SMART TRAFFIC MANAGEMENT AND CONTROL SYSTEM BASED ON IOT

Pradeep Nayak[1], Priyanka K[2], Rakshitha S[3], Rakshitha K[4], Sachin[5]

[1]Assistant professor, Dept. of Information Science and Engineering, Alva's Institute of Engineering and Technology, Karnataka, India

[2]UG Student, Department of Computer Science and Engineering (Internet of Things, Cybersecurity Including Blockchain Technology), Alva's Institute of Engineering and Technology, Karnataka, India

[3]UG Student, Department of Computer Science and Engineering (Internet of Things, Cybersecurity Including Blockchain Technology), Alva's Institute of Engineering and Technology, Karnataka, India

[4]UG Student, Department of Computer Science and Engineering (Internet of Things, Cybersecurity Including Blockchain Technology), Alva's Institute of Engineering and Technology, Karnataka, India

[5]UG Student, Department of Computer Science and Engineering (Internet of Things, Cybersecurity Including Blockchain Technology), Alva's Institute of Engineering and Technology, Karnataka, India

Emails:

pradeep@aiet.org.in[1], manjunathkabbalagi2@gmail.com[2], rakshithasudi428@gmail.com[3], rakshithakanchan17@gmail.com [4], reddysachin532@gmail.com[5]

Abstract

In lots of cities they have been grown too much during the past 20 years. Making it hard to control and regulate the traffic. The National Transport and Safety In 2020, the Kenyan Authority says that 3600 people died in 134,000 crashes. When traffic is at its worst, we can help. Everyday, the average city person in Kenya wastes two litres of petrol in their car. Congestion make us waste time, and nearly an hour each day for the average driver. Because they give off greenhouse gases that is helping the planet get warmer, they waste petrol and spray chemicals into the air. The worst part about pollution is the impact on plants, animals and people around them. The traffic and control issues in the city is a best approach for IoT technology. The style is the main topic of this article. The simple way design, develop and put in place the suggested system gives it a slight edge over other approaches right now. It will also reduce gas use, the number of people who die each day and crash, and how long everyone has to stay on the road everyday.

Keywords

WSN, IoT, image processing, Node-Red, and ultrasonic sensors

1. INTRODUCTION

People who live in the city know that traffic is a big problem. It makes the air bad and it makes our lives late. The amount of cars on the roads goes up all the time as cities grow and more people move to live in them. So, everyone talk about the traffic problem in big cities.Besides being a waste of time, traffic hurts the economy of our country and work too. So for this, smart people look all the time for a better way to make this mess better. More than half of the people in the world lived in the cities in 2014 and that number still go up. As the people in the city grow, the buses and the roads also get too full. Also, many people end up doing their work far away from where they stay because it cost a lot to stay close to where you work, and this make the cars on the roads go up. Making the roads bigger might look like the best way to fix this, but to be honest cities got to do better at this traffic thing.

This is where smart traffic control comes in. These new systems use data from sensors at intersections to time the lights rather than the old way. The sensors count how many cars are in each lane. A computer system decides the best time for each light to turn green or red by looking at all this info. The goal? Cut down how long cars sit at red lights. This report looks at how to make traffic better with smart agents, the Internet of Things, and more tech. With apps or traffic signs, drivers can see info collected by IoT tools like cameras and sensors. They can avoid traffic, see updates on traffic, and get to where they want to go faster in this way.

2. LITERATURE SURVEY

This system uses real time vehicle tracking with IoT. With IoT, RFID, and cloud, it tracks cars and shows real time traffic info. The GPS tells you how fast you are going and how far you have gone. Why is this big? Because the system tells you when you go over the speed limit, which helps avoid accidents and can save lives. Using PEPA, IoT, and TOPSIS, researchers modeled real time traffic queries for smart traffic system. You will always get the latest traffic info to help you make the most of your drive thanks to their performance evaluation method, which looks at real time queries and how good the system does.

Another group worked on Graph theory and Intelligent Traffic Management Systems (ITMS). They built their model to show how traffic info can be gathered through nodes placed along city streets. By following this set up, drivers can get to where they are going without running into too many cars or people and get there faster with less trouble. The authors have used distributed multi-agent Q learning to make this awesome traffic light system. Basically, their system has to handle both cars and people traffic so that the city intersections are easier to work with. They change the lights to keep things moving after they work out how long the lines and how many folks are waiting.

IoT and cloud work as one now in city smart traffic solving the big problem on growing cities, traffic jam.. The smart team had a way to make jam less, more so when a car on call, ambulance or fire truck needs to go fast. To control the city lights, the team made a plan and used Node MCU, Raspberry Pi, and RFID tags. The smart city light system changes the light so the ambulance or fire truck can go by fast, the system talks to the car's sensors.

Now lets have a talk about the Internet of things or the IoT that means the Internet of everything. All these smart web connected devices always are collecting information, sharing it, and doing things based on that information about their environment. Think about how many sensors, chips and communication system are in everything from your washing machine to your cars. The connected devices are all the time talking to each other (called machine to machine or m2m) and they are using the data they are collecting to make decisions. Even when all this is automatic you can still talk to them, setup and see the information.

3. Methodology

In simple terms, an RSU is a bridge that connects cars, road equipment, and other roadside devices. It makes sending and getting information much easier by doing what all of this equipment is built to do gather and share data following the rules of the industry. Cars have many sensors, so they are always taking in details about what is around them. With a mobile app, all of this details whether it is from the RSU or from the cars is put together and sent straight to users. RSUs are on all of the biggest streets of the city.

Each one has a small computer that is linked to a smart IP camera. This camera captures live images of traffic lights and their countdown timers. The small computer runs a special program, scans the images quickly, and sends the traffic data to a main database. Every car has a radio wave identification (RFID) chip on it, and every traffic light has RFID chips as well. Active RFID chips are used here because they can communicate without wires. When a car with an active RFID chip gets near a reader, the system detects it automatically and the traffic data goes to the database.

Here is what will come next: the main server gets those images from the RSU, takes the lights timed from it, adds five to ten seconds more of work time, and keeps everything in order. After getting those images from the RSU, the main server gets the lights timing, adds five to ten seconds of work time, and keeps everything neat. Anyone can look at live traffic light info all over the city thanks to the phone system, which uses HTML5. Every RSU place is a dot on the maps in the app. Touch the dot to see what is at a intersection. Because of the timestamp and GPS, cars can use the same system to find how close they are to a light. This system also helps check how busy the roads are.

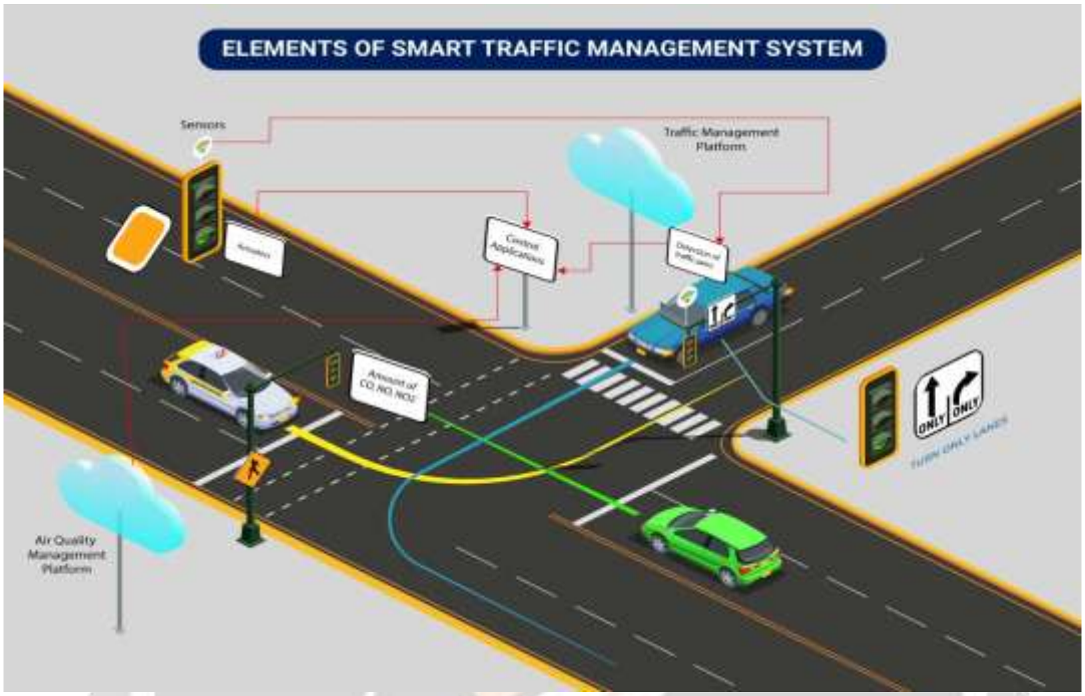
4.Discussion

This paper shows how a new system uses Internet of Things tech to help drivers get live traffic info. The system does three main things: it deals with maps, gets traffic info, and manages storage and display. To find out where each message should go, it grabs road info from a free wiki map. The setup uses magnetic sensors to spot cars, work out how long they are, and find how much space they take up on the road to get traffic data. To prove the idea works, the makers built a test model. Each part was tested alone, and they found the info was pretty close to right most of the time. Here's how it all works: the system links sensors to the IoT thing using Wi-Fi. A tiny computer and magnetic side-road sensors talk through a client-server system over Wi-Fi. Nodes A and C are clients for some readings, and nodes B and D are servers. Node A becomes the client and node B acts as server for more data. Node B sends real-time data to the IoT system and uses Wi-Fi to send messages to the side-road unit. The Node MCU microchip in the test model could be swapped for a stronger one in real use. The IoT system and the main traffic control system could link in the same way, but that is not covered here. Because magnetic sensors are cheap and easy to find, they were used in the test model. However, ready-made PCBs like IVCCS or PRS, which have already proven they can spot cars, work out their speed, measure how long they are and the magnetic strength, and tell what type they are, could be used in a full build.

5. ADVANTAGES AND DISADVANTAGES

Much of the great ideas about car control and roads has already come from a lot of smart people who have jumped into making and running IoT controlled traffic systems and they did a really good job of it. These people have taken live image feeds of how cars fill different parts of the roads and feeds it back to the server, and from there they use it to control the traffic automatically. The best part? IoT really makes it super easy for people to keep an eye on the traffic and the work being done out there. Now, the police officers also get live info about whats happening on the streets. Think bigger, your MATLAB can even connect to Thing Speak and help work through the traffic loads in real time. Self-driving cars can do all this too with these systems. The researcher of this work have worked super hard to make sure everything is safe for all users. These systems make it so you can run a whole bunch of complex programs without worrying about how much memory your microcontroller has. Certain systems can even make way for emergency cars and change signals around depending on how busy the roads are. These are cheap, easy to put in any place. But things get a lot harder when you add more sensors and gadgets in the picture. Now days there are so many things connected to each other, businesses need to step up and make sure the info they have is safe. All IoT systems have to follow security rules, but keeping track of everything can be really tough. Managing all that data, handling so many IP addresses, and keeping up with all the new and complex things in the IT systems can be a challenge. As more devices and controls come online, networks need to grow even more.

6. Figure



7. Conclusion

Drivers can get live updates on how busy the roads are, thanks to a smart traffic system made with IoT tech. The setup is simple: an IP smart camera, a microcontroller, and a roadside unit watch the road. This is all reliable, cheap, and uses what we already have. Heavy traffic is a big pain, especially in places with poor roads. They cause bad air and waste gas. But, using computer vision and IoT gets us a way better traffic system. Some systems can even send updates to drivers through websites, to help you avoid getting caught in traffic. IoT-enabled smart roads make trips faster, cut congestion, and make people safer. Cities can move these gadgets anywhere, and they cost little to put in and move around. Even at busy times, there is less traffic and less time waiting at stop lights. Pedestrians are safer too. Honestly, you can see the results right away: trips are easier overall, fire trucks and ambulances can get through faster, and people waste less time in their cars.

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