Traffic Congestion Avoidance for Narrow Road Based on IoT

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ABSTRACT

In recent years, with the increasing population and development of urbanization the issues related to transportation also increases. Traffic congestion in narrow roads is one of the major issue of transportation system. Recently a lot of research has been done on traffic control. Current existing traffic control system are developed for highways using various techniques. Traffic Congestion Avoidance for Narrow Road Based on IoT is one of the effective solution for this problem. This system focuses on heavy vehicle detection, identification, analysis & send message if heavy vehicle detects. In this system, we make use of various advance techniques as IoT, Deep Learning and Cloud Computing.

KEYWORDS

Raspberry Pi, Open CV TensorFlow, RabbitMQ, Python, Camera Sensor, AMQP (Advanced Message Queuing Protocol)

INTRODUCTION

Nowadays, the transportation system is an essential part of human activities. Public faces many traffic problems in narrow road due to heavy vehicles such as bus, truck etc. Traffic congestion affects their personal lifestyle. Negative impacts of traffic congestion effects the valuable time of the motorists and passengers, which is a non-productive activity for most of the people. It reduces regional economic health. Most importantly It creates Delays, which may results in late arrival for employment, meetings, and educations which in turn affects the business. It causes wastage of fuel increasing air pollution and carbon dioxides emissions because of increased idling, accelerations and braking. Wear and tear on vehicles as a result of idling in traffic and frequent acceleration and raking, leading to more frequent repairs and replacements. Blocked traffic may interfere with the passage of emergency vehicles travelling to their destinations where they are urgently needed [5]. There are several traffic control system using methods such as GPS tracking [1], RFID (Radio Frequency Identification) technology [2], image processing using CCTV cameras [3][4], only for urban area or highways but not for specifically narrow road and tunnels, So we proposed a system Traffic Congestion Avoidance for Narrow road Based on IoT.

The focus of Traffic Congestion Avoidance for Narrow road Based on IoT is to reduce congestion in narrow road areas. It based on 1) Detection of vehicle 2) Identification of vehicle 3) Communication between signal ends.

PROPOSED SYSTEM

Proposed system consist of structure diagram of Traffic Congestion Avoidance for Narrow road Based on IoT as well as three step description is given in methodology. System

combines technologies like IoT, deep learning, cloud computing. Overview of the system can be seen in fig.1

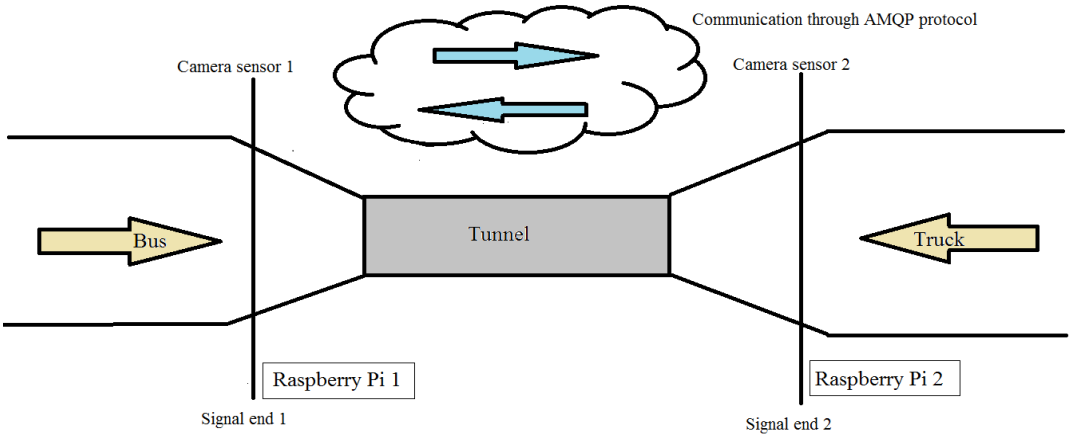

Fig.1 Overview of system

a) Components

A. Hardware Components:

1.Raspberry Pi 3 model B :-For providing hardware platform to system.

2.Camera Sensor (5mp) :- For capturing images of heavy vehicle.

3.LED signal (Red and Green):- To generate signals.

B. Software Components:

1.TensorFlow SSDLite-mobilenet :- Used for deep learning part involve in system.

2.RabbitMQ :-Message broker software for communication.

3.Python 3.6 :- Basic programming language used for programming

b)Methodology

Phase I: Identification of heavy vehicle

In this phase, the image capture by camera sensor of Raspberry Pi is used by Tensorflow software for identification purpose, if identified image is of bus or Truck then only it transmits message to cloud.

Phase II: Communication between signal ends

In this, RabbitMQ message broker software is used to establish connection between two ends of the signals.

Steps:

Steps of implementation of Traffic Congestion Avoidance in Narrow road Based on IoT are as follows:

- Supply power to Raspberry Pi. Power bank is enough to provide power supply to prototype model.
- When vehicle arrives at end of the narrow road then Camera sensor capture the image of vehicle.

- Tensorflow software identifies image if image of vehicle is of truck or bus then only it transmit message to cloud.
- At the other end, another raspberry pi act as receiver which receive message from cloud. It generate red signal at that end.
- Similar procedure takes place at other end when vehicle appears at that end.

Conclusion :-

Traffic congestion in narrow roads is one of the issue of transportation system, which causes wastage of time and fuel also increases possibility of accidents. Traffic Congestion Avoidance for Narrow road Based on IoT is one of the effective solution for this issue. In this with the TensorFlow object detection API we have tested identification of heavy vehicle which helps to prevent entering of heavy vehicle in narrow road that leads to smooth transportation.

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