1. Good --------------, Head of Department, Professor and Lecture, I am Capt. AMK from NO(10) Master Engineering Courses. Today I would like to present Design and Implementation of Adaptive Traffic Signal Control System.
2. These are outline of thesis.
3. Traffic congestion is the major problem with every country faces. The simplest way for controlling a traffic light is using timer for each phase. Another way is to use electronic sensors in order to detect vehicles, and produce signal that cycle. In this system, that control the time interval of traffic light based on traffic density and controlling the traffic light by image processing. Some of camera will be install alongside the traffic light. These camera capture image sequences and then analyze using digital image processing for vehicle detection and according to traffic conditions on the road, that control traffic signal timing.
4. This slide show Aims and Objectives.
5. The timing of a traffic signal is continuously adjusted based on the changing arrival patterns of vehicles at an intersection. Traffic Data are collected using Camera. Main Control unit is evaluated and signal timing improvements are developed. Finally, implement signal timing updates. Adaptive signal control typically improves travel time and delay by 10 percent and as much as 50 percent at locations with outdated signal timing plans. The process is continuously repeated internally by the system hardware or software.
6. This is System Overview of Adaptive Traffic Signal Control System.
7. This slide show block diagram of Adaptive Traffic Signal Control System.
8. The main control unit consists of computer, router, Lan repeater and AC power source. Then Object Detections, Classification and Counting are tasking.
9. The functions of Main Control Unit are collecting traffic data from each camera. Analyzed image from camera by using background subtraction and YOLO framework to get traffic flow and saturation flow.Then number of traffic congestion is inserted into mysql database. Alongside UDP server is and running and receive data from traffic control unit. When receive data is ready, Server select data from mysql database and calculate timing cycle with Webster’s Method. After finish calculation, new timing cycle send to Traffic control unit by UDP protocol.
10. Object Detection is the process of finding out the particular objects in the images. The process of classifying images on the basis of recognized features or characteristics is known as classification. The difference is following. If we have to define the class of an image, it relates to the object classification task. If you have to define coordinates of an object on the image, then it is the object detection task. Classification means answering ‘what’ and Detection means answering ‘where’.
11. Background subtraction is a popular method for isolating the moving parts of a scene by segmenting it into background and foreground. That calculates the foreground mask performing a subtraction between the current frame and a background model, containing the static part of the scene or, more in general, everything. Background subtraction technique is important for object tracking. the video sequence is analyzed over a particular set of frames. During this sequence of frames, the running average over the current frame and the previous frames is computed.
12. Result
13. You only look once (YOLO) is a state-of-the-art, real-time object detection system. On a Pascal Titan X it processes images at 30 FPS. apply a single neural network to the full image. This network divides the image into regions and predicts bounding boxes and probabilities for each region. These bounding boxes are weighted by the predicted probabilities. It is faster than Region Convolution Neural Network.
14. The algorithm applies a neural network to an entire image. The network divides the image into an S x S grid and comes up with bounding boxes, which are boxes drawn around images and predicted probabilities for each of these regions. The method used to come up with these probabilities is logistic regression. The bounding boxes are weighted by the associated probabilities. For class prediction, independent logistic classifiers are used.
15. In YOLO, **anchor boxes** are used to predict bounding boxes. The main idea of anchor boxes is to predefine two different shapes. YOLO can work well for multiple objects where each object is associated with one grid cell. But in the case of overlap, in which one grid cell actually contains the centre points of two different objects, we can use something called anchor boxes to allow one grid cell to detect multiple objects.
16. This is flowchart of YOLO framework.
17. Result
18. Result
19. This method is used to compute the required data for determining suitable signal timing as it is suitable for timing of a pre-timed signal. The optimum signal cycle corresponding to the minimum total delay of the traffic at the signalized intersection can be obtained. The cycle length is given by; from slide.
20. The saturation flow of a signal approach is expressed in passenger car units per hour (pcu/h). Table show the value of passenger car unit.
21. Signal Timing Phase Plan read and explain equation.
22. This is Timing Diagram of Phase Plan
23. a communications protocol that facilitates the exchange of messages between computing devices in a network. It’s an alternative to the transmission control protocol (TCP). In a network that uses the Internet Protocol (IP), it is sometimes referred to as UDP/IP.
24. UDP divides messages into packets, called datagrams, which can then be forwarded by the devices in the network – switches, routers, security gateways – to the destination application/server. For the real time services like computer gaming, voice or video communication, live conferences, UDP is needed. Since high performance is needed, UDP permits packets to be dropped instead of processing delayed packets. There is no error checking in UDP, so it also saves bandwidth.
25. UDP packet's called as user datagrams with 8 bytes header. In the user datagrams first 8 bytes contains header information and the remaining bytes contain data.
26. Source port number: This is a port number used by source host, who is transferring data. It is 16 bit longs. So port numbers range between 0 to 65,535.
27. Destination port number: This is a port number used by Destination host, who is getting data. It is also 16 bits long and also same number of port range like source host.
28. Length: Length field is a 16 bits field. It contains the total length of the user datagram, header and data.
29. Checksum: The UDP checksum is optional. It is used to detect error for the data. If the field is zero then checksum is not calculated. And true calculated then field contains 1.
30. Multithreading is defined as the ability of a processor to execute multiple threads concurrently. single-core CPU, it is achieved using frequent switching between threads. It is a lightweight process which is the execution of code sequence along with all the data supporting structures. In case we want to run the code in parallel making programming easy. It takes benefit from the architectures of multi-CPU. It can also run multiple processes or multiple threads within one process. Multi-Threading is used in implementing network server and web server.
31. MySQL is an Oracle-backed open source relational database management system ([RDBMS](https://searchdatamanagement.techtarget.com/definition/RDBMS-relational-database-management-system)) based on Structured Query Language ([SQL](https://searchsqlserver.techtarget.com/definition/SQL)). MySQL runs on virtually all platforms, including [Linux](https://searchdatacenter.techtarget.com/definition/Linux-operating-system), [UNIX](https://searchdatacenter.techtarget.com/definition/Unix) and [Windows](https://searchwindowsserver.techtarget.com/definition/Windows). Although it can be used in a wide range of applications. It can be used in a client-server network environment.
32. This is Flow chat of Main Control Unit.
33. Traffic Control Unit consists of following.
34. This Ethernet Shield allows you to connect Arduino to a network. It is assembled with long stackable pin headers, and don’t need to solder the headers separately. The Nano Ethernet Shield is based on the ENC28J60 Ethernet chip which provide a network (IP) stack capable of both TCP and UDP. Use the Ethernet library EtherCard.h to write sketches which connect to the internet using the add-on module.  
      
    ENC28J60 is a 10BASE-T stand-alone Ethernet unit with on board MAC & PHY, 8 Kbytes of Buffer RAM and an SPI serial interface for 3.3V and 5V logics. With a small size the Nano Ethernet Shield minimizes complexity, board space and cost. Target applications include VoIP, Industrial Automation, Building Automation, Home Control, Security and Instrumentation.
35. The 74HC595 is an 8-bit serial-in / serial or parallel-out shift register with a storage register and 3-state outputs. Both the shift and storage register have separate clocks. Connect more than 1 shift register in parallel.
36. Circuit Diagram of seven segment display with tri color.
37. Closed-circuit television (CCTV), also known as video surveillance is the use of video cameras to transmit a signal to a specific place, on a limited set of monitors. It differs from broadcast television in that the signal is not openly transmitted, though it may employ point-to-point (P2P), point-to-multipoint (P2MP), or mesh wired or wireless links. Though almost all video cameras fit this definition, the term is most often applied to those used for surveillance in areas that may need monitoring such as banks, stores, and other areas where security is needed
38. This is used to step down the given input dc voltage.  
    In this converter the chopper is connected in series and diode in parallel. The fundamental circuit for a step down converter or buck converter consists of an inductor, diode, capacitor, switch and error amplifier with switch control circuitry. The circuit for the buck regulator operates by varying the amount of time in which inductor receives energy from the source.
39. Flow chat of Traffic control unit flow chat
40. Circuit Diagram of Traffic Control Unit
41. Implementation of Traffic Control Unit
42. Traffic Flow counting with background subtraction technique at Zay lay junction.
43. Testing Traffic Control Unit With UDP protocol
44. Conclusion
45. Future Work