SMART TRAFFIC MANAGEMENT-IOT

Ranjani M Sellamani S Shifa Rukshana B Kirana S
Guide Name : Lathika B

Introduction

Traffic congestion is becoming one of the critical issues with increasing population and automobiles in cities. Traffic jams not only cause extra delay and stress for the drivers, but also increase fuel consumption and air pollution. Although it seems to pervade everywhere, megacities are the ones most affected by it. And its ever-increasing nature makes it necessary to calculate the road traffic density in real-time for better signal control and effective traffic management. The traffic controller is one of the critical factors affecting traffic flow. Therefore, the need for optimizing traffic control to better accommodate this increasing demand arises. Our proposed system aims to utilize live images from the cameras at traffic junctions for traffic density calculation using image processing and AI. It also focuses on the algorithm for switching the traffic lights based on the vehicle density to reduce congestion, thereby providing faster transit to people and reducing pollution.
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Motivation

One of the top benefits of smart traffic management systems is the predictive insights that they offer. Data collected from smart traffic sensors can be analyzed to assist governing bodies in determining how frequently roadways are used, the daily quantity of vehicles at specific intersections, and essential urban data. Ultimately, ITS can provide crucial preventative roadway insights.

Scope of the Project

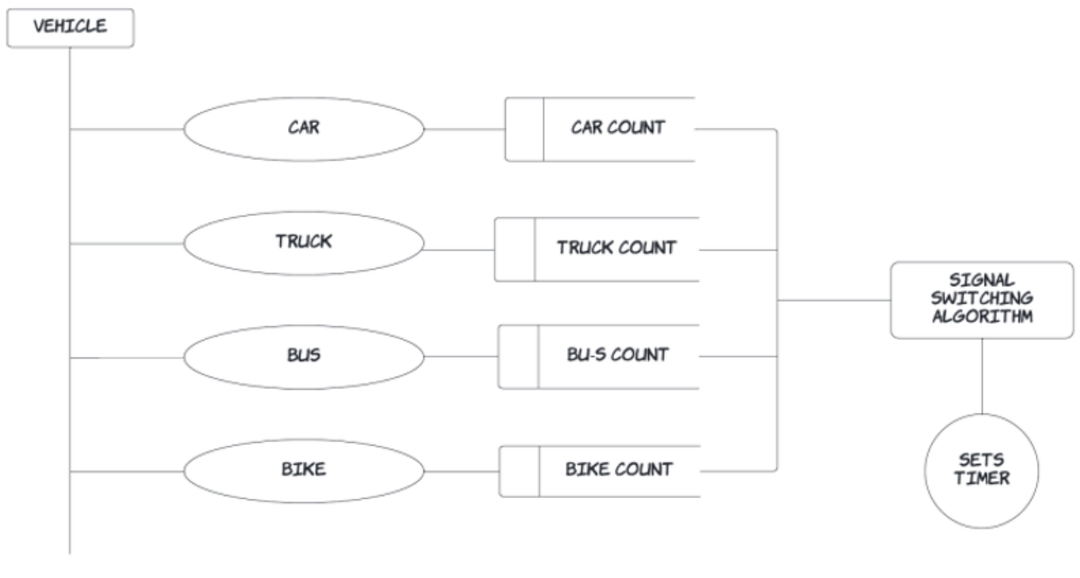
The scope of this project included :

1. Traffic Control Management is the design, auditing and implementation of traffic control plans at worksites and civil infrastructure projects. Traffic Management can include: flagging, lane closures, detours, full freeway closures, pedestrian access, traffic plans, traffic management vehicles and sidewalk closures..

2. An Internet of Things (IoT)-enabled intelligent traffic management system can solve pertinent issues by leveraging technologies like wireless connectivity & intelligent sensors. Considered a cornerstone of a smart city, they help improve the comfort and safety of drivers, passengers & pedestrians.

Methodology

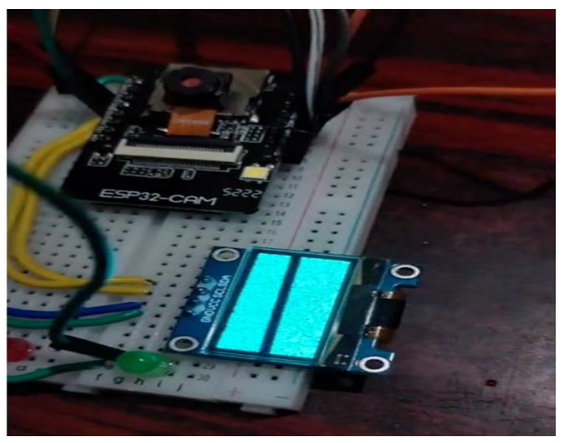
1. Define the requirements: The first step in here are four basic elements in a computerized traffic control system: computer(s), communications devices, traffic signals and associated equipment, and detectors for sensing vehicles
2. User research: Conducting user research is essential to understand the target audience's needs and preferences. This involves conducting surveys, focus groups, and interviews to gather insights into the users' travel patterns, pain points, and expectations from a traffic management.
3. Design and prototyping: Once the requirements and user research are defined, the next step is to create the design and prototype. This involves creating wireframes and user interfaces that reflect the
4. features and functionalities.
5. Development: After the design and prototyping phase begins. This involves coding the app's front-end and back-end, integrating APIs for real-time information, and testing the app's functionalities to ensure that they work seamlessly.
6. Testing and quality assurance: Once the development is complete, it is essential to test the app's functionalities thoroughly. This involves testing the app for usability, performance, security, and compatibility with various mobile devices.
7. Deployment and maintenance: After testing and quality assurance, the system is ready for deployment. Reduce everyday congestion markedly, by smoothing traffic flows and prioritizing traffic in response to demand in real time.



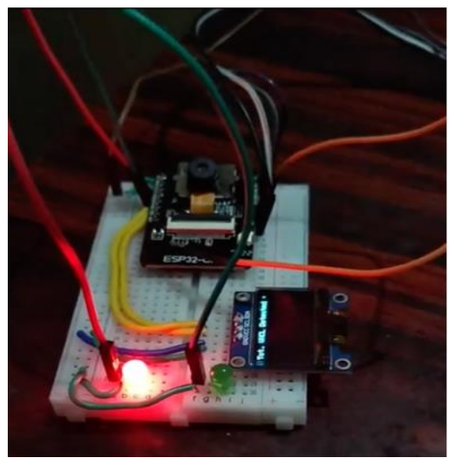
Architecture Diagram

Results

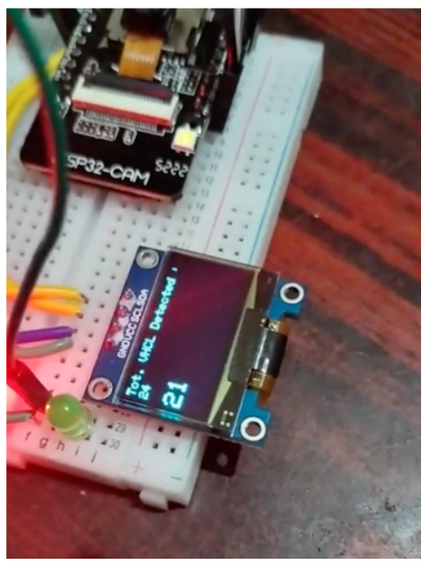
A prototype was developed to demonstrate the applicability of our proposed system. Several experiments on real traffic data were carried out to evaluate the efficiency of the proposed algorithm. The traffic density was monitored and calculated by vehicle detection . As soon as the traffic density crosses the specified threshold on a road, the system stopped the normal operation and kept the green light on till the situation on the road became normal. The real-time data was also being sent to he local and central server as well.



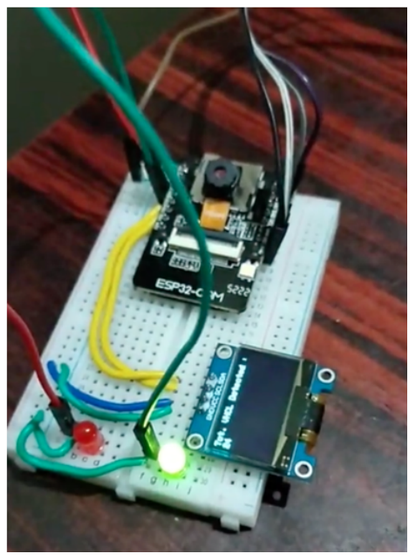
Initial wiring



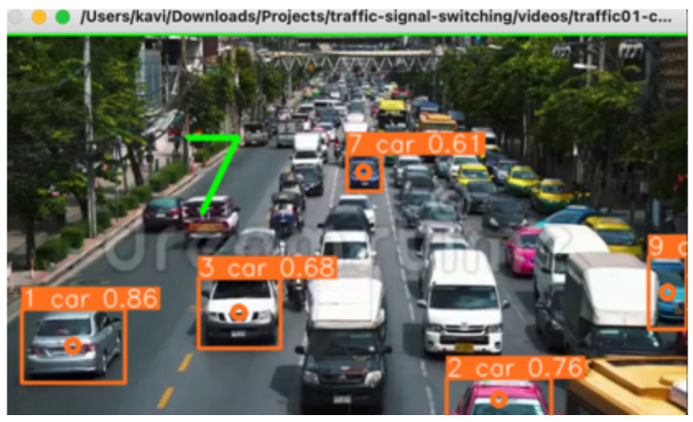
Display and light wiring



Total detected vehicles and timer



Green light after timer completes



Vehicle detection using yolov3

Conclusion

In conclusion, Traffic light timing in real-time: The smart traffic management system helps traffic light to operate in real-time conditions. Traffic operates based on traffic congestion automatically. Safety from road accidents: Due to the deployment of this system, the chances of road accidents can be minimized.The proposed work focuses on Smart Traffic management System using AI which will eliminate the drawbacks of the existing system such as high implementation cost, dependency on the environmental conditions, etc. The proposed system aims at effective management of traffic congestion. It is also cost effective than the existing system.
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References

[1] Traffic flow Optimization and vehicle Safety in Smart Cities, S. Krishnan & T. Bala subhramanyam in Research gate,May(2022)

[2] V. Srinivasan, Y. Priyadharshini Rajesh,S. Yuvaraj and M. Manigandan, “Smart site visiters manipulate with ambulance detection” , IOP Conference Series: Materials Science and Engineering, vol. 402, pp. 012015,2018.