Project Presentation On

"Automatic Speed controlling of Vehicle based on FREERTOS using STM32 and LiDAR Module"

Presented By:

Badashaha Vinita	230340130015
Nikam Sandip	230340130032
Rishi Suri	230340130041
Shubham Pandey	230340130049
Saindre Shivraj	230340130059

Guided By:
Mr. Shripad Deshpande

Coordinated By:
Ms. Srujana B.

CDAC ACTS PUNE

PG-DESD MARCH 2023

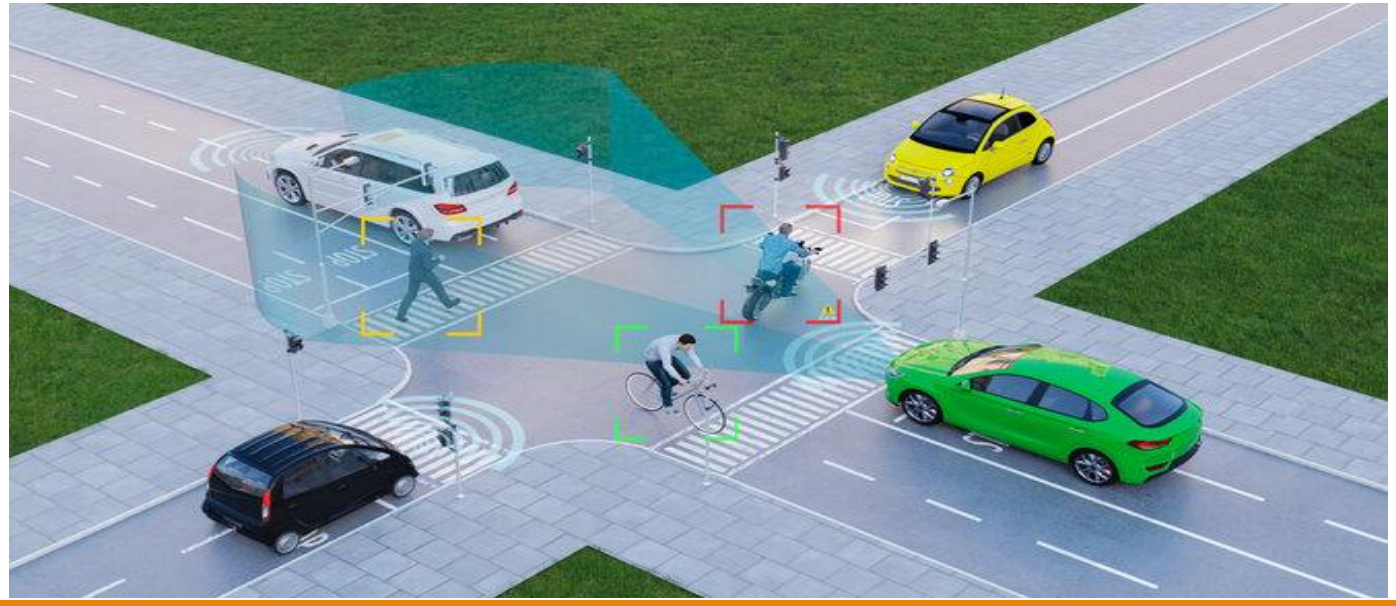
Date: 28 / 08 / 2023

CONTENTS

INTRODUCTION

The project "Automatic Speed Controlling of Vehicles based on FREERTOS using STM32 and LiDAR Module" seeks to address the need for improved road safety and traffic management through the fusion of LiDAR technology and an RTOS on the STM32 microcontroller platform.

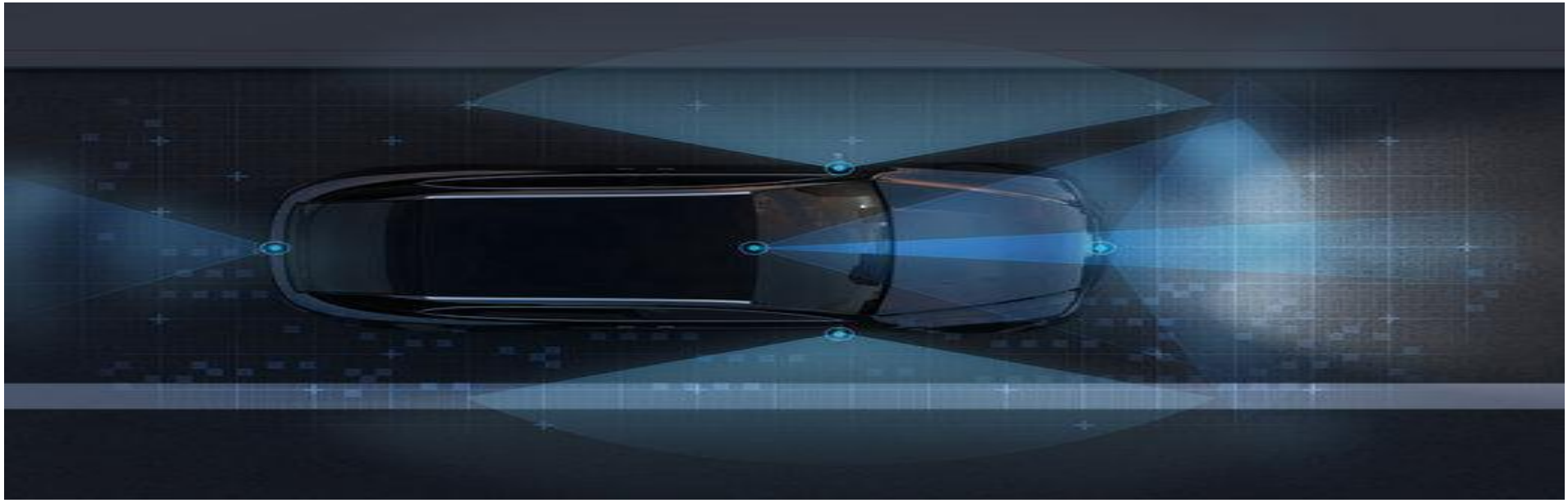
The project aims to develop a prototype system that can automatically adjust a vehicle's speed by processing LiDAR data in real-time and utilizing the capabilities of FreeRTOS for efficient task scheduling and control.



OBJECTIVE OF THE PROJECT WORK

NEED OF THE WORK:

Safety is a essential part of everyone's life. Large number of road accident occurred due to over speeding,rash driving,lane cutting, violation of traffic rules and failure to understand signs. Due to such accident cases reported all over the world, more attention is needed for research in this domain.



Why LiDAR? Why not RADAR!

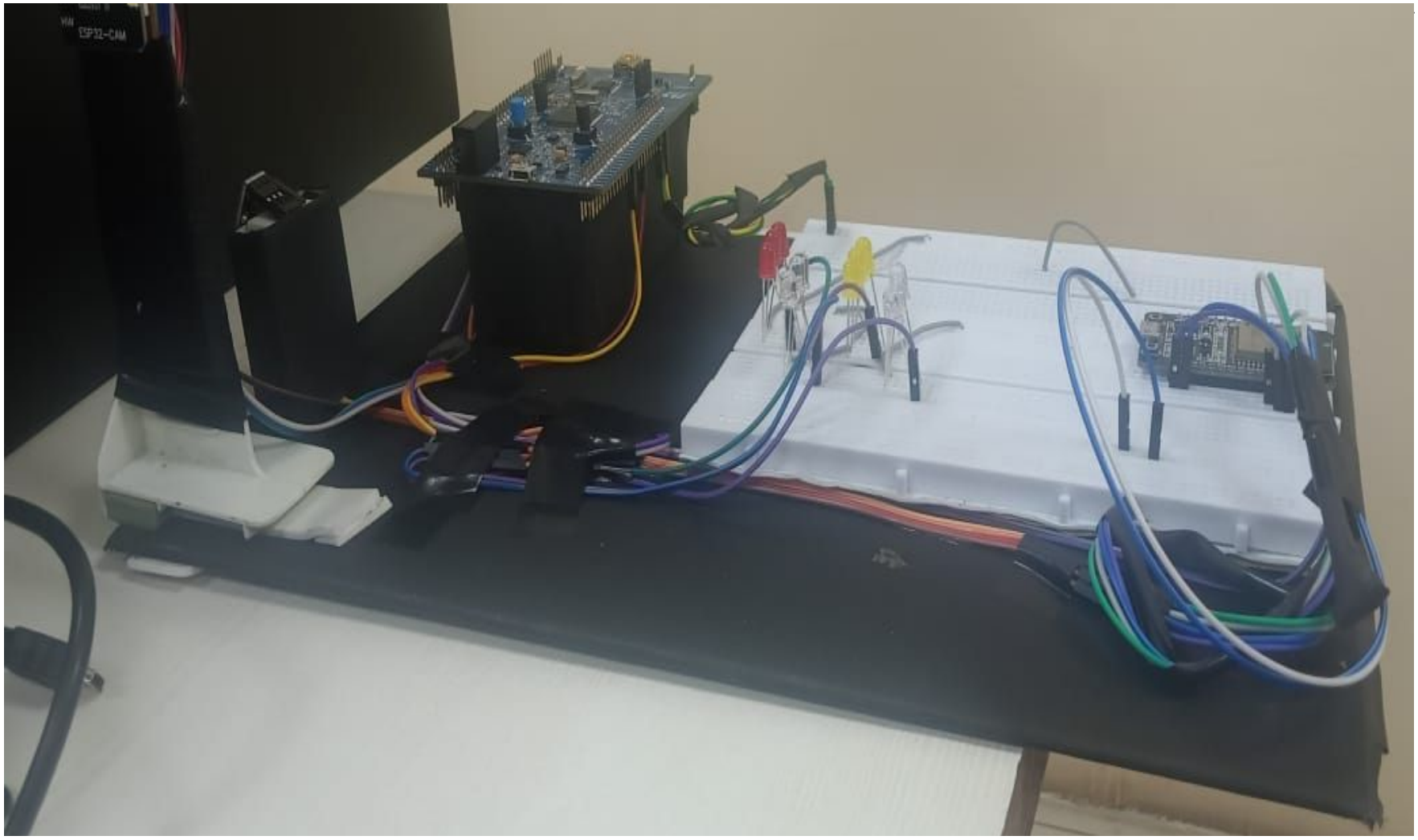
Lidar and Radar are two popular remote sensing technologies used for detecting and measuring the distance of objects.

LiDAR detects the exact size of obstacle on road, distance in between LiDAR instrument and object, time based on result. Lidar is used to identify the object near the surroundings like pedestrians, divider , speed breaker and makes 3D images. except Tesla all automobile giants are working on LiDAR because they uses vision based system .

Whereas RADAR system works on radio waves used for wide range applications like battleship, fighter jets, military purpose etc. RADAR waves has less absorption.

basically LiDAR technology offers higher resolution and better accuracy compared to RADAR.

WORKING MODEL OF PROJECT



HARDWARE/SOFWARE USED

Hardware Details:-

ESP32-CAM,

FT232RL USB to TTL 3.3V 5.5V Serial Adapter,

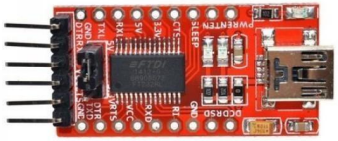
ESP32 DEVELOPMENT BOARD,

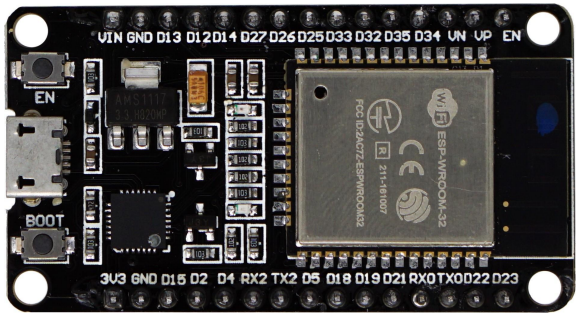
STM32F407VGT6,

Software Details:-

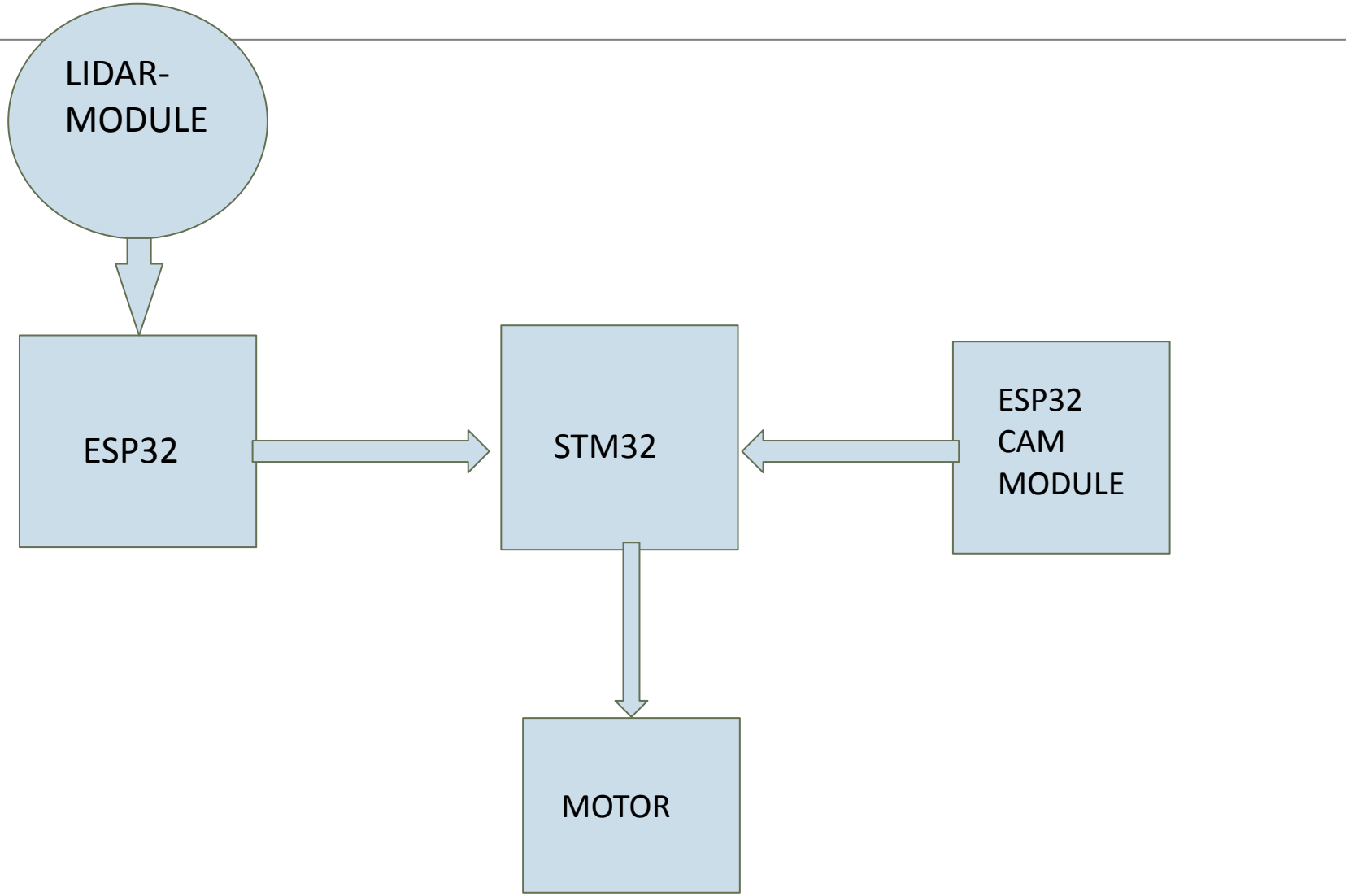
Arduino 1.8.19 & 2.12,

STM32 Cube IDE,

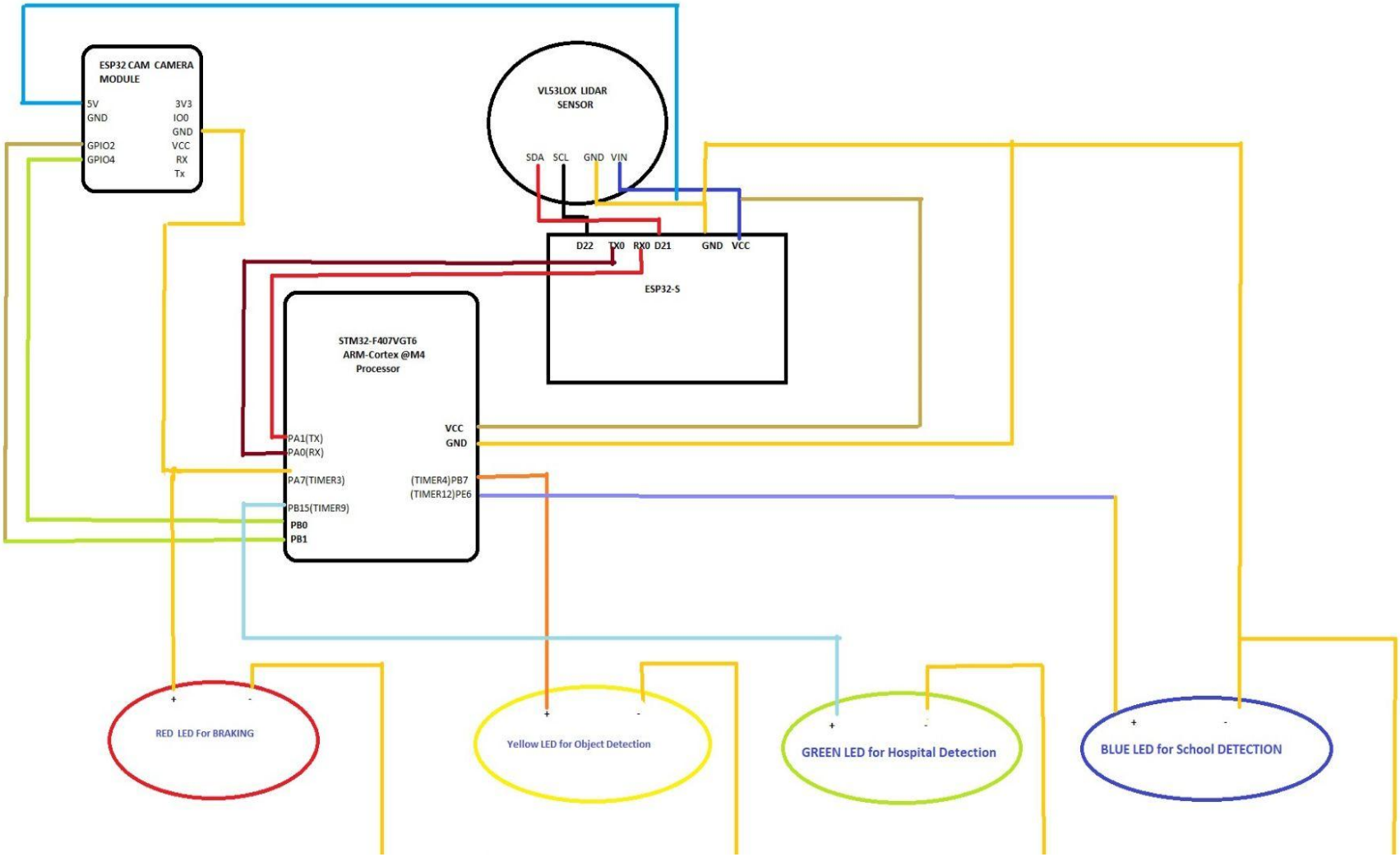




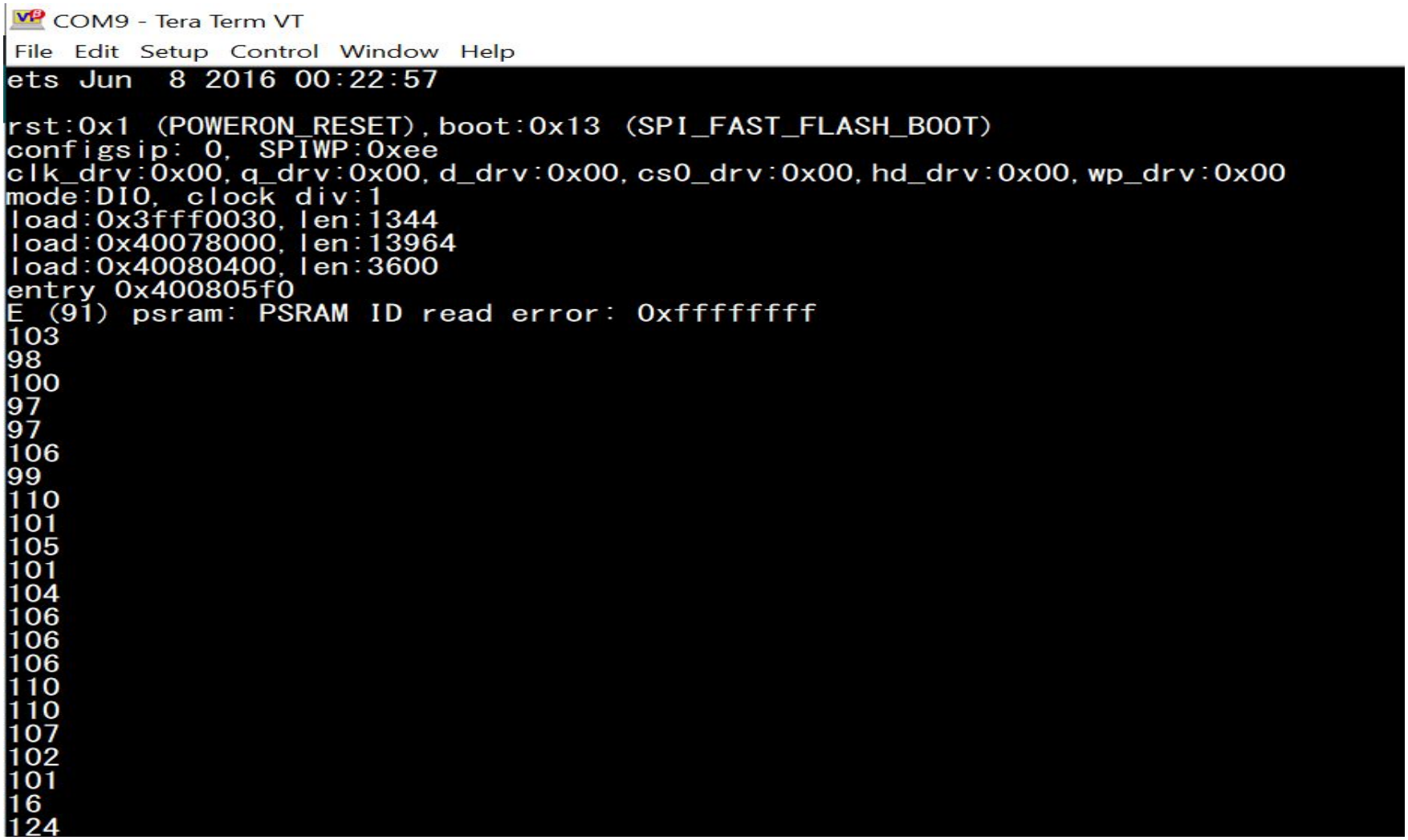
FLOW DIAGRAM



CIRCUIT DIAGRAM



RESULTS / OUTPUT



DATA FROM LiDAR

RESULTS / OUTPUT cont…

```
    No objects found
Predictions (DSP: 7 ms., Classification: 707 ms., Anomaly: 0 ms.):
    School (0.863281) [ x: 72, y: 24, width: 8, height: 16 ]
    School (0.835938) [ x: 32, y: 32, width: 8, height: 8 ]
Predictions (DSP: 7 ms., Classification: 707 ms., Anomaly: 0 ms.):
    School (0.886719) [ x: 72, y: 24, width: 8, height: 16 ]
    School (0.925781) [ x: 32, y: 32, width: 8, height: 16 ]
Predictions (DSP: 7 ms., Classification: 707 ms., Anomaly: 0 ms.):
    School (0.941406) [ x: 72, y: 24, width: 8, height: 16 ]
    School (0.972656) [ x: 32, y: 32, width: 8, height: 8 ]
Predictions (DSP: 7 ms., Classification: 707 ms., Anomaly: 0 ms.):
    School (0.597656) [ x: 72, y: 16, width: 8, height: 24 ]
    School (0.984375) [ x: 32, y: 32, width: 8, height: 8 ]
Predictions (DSP: 7 ms., Classification: 707 ms., Anomaly: 0 ms.):
    School (0.574219) [ x: 72, y: 16, width: 8, height: 8 ]
Predictions (DSP: 7 ms., Classification: 707 ms., Anomaly: 0 ms.):
    School (0.863281) [ x: 72, y: 16, width: 8, height: 8 ]
    School (0.875000) [ x: 32, y: 24, width: 8, height: 8 ]
Predictions (DSP: 7 ms., Classification: 707 ms., Anomaly: 0 ms.):
    School (0.773438) [ x: 32, y: 24, width: 8, height: 8 ]
Predictions (DSP: 7 ms., Classification: 707 ms., Anomaly: 0 ms.):
    School (0.890625) [ x: 32, y: 24, width: 8, height: 8 ]
Predictions (DSP: 7 ms., Classification: 707 ms., Anomaly: 0 ms.):
    School (0.500000) [ x: 40, y: 24, width: 8, height: 8 ]
```

DATA FROM ESP32 CAM MODULE

FUTURE SCOPE

- The future scope for the project "Automatic Speed Controlling of Vehicles based on FREERTOS using STM32 and LiDAR Module" is very promising. As the technology continues to develop, it is likely that automatic speed control systems will become more sophisticated, reliable, and user-friendly.
- These systems have the potential to make a significant contribution to the field of transportation by improving road safety, reducing traffic congestion, and reducing pollution.

CONCLUSION

The project "Automatic Speed Controlling of Vehicles based on FREERTOS using STM32 and LiDAR Module" is a promising development that has the potential to make a significant contribution to the field of transportation.

It is still in the early stages of development, but there is a lot of potential for it to be successful. As the technology continues to develop, it is likely that automatic speed control systems will become more reliable and user-friendly. This will make them more feasible to deploy and will help to realize their potential benefits.

REFERENCES

- Donzia, S. K. Y., Kim, H. K., & Geum, Y. P. (2021, September). Implementation of Autoware Application to real-world Services Based Adaptive Big Data Management System for Autonomous Driving. In 2021 21st International Conference on Computational Science and Its Applications (ICCSA) (pp. 251-257). IEEE.
- Alaba, S. Y., & Ball, J. E. (2022). A survey on deep-learning-based lidar 3d object detection for autonomous driving. Sensors, 22(24), 9577.
- Widmann, G. R., Daniels, M. K., Hamilton, L., Humm, L., Riley, B., Schiffmann, J. K. & Wishon, W. H. (2000). Comparison of lidar-based and radar-based adaptive cruise control systems. SAE transactions, 126-139.

THANK YOU !!!

ANY QUESTIONS ???