JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Automatic Traffic Control System Using Raspberry Pi

[1] Sarvesh Rodi,[2] Swapnil Jagtap,[3] Aastha Sahani
[1]ENTC Student,[2]ENTC Student,[3]ENTC Student
Electronics and Telecommunications
AISSMS IOIT, PUNE, INDIA

Mrs. Geeta Salunkhe
Professor
Electronics and Telecommunications,
AISSMS IOIT, PUNE, INDIA

Abstract : In present situation, use of vehicles is rapidly increasing all over the world, particularly in urban areas. In the recent years, the numbers of vehicles on roads are arising at an exponential rate. An Automatic traffic control system is designed to overcome the increasing demand of all these essentials. The Main proposed model checks for the traffic at the traffic signal by capturing the real time video or photo. A video camera and traffic lights are interfaced with Raspberry Pi board. The video is processed real time and the Raspberry Pi enables the traffic lights to change when required. This could make the movement of traffic easier and time saving. This is an improvement from the conventional timer based operation of traffic lights and changes the traffic lights accordingly. Also to control the realize timing of the signal depending on the numbers of vehicles present.

***IndexTerms*–Image processing, Traffic, Raspberry pi.**

I. INTRODUCTION

Traffic is one of the major problems that we face in our day to day life. The current traffic signal system is a static system and cannot adapt to the changes in the traffic .The static system functions on a preset timer system, which may lead to increased waiting time at signals. One of the major problems of modern India is Road Traffic. This is due to the enormous addition of vehicles every day. There are around 50-55 thousand new vehicles registered in India every day, but the number of vehicles removed off the road are very less. This has led to the explosion of traffic on roads, resulting in road rage, higher number of accidents, deaths and increase in commuting time over the years.. The road traffic rules apply to all these forms of traffic. Not many people tend to follow the traffic rules. This is due to poor knowledge, negligence, road rage, lack of time and peer pressure. It is resulting in traffic snarls, confusion, slow movement of traffic and mainly, accidents. The two main means of controlling traffic in India at present is by using a traffic signal and with the help of a policeman. These two methods have been mostly effective in controlling the traffic till date. But, we need an efficient and smarter way to control the traffic, using technology and less manpower. Our project works on this.

II. LITERATURE REVIEW

Rongrong Tian, Xu Zhang [13] Suggested to use the TRANSYT traffic modeling software to find the optimal fixed-time signal plan and VISSIM micro-simulation software to affirm and evaluate the TRANSYT model and to help assess the optimal signal plan; build an adaptive frame signal plan and refined and evaluated the plan using VISSIM with VS-PLUS emulator. The delay in the adaptive signal control was less than the fixed time control.

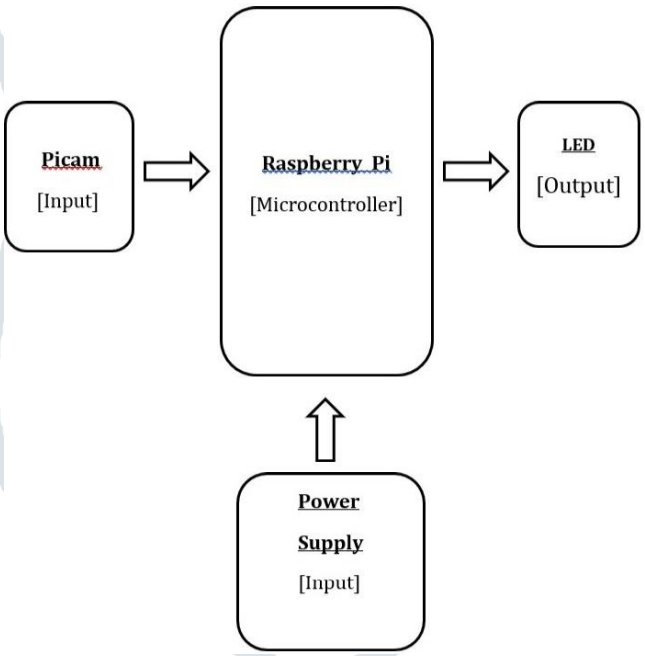
Jianhua Guo et al [7] introduced a new method for area-wide traffic signal timing optimization under user equilibrium traffic. A genetic algorithm was developed to derive the model solution. A simulation in PARAMICS software tool which is able to conducting area-wide micro simulation is adopted to design the logic frame and the function module of the traffic signal control system.

Junchen Jin and Xiaoliang Ma Proposed a group-based signal control approach capable of making decisions based at the intersection level . The control problem is formulated using a framework of stochastic optimal control for multi-agent system in which each signal group is modeled as an intelligent agent. The proposed system is designated to be compatible with the prevailing signal system. The parameters were off-line optimized using a genetic algorithm.

In a paper titled 'Image processing based traffic sign detection and recognition with fuzzy integral', authored by Canan Tastimur et al. [2], traffic signs on roads can be detected using image processing and recognized using Fuzzy Integral. But this does not help manage the traffic signal at a junction.

III. RESEARCH METHODOLOGY

3.1 SYSTEM ARCHITECTURE



The project focuses on detecting number of vehicles using python implemented on a Raspberry Pi. The process begins with the neural network and yolo weights which contains the information and parameters of vehicles detection. After providing image the programs give the number of vehicles present in the image as output. Further that number is analysed and output to signal is given.

3.2 METHODOLOGY

- **Image processing:**

Image preprocessing techniques are applied to enhance the quality, analyze, and extract information from digital images. Several libraries and frameworks in Python provide comprehensive support for image processing tasks. Some commonly used libraries are PIL(python image library), OpenCV(Open Computer vision), Scikit images , numpy.

Images undergo preprocessing to improve their quality by correcting distortions, reducing noise, and adjusting color balance.

Image enhancement techniques are then applied to improve the visual appearance by adjusting contrast, brightness, and sharpness

- **Model Output :**

The extracted features are used as inputs to the classification model, which has been trained on a labeled dataset to learn the patterns and characteristics associated with each class. The classification model assigns a probability or confidence score to each class, indicating the likelihood of the image belonging to that category. The model learns the patterns and relationships between the extracted features and the corresponding classes during the training process. The architecture is designed to automatically learn and extract relevant features from input images through the application of convolutional filters. The learned features are then fed into fully connected layers, followed by a final classification layer that outputs the predicted class probabilities.

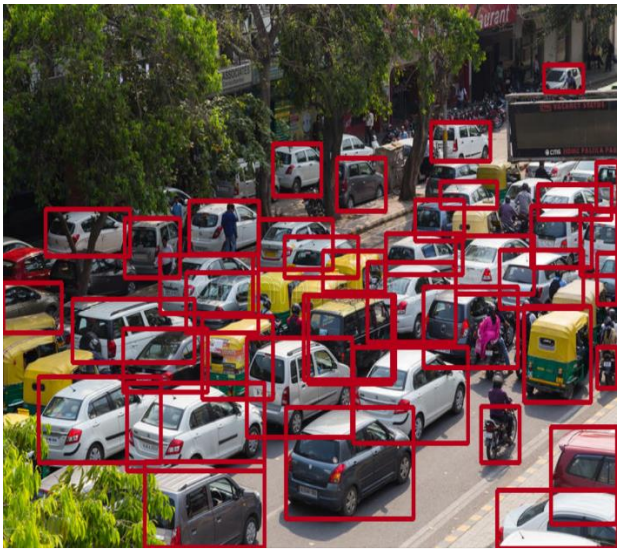
- **Model Testing :**

Testing the model involves evaluating its performance on a separate set of images that were not used during the training phase. The testing phase helps assess the model's ability to generalize and make accurate predictions on unseen data.The model is used to predict the classes of the test images, and performance metrics such as accuracy, precision is calculated. The results provide insights into the model's ability to classify vehicle images accurately.

IV. RESULTS

4.1 HARDWARE IMPLEMENTATION

4.2 IMAGE PROCESSING RESULT



V. CONCLUSION

In conclusion, It's important to note that the effectiveness of Automatic Traffic control system depends on the image quality and accuracy of algorithms. After quality improvement Automatic Traffic Control system will be more effective. As per the number of vehicles the program returns the most accurate time for that particular traffic condition. With the help of data analysis the traffic of 0.7 is multiplied with the number of vehicles and signal time is obtained

VI. ACKNOWLEDEMENT

I would like to thank my guide Mrs.Geeta Salunkhe, Aissms Ioit, Pune for their continuous guidance. Also, I would like to thank my family and friends for their constant support in my research Work.

VII. REFERNCES

1)Rongrong Tian , Xu Zhang, "Design and Evaluation of an Adaptive Traffic Signal Control System – A Case Study in Hefei", China.

2)Jianhua Guo, Ye Kong, Zongzhi Li, Wei Huang, Jinde Cao, Yun Wei , "A model and genetic algorithm for area-wide intersection signal optimization under user equilibrium traffic", International Association for Mathematics and Computers in Simulation (IMACS), 0378-4754 (2017).

3)Junchen Jin , Xiaoliang Ma, "A group-based traffic signal control with adaptive learning ability", Engineering Applications of Artificial Intelligence 65 (2017) 282–293

4)Benjamin Coifman, David Beymer, "A Real-Time Computer Vision System for Vehicle Tracking and Traffic Surveillance", Transportation Research Part C: Emerging Technologies, Volume 6, Issue 4, August 1998, Pages 271-288.