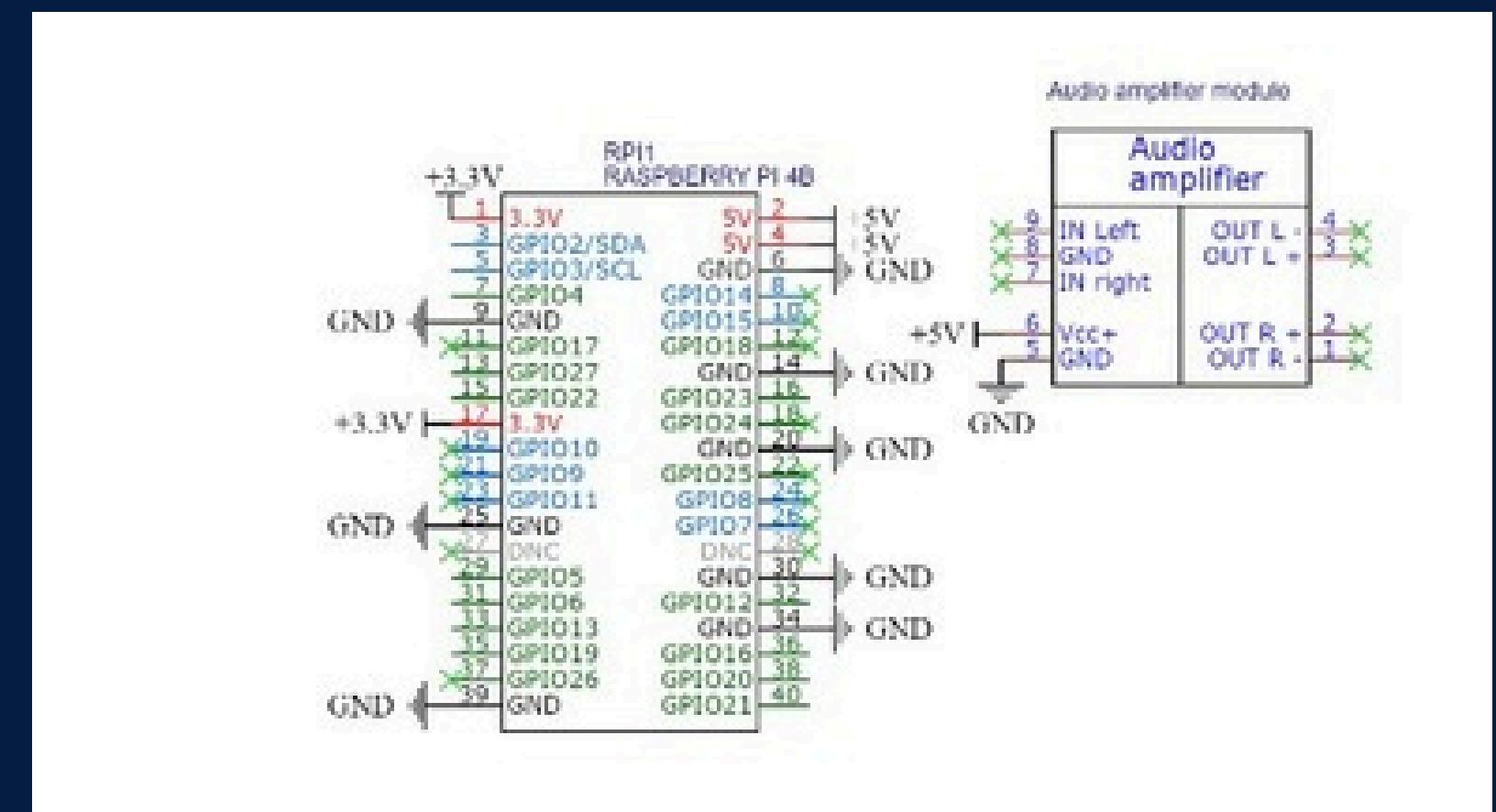
- Voice assistance



When a user issues a command via the microphone, Luigi processes the input, generates a response utilizing the Gemini AI tool, and delivers the output through the speakers.

- Game with hand gesture

Luigi can play rock,paper scissor game with the user.

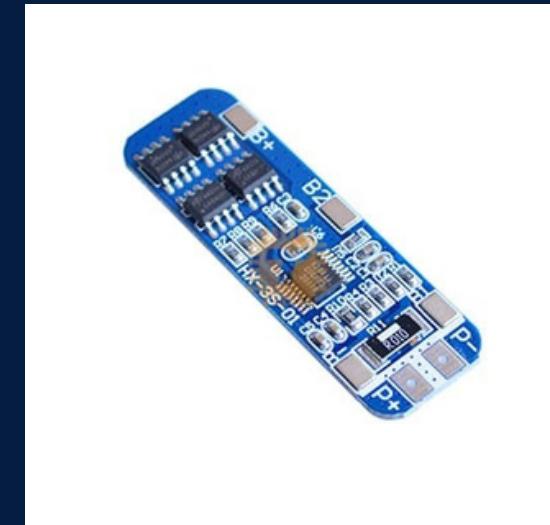


224063X

GUNAWARDENA T.U.D

- **Battery Pack**

Li -ion 18650 battery protector & Battery management System



224098H

M.C.KAHANDA

- PCB designing

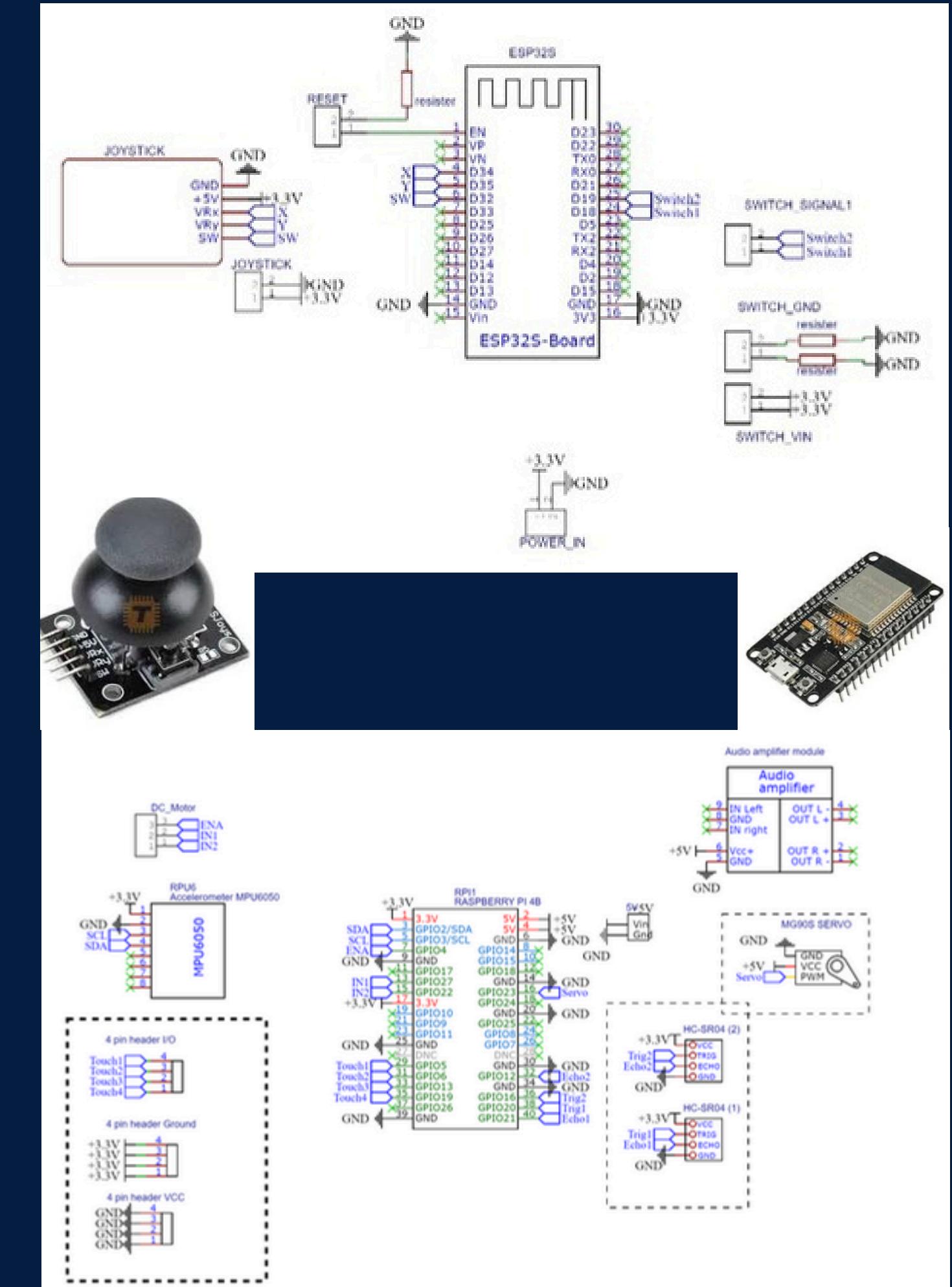
Create a detailed schematic diagram and using the EasyEDA online tool for PCB design, successfully completing task.

- 3D designing

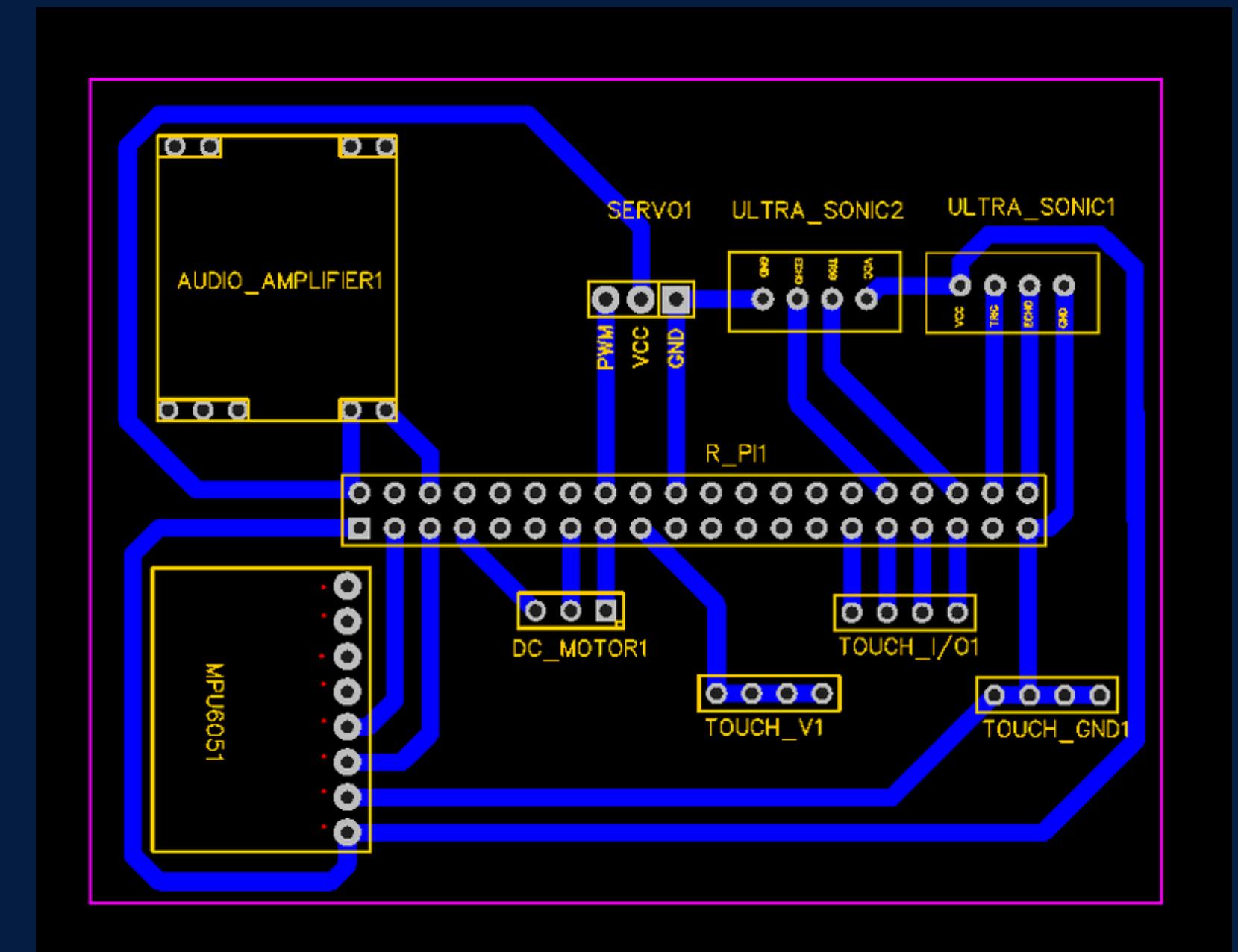
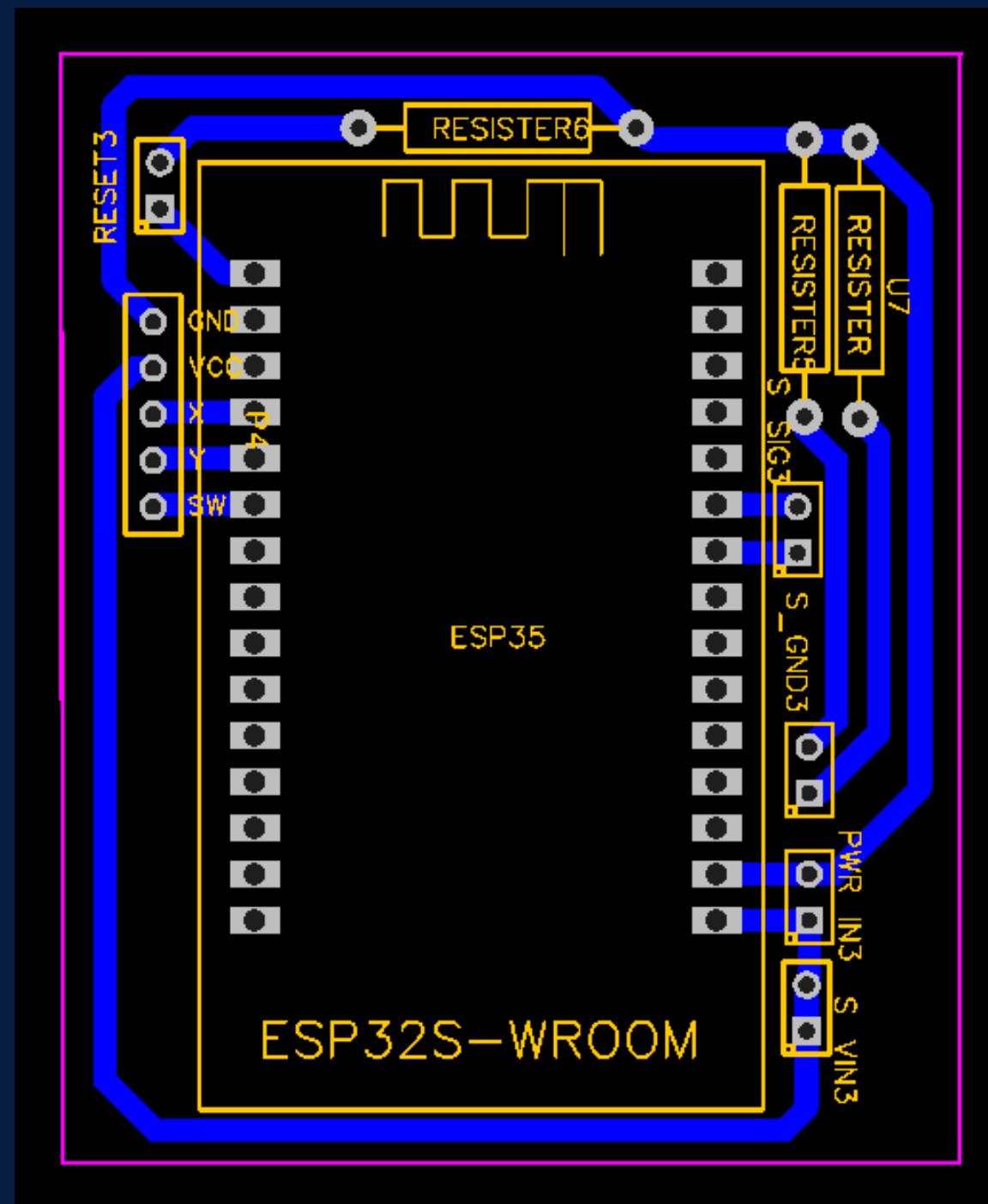
Design a 3D model for joystick using fusion.

- Remote controller

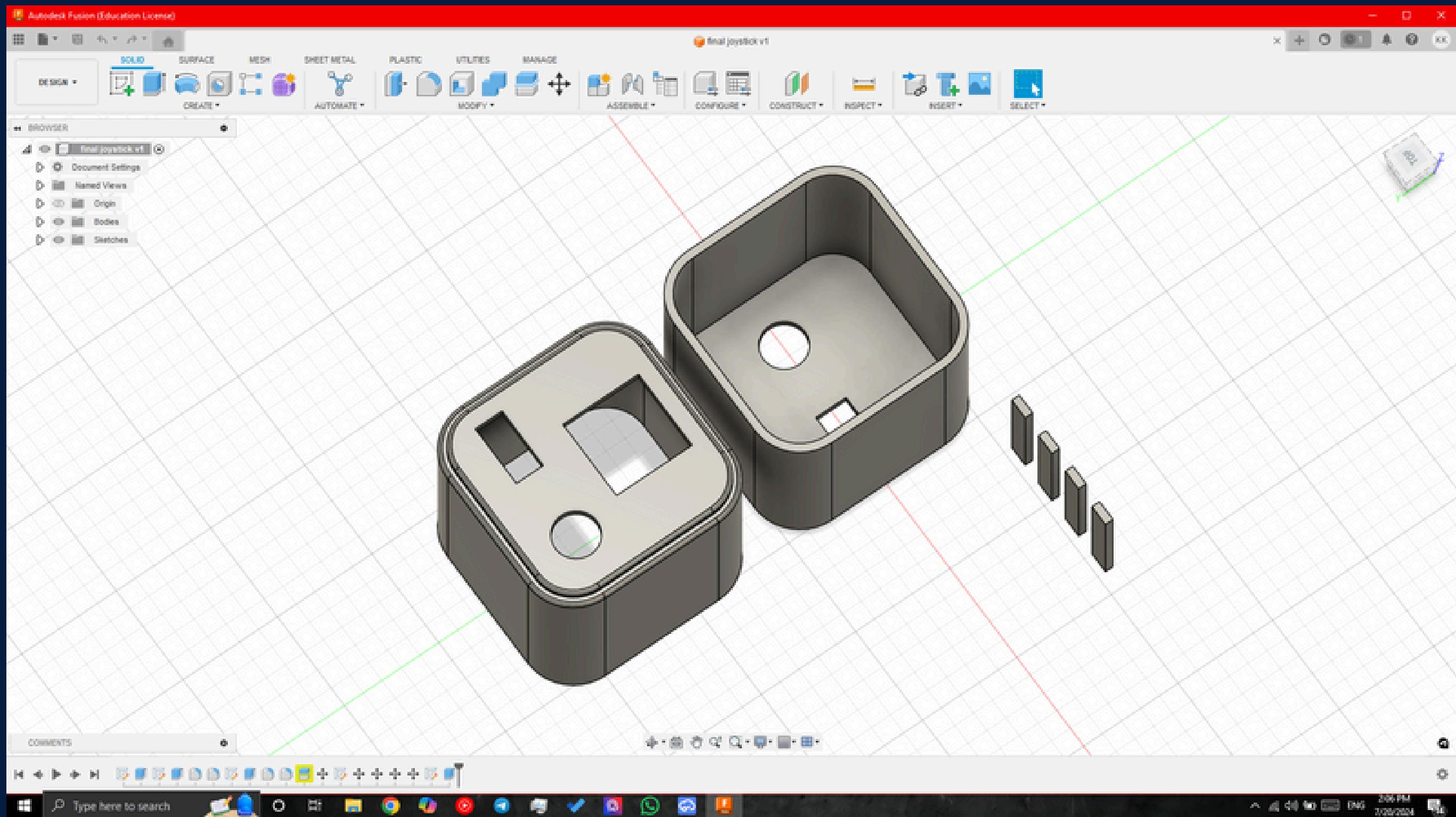
Using joystick controller enables to control the car remotely



PCB



3D Design



224056E

GAMAGE G.G.P.T

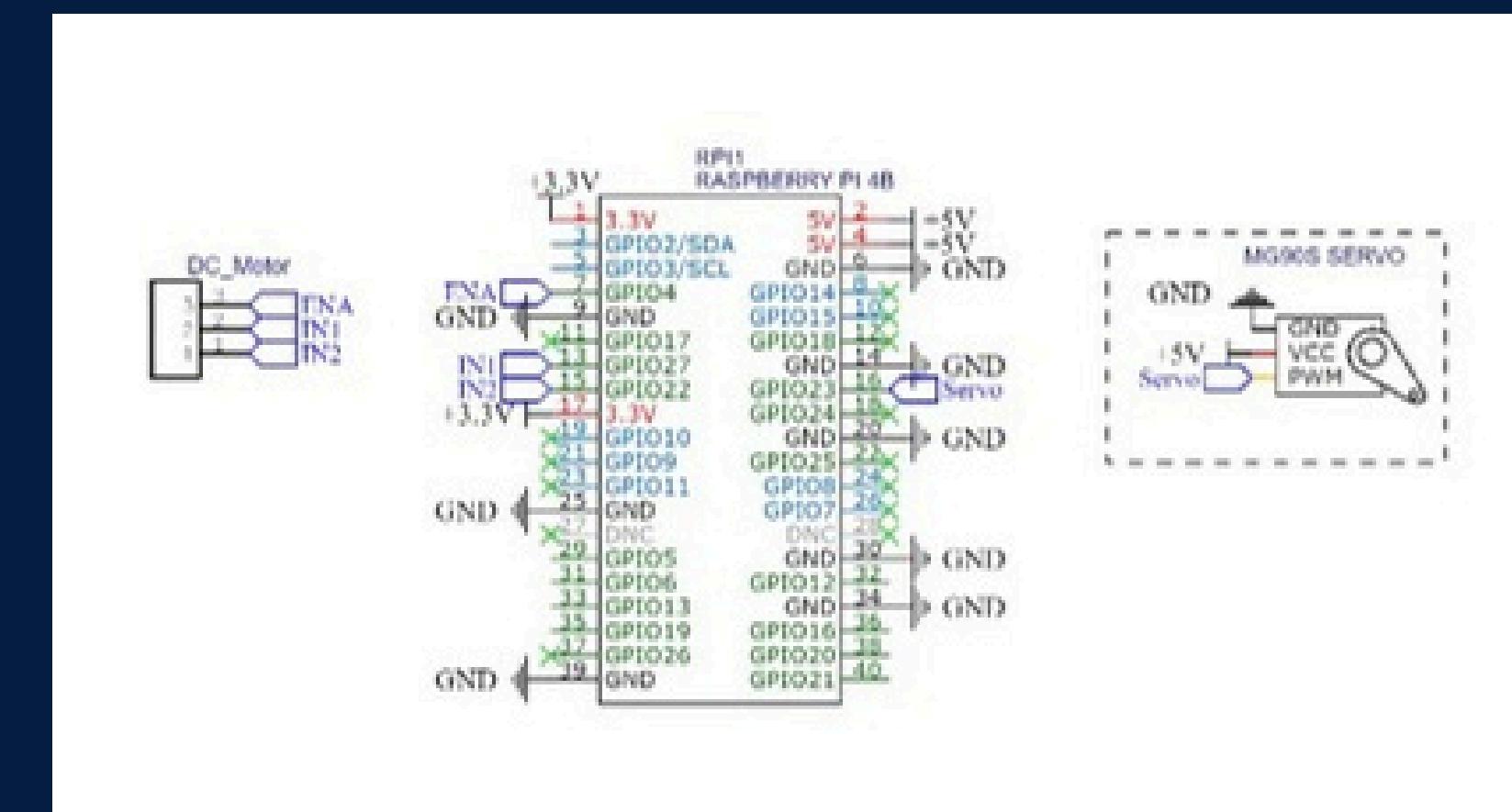
- Carbase functions

According to the remote signals, Luigi moves using DC motors and servo motor, enabling precise and responsive control.



- Reactions and Lighting system.

Luigi has headlights that can be controlled using the joystick, and when the wheels move backward, the brake lights at the back of the car illuminate. When Luigi is lifted from its surface servo motor moves continuously until it get back to the surface .

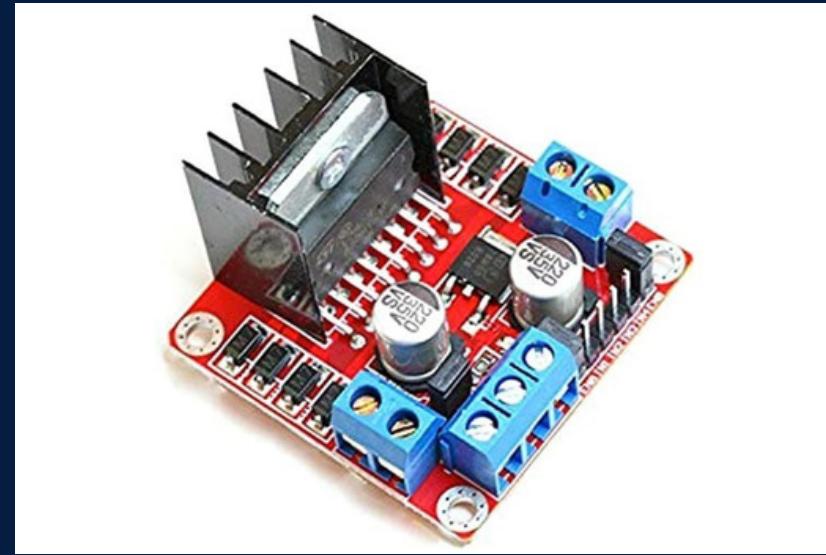


224056E

GAMAGE G.G.P.T

- Motor driver**

The motor driver is used to control the DC motors to move LUIGI forward and backward according to the command received from the Joystick.



224115K

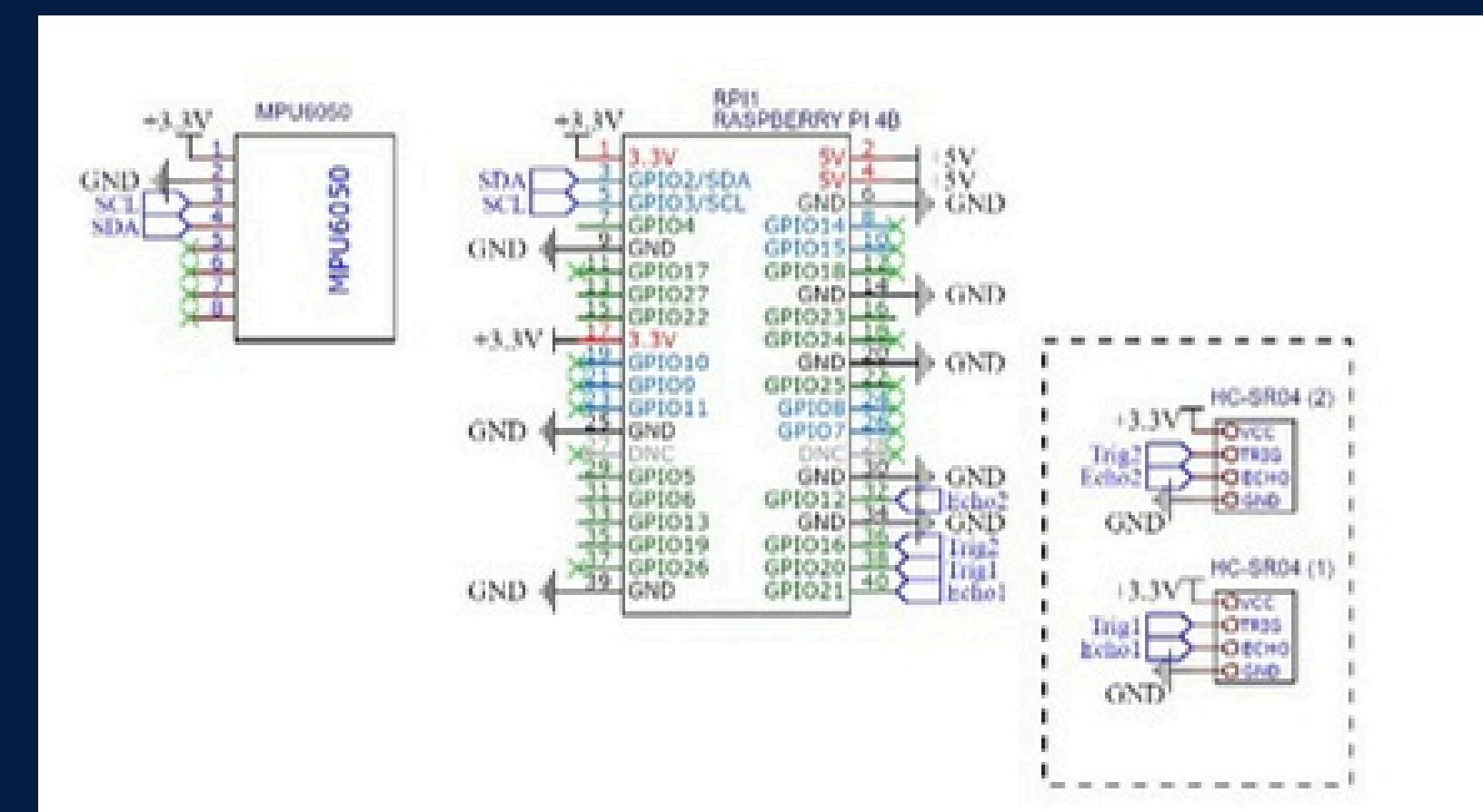
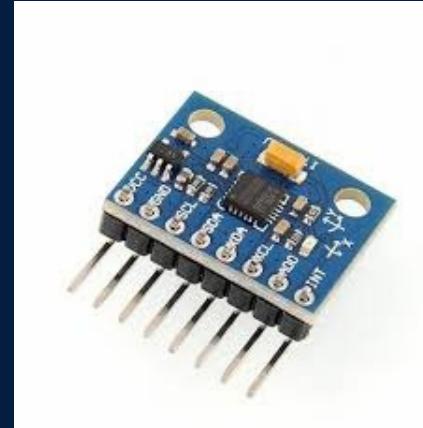
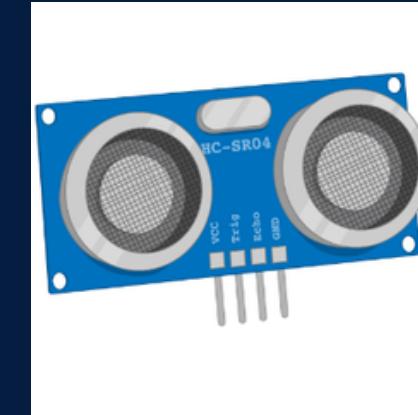
KUMARI.J.K.A.V

- Shake detection using MPU6050.

By utilizing an accelerometer to detect shaking, Luigi can transition from sleep mode to an active state, subsequently navigating to the main menu web view and altering the color of the web view buttons.

- Security movements and make more interactive.

Using an ultrasonic sensor, Luigi detects distance and initiates servo movement and repetitive turning if uplifted more than 10 cm, with sound and corresponding emotion display. Additionally, the sensor detects objects in front of the car to avoid collisions as a safety measure.



224115K

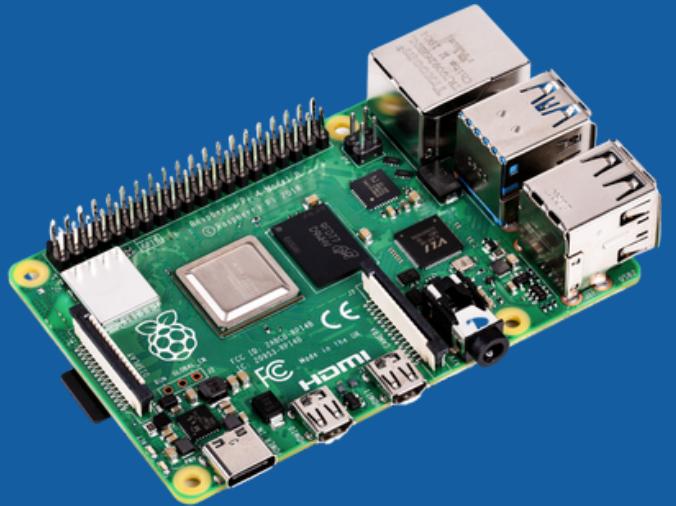
KUMARI.J.K.A.V

- Buck Converter

**Convert a higher battery voltage to a voltage suitable
for a Raspberry .**

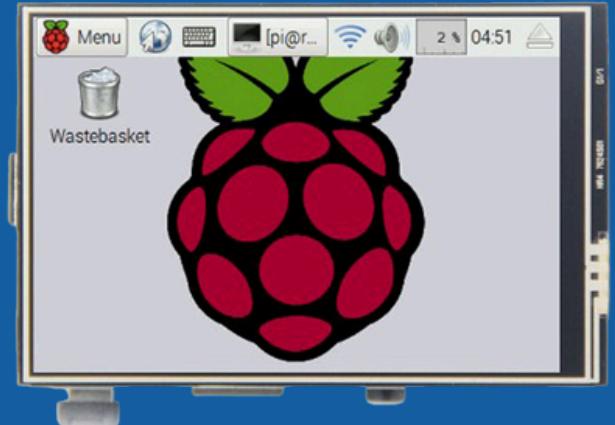


COMPONENTS



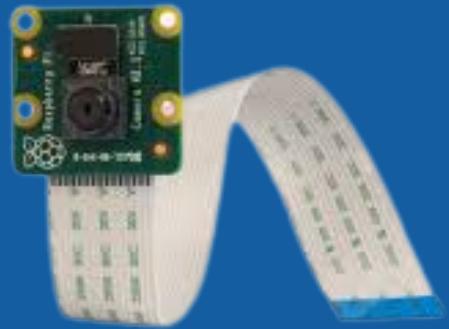
Raspberry pi 4

The Raspberry Pi 4 is a powerful single-board computer with a quad-core ARM Cortex-A72 CPU and up to 8GB of RAM. It supports dual 4K HDMI displays, USB 3.0, and gigabit Ethernet. Its enhanced performance and connectivity make it versatile for various applications.



3.5 inch TFT Display 320*480 pixels with Touchscreen

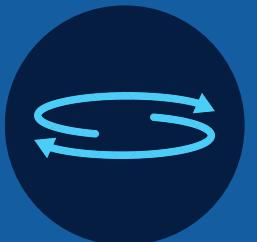
The 3.5-inch TFT display features a resolution of 320x480 pixels and includes a touchscreen interface. It provides vibrant visuals and responsive touch input, making it ideal for interactive projects and compact devices.



5MP Camera Module Board REV 1.3 / Webcam / Video 1080p 720p Fast For Raspberry Pi 3

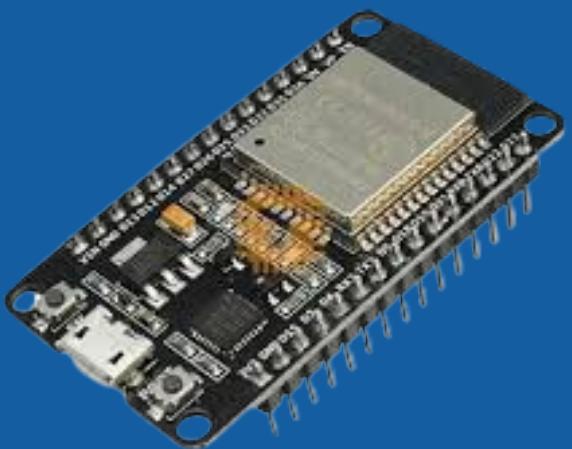
The 5MP Camera Module Board REV 1.3 is designed for the Raspberry Pi 3, offering high-quality imaging with support for 1080p and 720p video. It functions as both a webcam and a video recording device, ideal for various photography and video projects.

COMPONENTS



Servo motors MG90

The MG90 servo motors are compact and versatile, offering precise control with metal gears for enhanced durability. They are ideal for applications requiring reliable and accurate movements, such as robotics and remote-controlled devices.



ESP32 module

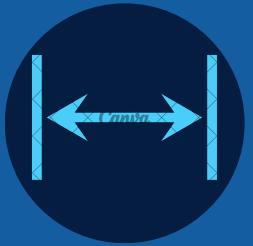
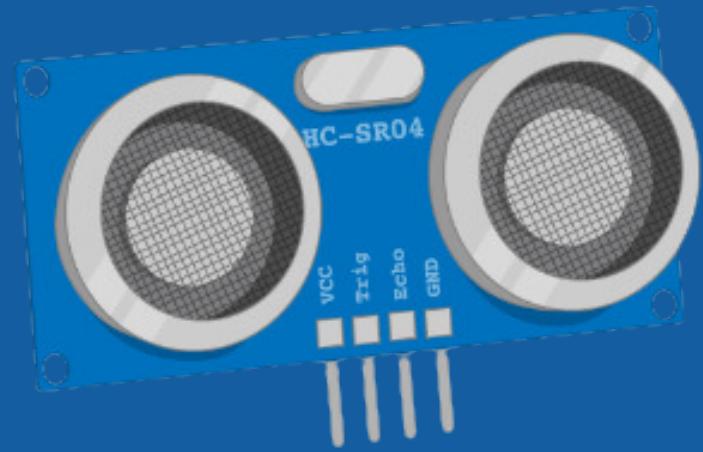
The ESP32 is a low-cost, low-power system on a chip (SoC) series with Wi-Fi and dual-mode Bluetooth capabilities, created by Espressif Systems. It is designed for a wide range of applications, including Internet of Things (IoT) devices, wearable electronics, and smart home automation.



Thumb Joystick module MDO106

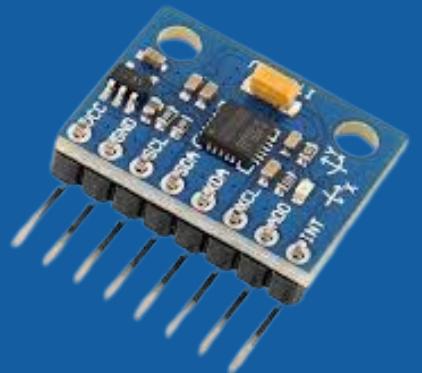
The 5MP Camera Module Board REV 1.3 is designed for the Raspberry Pi 3, offering high-quality imaging with support for 1080p and 720p video. It functions as both a webcam and a video recording device, ideal for various photography and video projects.

COMPONENTS



Ultrasonic Sensor

An ultrasonic sensor is a device used to measure distance or detect objects using ultrasonic sound waves. The sensor typically has a transmitter that emits ultrasonic sound waves and a receiver that detects the waves reflected back from an object. The sensor sends out a sound wave at a frequency above human hearing (typically around 40 kHz). When the sound wave hits an object, it reflects back to the sensor. The time it takes for the echo to return is used to calculate the distance to the object based on the speed of sound.



Gyroscope module

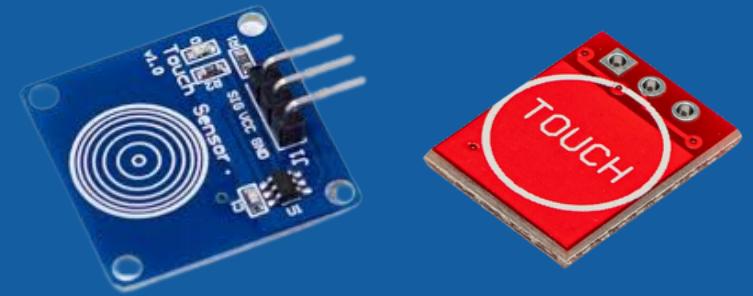
A gyroscope module measures angular velocity by detecting changes in vibration patterns of microelectromechanical systems (MEMS) elements due to the Coriolis effect. It outputs data on rotational motion, which is essential for applications requiring precise orientation and motion tracking.



Speakers

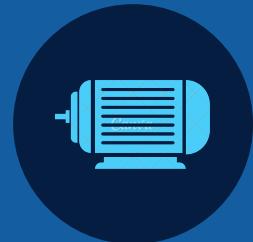
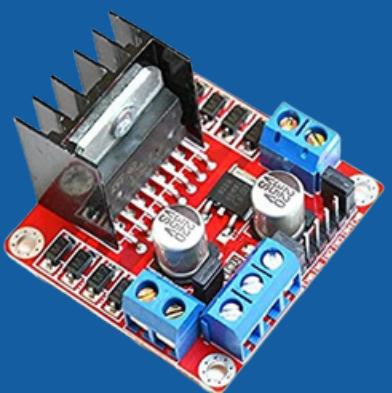
A 5V 5W speaker module is a compact audio device designed to operate with a 5V power supply, providing up to 5 watts of audio output power. It is typically used in electronic projects and small devices to deliver clear sound and is often used in applications like alarms, notifications, and audio playback in DIY electronics. The module is usually easy to integrate with microcontrollers and other low-voltage circuits.

COMPONENTS



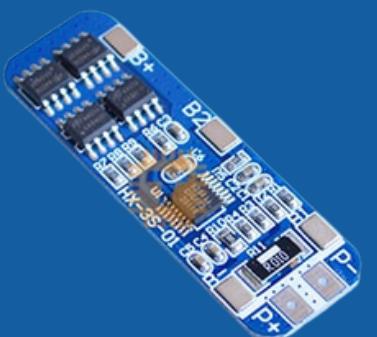
Touch sensors

A touch sensor is a type of device that captures and records physical touch or embrace on a device and/or object. When there's contact, touch, or pressure on the surface of a touch sensor, it opens up an electrical circuit and allows currents to flow through it. It enables a device or object to detect touch or near proximity, typically by a human user or operator.



Motor driver L298

The L298N is a dual H-Bridge motor driver which allows speed and direction control of two DC motors at the same time. The module can drive DC motors that have voltages between 5 and 35V, with a peak current up to 2A.



Battery management system

Battery management system (BMS) is technology dedicated to the oversight of a battery pack, which is an assembly of battery cells, electrically organized in a row x column matrix configuration to enable delivery of targeted range of voltage and current for a duration of time against expected load scenarios.

COMPONENTS

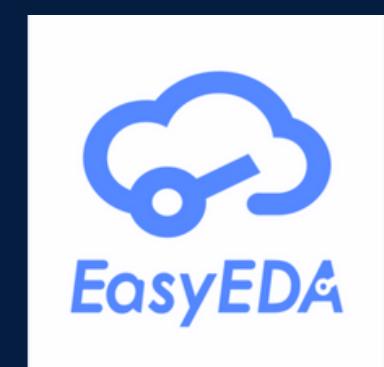


Li-ion Rechargeable Battery

The 3.7V 3200mA 18650 Li-ion Rechargeable Battery (model BA0026) is a high-quality power source designed for a wide range of electronic devices. Known for its reliable performance and long-lasting charge, this battery is ideal for applications requiring consistent and efficient energy. Its durable construction ensures safety and longevity, making it a trusted choice for both professional and everyday use.

Technologies

- Html, css, javascript
- autodesk FUSION
- Easy EDA
- pycharm
- Wokwi
- Arduino ide
- VNC viewer
- VS code



BUDGET

Components	Price
Raspberry pi -4	18 000
Esp32	1350
Display	4750
PCB Printing	1400
Camera Module	2740
Servo motor	600
Gyroscope	500

BUDGET CONT.

Components	Price
DC motors & Chassis	1950
Battery(3200mAh)	1890
Battery (1800mAh)	400
Battery Management system	500
Speaker	200
SD card	900
Motor driver	350

BUDGET CONT.

Components	Price
Microphone	660
Ultrasonic sensor	500
3D printing	1350
cooling fan	260
Amplifier	50
Touch Sensors	300
wires	200

BUDGET CONT.

Components	Price
Joystick switchh	150
JST connectors	100
Other	1000
Total	40100

REFERENCES

- Raspberry Pi 4 documentation
- Texas Instruments
- Adafruit
- Youtube

Q & A



Group 7 -IT

Thank you.....



A WORLD OF PLAY IN YOUR PALM

Connect with us.



+94 77 651 1756

