IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

ADVANCED SMART AND SAFE CAR USING OBJECT DETECTION, ALCOHOL DETECTION AND SAFE PARKING

[1]DASARI V V AKHIL, [2]MIGADA NAVEEN, [3]PERLA SUSHMA, [4]DINISHA REDDY VAKADA, [5]MADIREDDI SAIKUMAR

[1]Student, [2] Student, [3] Student, [4] Student, [5] Student
COMPUTER SCIENCE & ENGINEERING

VISAKHA INSTITIUTE OF ENGINEERING & TECHNOLOGY
VISAKHAPATANAM, ANDHRA PRADESH
INDIA

Under Guidance of
M.USHA
Visakha Institute of Engineering & Technology
Faculty of Computer Science Engineering
Visakhapatnam, Andhra Pradesh

Under Guidance of
A.S.C. TEJASWINI KONE
Visakha Institute of Engineering & Technology
HOD of Computer Science Engineering
Visakhapatnam, Andhra Pradesh

Abstract: Revolutionizing driving safety with a Raspberry Pi, IoT, and AI integration. A backup camera employs computer vision for real-time object detection, providing visual and textual feedback. Smart parking sensors calculate distances, displaying object representations for secure parking. Alcohol detection chip in the steering ensures enhanced safety by preventing drunk driving.

INTRODUCTION

In response to the escalating road accident rates, our project pioneers a comprehensive safety initiative, integrating three core elements: Alcohol Detection, Object Detection, and Safe Parking. The Alcohol Detection with Vehicle Controlling segment tackles the global issue of drunk driving by introducing an in-car Alcohol Detector equipped with a breath analyzer, designed to intervene when necessary.

The second component, Object Detection, aligns with the advancements in autonomous driving. Leveraging state-of-the-art sensors and computer vision, this feature ensures precise identification of vehicles, pedestrians, and traffic elements, creating a secure driving environment.

Addressing urbanization challenges and parking inefficiencies, the Safe Parking feature proposes an intelligent Smart Parking System. By employing a wireless sensor network and Bluetooth technology, this system optimizes parking efficiency, reducing time and fuel wastage.

Collectively, these features prioritize both driving safety and parking convenience. The integration of IoT technologies emphasizes our commitment to modernizing transportation, ultimately contributing to a safer and more efficient driving landscape. This initiative seeks to revolutionize urban travel, envisioning a future where road safety and parking ease take precedence.

NEED OF THE STUDY.

In order to successfully execute our project, it is imperative to delve into the intricacies of computer vision and deep learning algorithms, with a specific focus on mastering techniques for precise object detection. Concurrently, a comprehensive understanding of IoT and seamless integration of sensors, including Ultrasonic, IR, and Alcohol sensors, within the IoT framework is crucial. Proficiency in Raspberry Pi programming using Python is essential for effective control of hardware components, forming a solid foundation for project implementation. Exploring the nuances of smart parking systems, particularly wireless sensor networks and Bluetooth technology, is pivotal for optimizing parking efficiency. Grasping the underlying technology of breathalyzers and alcohol sensors, integral to our project, is imperative. Acquiring familiarity with essential software tools such as Raspberry Imager, VNC Viewer, and MQTT is essential for the successful implementation of IoT applications. The ability to adeptly document and present project details is vital, emphasizing clarity in communication. Additionally, a nuanced understanding of safety regulations and standards, particularly those related to alcohol detection and driving safety systems, ensures compliance and adherence to legal requirements, contributing to the overall success of our innovative smart and safe transportation initiative.

OBJECTIVE

Our project deploys a real-time system employing computer vision and deep learning techniques. Cameras and sensors are utilized to identify obstacles, pedestrians, and other vehicles, offering visual and auditory alerts to the driver for prompt hazard awareness.

Transitioning to Alcohol Detection, our initiative integrates advanced systems like breathalyzers into the car's interior. Continuous monitoring of the driver's alcohol levels ensures adherence to legal limits. Detected impairment triggers immediate actions, including ignition disablement and alerts to authorities, effectively curbing drunk driving incidents.

For Safe Parking, our project employs infrared (IR) and ultrasonic sensors to implement a sophisticated parking system. This setup continuously monitors obstacles and distances, ensuring a safe and efficient parking process. Real-time feedback enhances overall parking security and addresses challenges associated with blind spots.

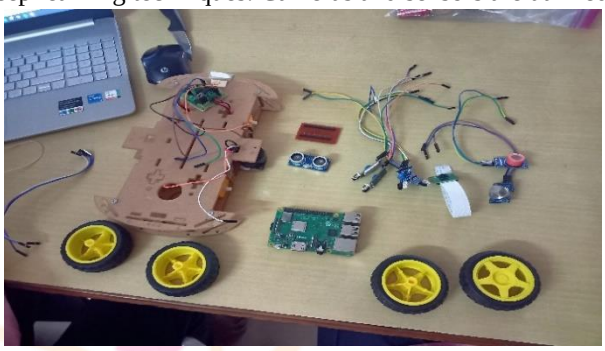


Fig. 1 – Components for this Project

HARDWARE

1. Raspberry pi 3B+
2. Motors
3. IR sensors
4. Ultrasonic sensor
5. Alocohol sensor
6. Pi Camera
7. L293D driver
8. Buzzer
9. SD card
10. SD card Reader
11. Car Body with tyres
12. Jumper wires
13. Laptop
14. Solder less Board
15. VGA to HDMI converter
16. USB cable
17. ADC

These are the hardware components to complete this and make Prototype of over Project.

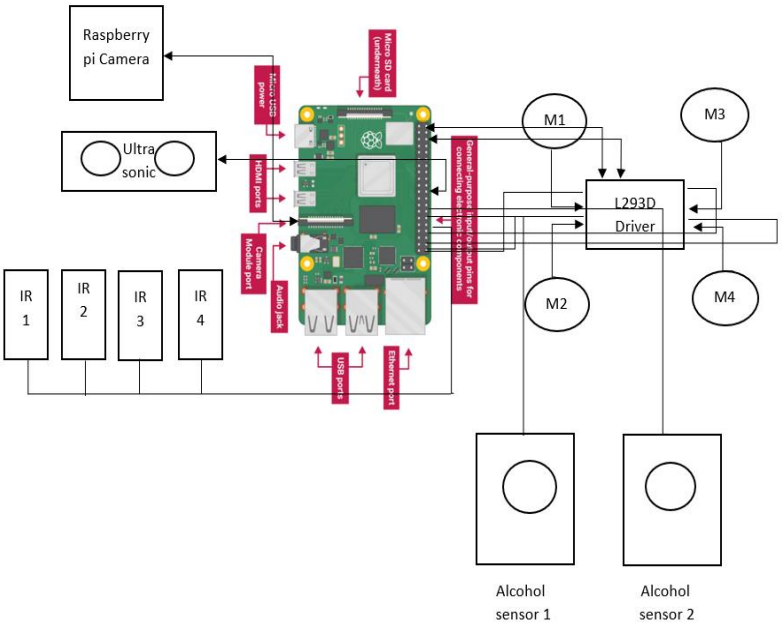
SOFTWARE

The software required for building the Advanced Smart and Safe Car using objectdetection, alcohol detection, and safe parking, are as follows

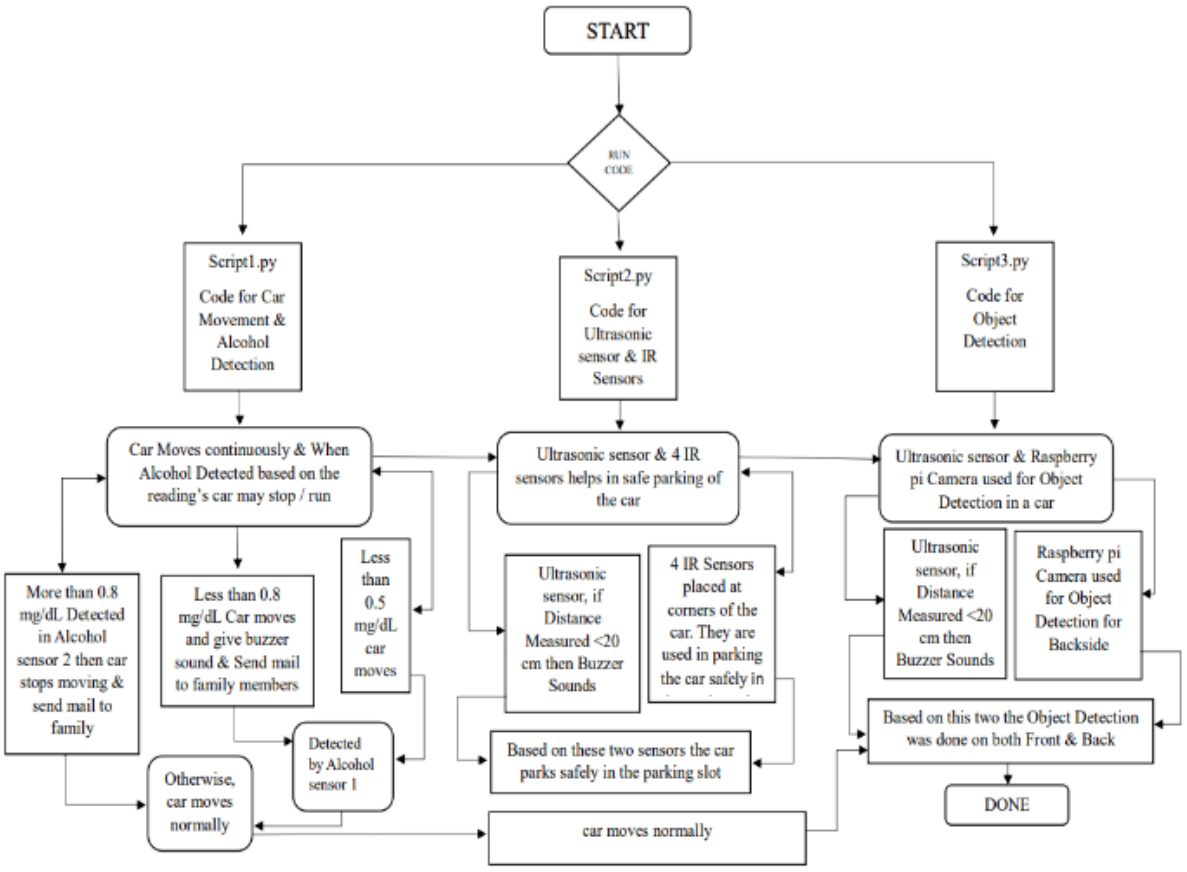
1. Raspberry Imager
2. VNC Viwer
3. Raspberry pi OS
4. MQTT
5. Libraries
6. Database
    a. COCO.NAMES
    b. Universal Data Tool
7. Python Programming
8. Raspberry pi Desktop

these are software needs to complete this Project

BLOCK DIAGRAM



FLOW CHART



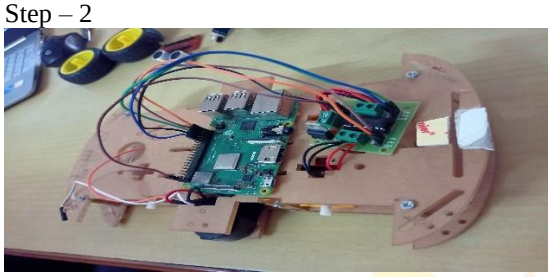
CONNECTIONS

The connections to complete this project are as follows

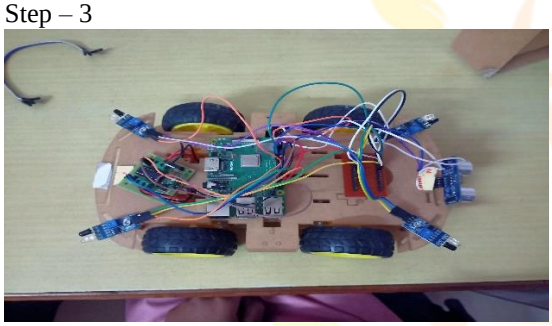
Let's see the connections through the project

Step – 1

Step – 2



Step – 3



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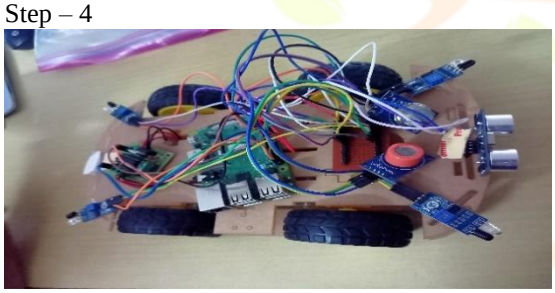

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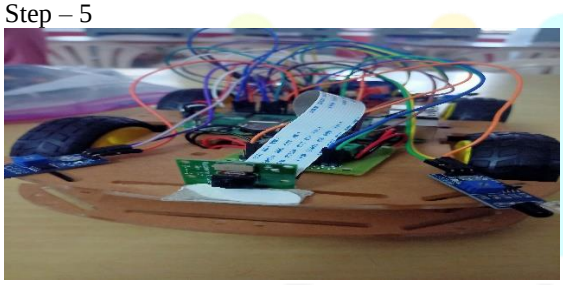
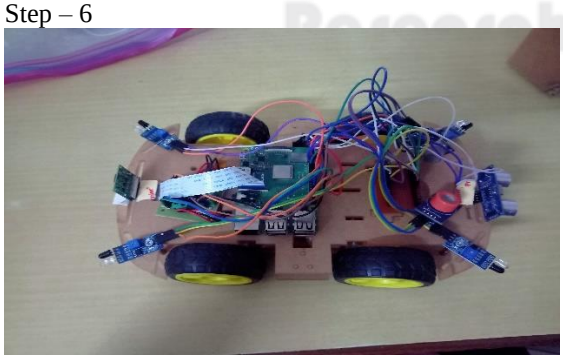


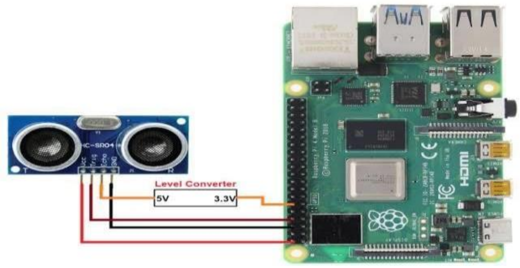
Step – 6

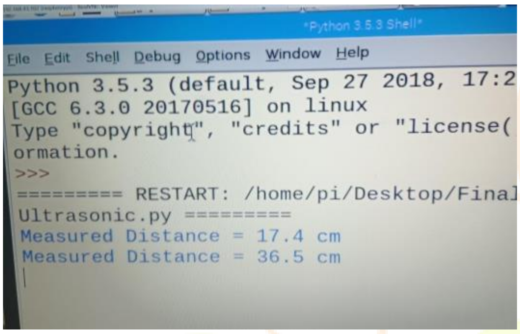


RESULTS

As result, the successful integration of Object Detection, Alcohol Detection, and Safe Parking features in this project, coupled with a Buzzer Alert System, ensures enhanced safety for both drivers and passengers. The implementation addresses various aspects of accident prevention: Object Detection provides rearview monitoring, Alcohol Detection alerts passengers and, at a critical stage, disables the engine to mitigate risks, while Safe Parking employs sensors for distance awareness and alerts. Our modified model car effectively tackles blind spot cases, offering a proactive approach to accident prevention. As technology evolves, our scalable project allows for future enhancements, ensuring continued relevance and effectiveness in an ever-changing landscape. Our project signifies a significant stride towards a safer, smarter, and more connected future.

Ultrasonic sensor output

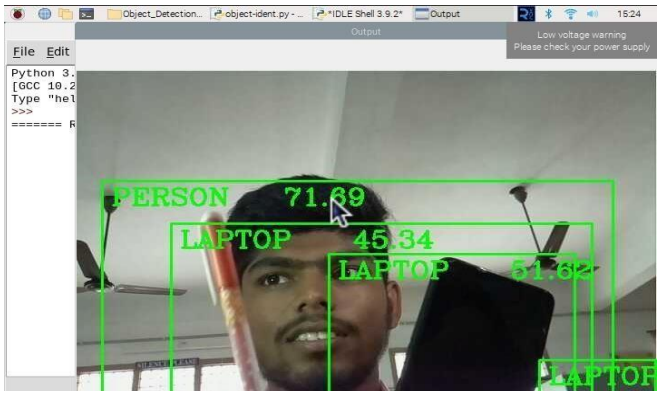




IR sensor output

Alcohol sesnor output

Object detection output



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PROJECT CONNECTION LINK:
https://drive.google.com/file/d/18nssvtjchwwgHBjZ2O-XdKTAbP56azYP/view?usp=sharing

DOCUMENTATION LINK :
https://drive.google.com/file/d/1WM4CkEHhUMRgAKNLFFnVZD3Sc2k0LZ_i/view?usp=sharing

CODE LINK:
https://github.com/Akhildasari5159/Advanced-smart-and-safe-car-with-object-detection-alcohol-detection-safe-parking