IOT BASED SMART TRAFFIC VIDEO DETECTION MANAGEMENT SYSTEM

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Abstract: Traffic management network is seen as one of a smart city's main dimensions. Despite rapid population growth and urban mobility in metropolitan cities, regular traffic congestion is seen on the highways. A smart traffic management network using the Internet of Things (IoT) is proposed in to resolve various issues relating to traffic management on roads and to support authorities in proper planning. A hybrid approach (centralized and decentralized combination) is used to optimize road traffic flow, and an algorithm is developed to effectively handle different traffic situations. To this end, the system takes the amount of traffic as feedback from a) cameras b) and sensors and then controls traffic signals. In addition, FLIR's are often used during a traffic jam to prioritize the emergency services such as ambulances and fire department services. A prototype is being designed to show the feasibility of the new traffic management system, which not only optimizes traffic flow but also links local fire departments with a centralized server. This also collects valuable details delivered in visual formats that could be of assistance to the authorities in future road planning.

Key Words: IOT, traffic management, metropolitan cities, FLIR's software.

1. INTRODUCTION

Traffic congestion is a growing worldwide problem causing waste of time and resources, emissions and even stress. Both are eager to reach their destination in a minimum of time. Once some VIP enters the city the issue becomes very bad. Both traffic is immediately halted and massive police and public services are used. Manage these situations especially when it is a metropolitan town is a hard nut to crack.

A few illustrative examples of the recent urban pilot programs are listed below:

City	Partners	Description
PITTSBURGH	surtrac, Rapid Flow, Carnegie Mellon University	Artificial intelligence (AI) technology to analyze data from each intersection independently, then adjust traffic control system in real time to optimize traffic flow. Currently deployed at 50+ intersections in Pittsburgh.
City of Rotterdam	FLIR	Thermal sensors to detect and distinguish cyclists from motorists, which allows dynamic traffic control to reduce wait time for cyclists.
City of Dallas	ERICSSON	Ericsson will install its Advanced Traffic Management System (ATMS) to enable real-time data collection and dynamic traffic control capabilities.
KUALA LUMPUR	Alibaba Group, MDEC	Alibaba Cloud will support the city to launch its Malaysia City Brain initiative to optimize traffic flow and emergency response in the city.

FLIR Systems: the world leader in thermal imaging cameras. FLIR Systems is the world leader in thermal imaging systems design, manufacturing and marketing for a wide range of commercial, industrial and government applications. Rapidly emerging markets and organization Demand for thermal imaging cameras in a wide variety of markets has grown considerably over the last few years. More and more skilled people are finding out that thermal imaging cameras are powerful tools that can help them solve problems they face. FLIR Systems aims to be present in all emerging markets through an ambitious acquisition strategy where thermal imaging will play a pivotal role.

2. PROPOSED SYSTEM

The outcome of the proposed system is to assess the substantially enhanced level of traffic-dependent control relative to the current system. We use FLIR's smart traffic sensors and software to better manage the city's traffic congestion. Video sensors for car, pedestrian and bike traffic control flows in a smarter manner and with FLIR's management.

2.1 Enhancing Safety and Efficiency for Road Traffic and Public Transformation

Traffic planners worldwide use FLIR Intelligent Transportation Systems systems to keep roadways running efficiently and safely. FLIR's tools for detecting and tracking help traffic and public transport authorities handle traffic flows effectively and ensure safety. FLIR hardware and software systems are based on advanced technology, which has been tested for more than 25 years. Hardware and software solutions from FLIR help you track cars and pedestrians in urban environments, identify road and tunnel accidents, collect traffic data and ensure protection on our public railways

2.1.1 Urban intersections

FLIR traffic sensors allow officials to monitor traffic signals at intersections to allow for smooth flow of urban traffic. These also help manage traffic flows for pedestrians and bicyclists, and improve their health in busy traffic environments. FLIR sensors also collect useful traffic data for Traffic engineer data which explores flow patterns on road networks.

2.1.2 Highways, tunnels and bridges

FLIR help to save lives in tunnels and on roads and bridges by detecting smoke, fire, stopped cars, lost freight, pedestrians, wrong-way driving vehicles and other traffic incidents. Early detection of road irregularities allows first responders to quickly intervene and prevent secondary accidents.

2.1.3 Train tracks, platforms and on-board

FLIR technology FLIR thermal imaging cameras avoid serious incidents and damage to infrastructure by detecting vehicles blocking crossing levels and people entering metro tunnels. Traffic on Smart city sensor and passenger trains and help operators control occupancy of passengers. Automatically senses hazardous behavior and incidents can be prevented dropping on tracks from platform

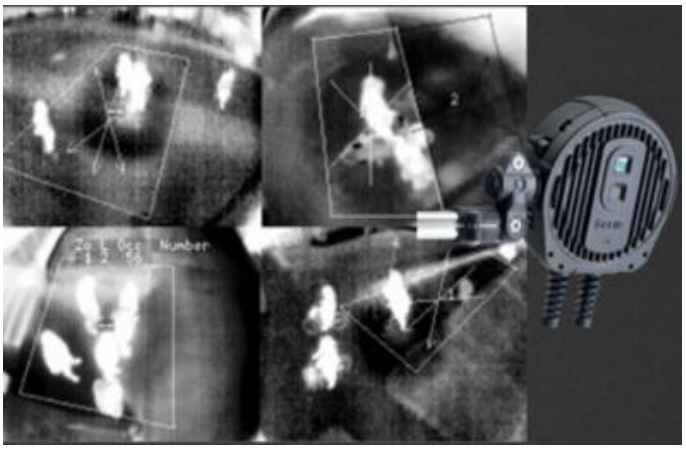
2.2 Flir Detection and Sensors for Traffic Signal Control

2.2.1 TrafiCam(Vehicel presence sensor)

The Vehicle Presence Sensors TrafiCam series incorporates a CMOS camera and video detector in one. TrafiCam helps you to dynamically monitor traffic lights, based on details about vehicle presence. The TrafiCam series includes standalone TrafiCam vehicle presence sensor and TrafiCam x-stream vehicle presence sensor and video sharing data collection.

2.2.2 TrafiOne(Smart city sensor)

FLIR TrafiOne is an all-round sensor which tracks pedestrians and bicyclists waiting and crossing in urban environments. In all weather conditions and even in complete darkness TrafiOne uses thermal imaging technology to track reliably. The integrated Wi-Fi monitoring system provides darkness TrafiOne uses thermal imaging technology to track reliably. The integrated Wi-Fi monitoring system provides high-resolution data to traffic engineers at intersections about cars, bicycles and crossing in urban environments.



2.2.3 ThermiCam2/TrafiSense2(Integrated Thermal Traffic Detector)

ThermiCam2/TrafiSense2 is an intelligent thermal sensor capable of detecting complex traffic signal control and data collection for cars, bicyclists and pedestrians. Integrated Wi-Fi technology enables simultaneous measurement of the thermal detection, travel time and delay time.

2.2.4 TrafiSense2 V2X / ThermiCam2 V2X(Intelligent Thermal Traffic Sensor with V2X)

TrafiSense2 V2X / ThermiCam2 V2X is a smart thermal sensor for detection of cars, pedestrians and bikes. Integrated V2X technology allows for simultaneous thermal detection and delivery of V2X messages. Since the TrafiSense2 V2X / ThermiCam2 V2X depends on thermal energy rather than light, it provides 24/7 traffic monitoring and is able to detect road users at night, in glare and in harsh weather.

2.2.5 TrafiRadar (Video Sensor & Radar Combination)

FLIR TrafiRadar is a combination of a video sensor and radar which provides information about the position and speed of vehicles approaching or waiting at an intersection. Whenever a car is present in the dilemma location, the TrafiRadar alerts the traffic light controller, either increasing the green time or increasing all red lights to increase overall protection at signalized intersections. Better decisions can therefore be taken to manage the traffic lights in a more efficient manner.

2.2.6 Acyclica by FLIR (Smart City Platform)

The smart city platform in Acyclica offers the knowledge and insight needed to consider congestion. Acyclica transforms data mountains into actionable information to help agencies understand travel times, patterns of traffic and congestion. From point-and-click analysis of the origin-destination to tracking congestion in real-time, Acyclica helps organizations understand how people travel. A selection of automated reports, efficient user interface and robust APIs ensure that when you need them, data is where you need them.

2.3 Video Detection and How It Works

Traffic managers worldwide use FLIR Intelligent Transportation Systems technology to track and control flows of traffic. Whether it's for tracking cars and pedestrians in urban areas, identifying road and tunnel collisions, or gathering traffic data for the purposes. FLIR Intelligent Transportation Systems provides both the intelligent traffic detection and control hardware and software. The combination of a video camera or thermal imaging camera with intelligent data analytics offers a great solution for handling and tracking traffic streams for traffic managers worldwide. A video or thermal imaging camera mounted transmits an input signal to a detection device. When the camera or the modules for processing video images are mounted, detection zones are superimposed on the video image.

If a car or a pedestrian reaches a detection zone the pixel value has changed inside that one. Depending on the difference in pixels the device enables the detection. Dedicated algorithms generate various types of traffic information: presence and incident-related data, statistical processing data, and pre- and post-incident analysis data.

Transmission of traffic data, compressed images, and alarms to the Technical Control Room. The system can be mounted such that a third party device like a traffic signal, electronic traffic sign or some other VMS panel is activated by the video image processor.

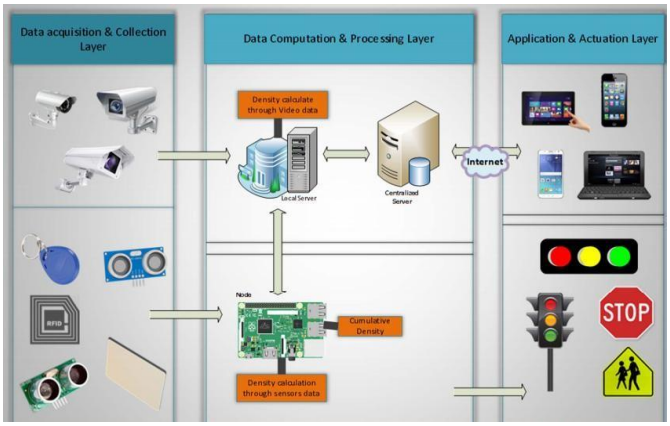


Fig: system model

3. Existing methodology

The existing system have had various issues for managing traffic on roads and to help authorities in proper planning, a smart traffic management system using the Internet of Things (IOT).A hybrid approach (combination of centralized optimize traffic flow on roads and an algorithm is devised to manage various traffic situations efficiently. Another algorithm based on Artificial Intelligence is used to predict the traffic density for future to minimize the traffic congestion. Besides this, RFID are also used to prioritize the emergency vehicles such as ambulances and fire brigade vehicles during a traffic jam. 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

4. Limitations of Existing System

a) Traffic control signals may result in re-entrant collision of vehicles
b) In this existing system they may cause a delay in the quick movement of traffic

5. Conclusion

This work provides an effective solution for the rapid growth of traffic flow particularly in big cities, which is growing day by day and conventional systems have some weaknesses as they struggle to effectively handle current traffic. Considering the state-of-the-art solution for traffic management systems, a smart traffic management system is introduced for more reliable and effective monitoring of road traffic situations. FLIR Systems provides intelligent traffic management as well as hardware and software control. Combining a video camera or thermal imaging camera with intelligent data analytics provides a perfect solution for traffic managers worldwide for

Managing and monitoring traffic streams. Mount with a video or thermal imaging camera, the input signal is sent to a detector. After mounting the camera or the video image processing modules, detection zones are superimposed on the video image.

6. Future work

FLIR ITS 'six hallmarks are revolutionizing the way traffic flows around the world on roadways. Our special, field-proven solutions help ensure smooth and safe flow of cars, pedestrians and bicycle traffic. FLIR Systems has the best solution for your particular situation by integrating video cameras, thermal sensors, and intelligent data processing, and command and

control applications. Traffic managers worldwide use FLIR ITS technology to keep roadways safe and functioning at peak performance. FLIR ITS technologies are helping to secure both residents and vital infrastructure. FLIR is happy that the places we live, work and fly to are as secure as possible

7. References

[1] M. P. a. B. B. Sivasankar, "IoT Based Traffic Monitoring using Raspberry Pi," Internation Journal of Research in Engineering, Science and Technology (IJRESTs), vol. 1, no. 7, pp. 2454-664x, 2016.

[2] A. Lone, "Karachi's crime malaise," Tribune.com.pk, 18 August 2011. [Online]. Available: https://blogs.tribune.com.pk/story/7540/karachis-crime-malaise/. [Accessed 20 September 2017].

[3] S. Sharief, "Road Accidents in Pakistan Reach Alarming High: Who's Responsible," Pakwheels.com, 2016. [Online]. Available: https://www.pakwheels.com/blog/alarming-increase-of- road-accidents- in-pakistan/. [Accessed 2017].

[4] B. k. Khan, "Traffic jams in Karachi result in losses worthof millions eachday,"PakWheels.com,2013. [Online].Available:https://www.pakwheels.com/blog /tra ffic-jams-karachi-result-losses- worth-millions-day/. [Accessed 2017].

[5] P. K. K. P. S. T. Prashant Jadhav, "Smart Traffic Control System Using Image Processing," International Research Journal of Engineering and Technology (IRJET), vol. 3, no. 3, pp. 2395-0056, 2016.

[6] E. Leigh, "Advancing integrated and sustainable transport for the Cambridge region," Smarter Cambridge Transport, 2017. [Online]. Available: http://www.smartertransport.uk/. [Accessed 2017].

[7] T. C. N. K. Kartikeya Jain, "Smart vehicle identification system using OCR," in 3rd International Conference on Computational Intelligence & Communication Technology (IEEE-CICT 2017), Ghaziabad, India, 2017.

[8] Misbahuddin, S., Zubairi, J.A., Saggaf, A., Basuni, J., Sulaiman, A. and Al-Sofi, A. IoT based dynamic road traffic management for smart cities. 12th International Conference on High-Capacity Optical Networks and Enabling/Emerging Technologies, 2015, 1-5.

[9] Choosri, N., Park, Y., Grudpan, S., Chuarjedton, P. and Ongvisesphaiboon, A. Iot-rfid testbed for supporting traffic light control. International Journal of Information and Electronics Engineering **5** (2) (2015).

[10] Togrikar, P.S. Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance, and Stolen Vehicle Detection. Imperial Journal of Interdisciplinary Research **2** (4) (2016).

[11] Aditi Dambe, Upasana Gandhe and Varsha Bendre. Automatic Penalty Charging for violation of traffic rules. International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering **2** (2) (2013).

[12] Sonal Deshmukh, Aditya Jagtap, Sameer Inamdar and Ganesh Mahadik. Real Time Traffic Management and Air Quality Monitoring System Using IoT. International Journal of Innovative Research in Computer and Communication Engineering **4** (4) (2016) 7026-7033.

[13] Shum, L.V., Hailes, S., Gupta, M., Bodanese, E., Rajalakshmi, P. and Dasai, U.B. Bi-scale temporal sampling strategy for traffic-induced pollution data with Wireless Sensor Networks. IEEE 39th Conference on Local Computer Networks, 2014, 279-287.

[14] Soylemezgiller, F., Kuscu, M. and Kilinc, D. A traffic congestion avoidance algorithm with dynamic road pricing for smart cities. IEEE 24th International Symposium on Personal Indoor and Mobile Radio Communications, 2013, 2571-2575.