# Employing VANET Technology to Alleviate the University of NORTHAMPTON

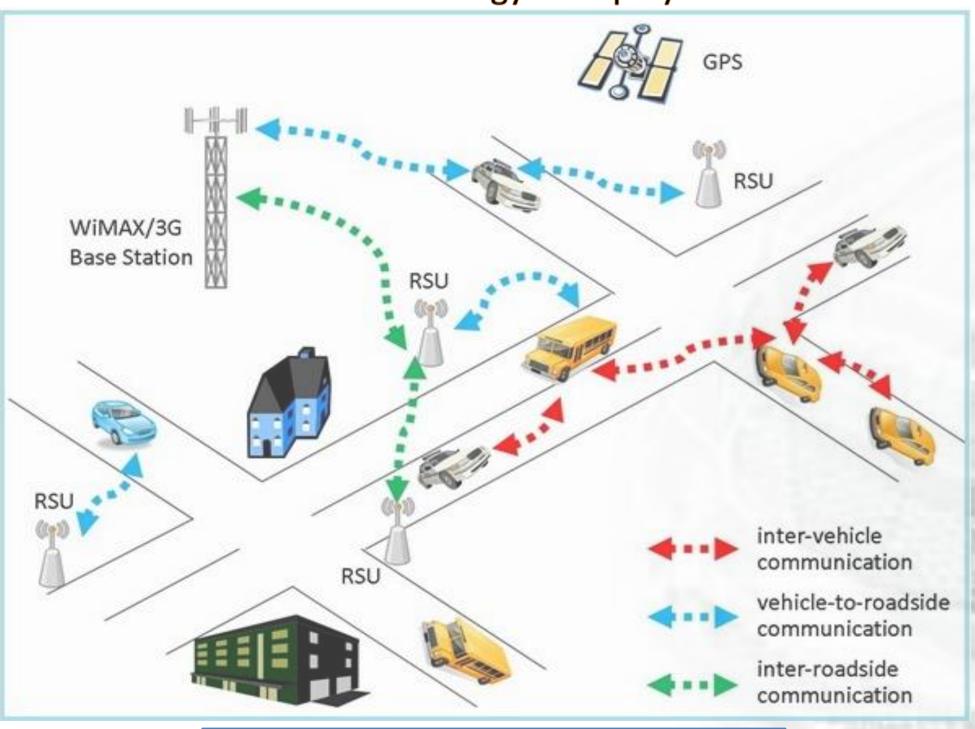
Road Congestion in Real Time

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### 1. Overview

Vehicular Ad Hoc Networks (VANETs) are a special category of networks communication. It consists of three main units: Application Unit (AU), On Board Unit (OBU) and Road Side Unit (RSU). The main aim behind VANET is to provide more safety for drivers vehicle. VANETs have three types:

- Inter-vehicle communication (V2V): It used a special communication technology to send/receive data among converged vehicles.
- Vehicle to infrastructure communication (V2I): Is used between vehicles and infrastructures which depend on Wi-Fi or Cellular technology to send and receive data.
- Inter-roadside communication: This is also known as Hybrid architecture (V2V and V2I) which depend on Wi-Fi, WiMAX or Cellular technology to deploy information.



**VANET Communication types (Abhi, 2012)** 

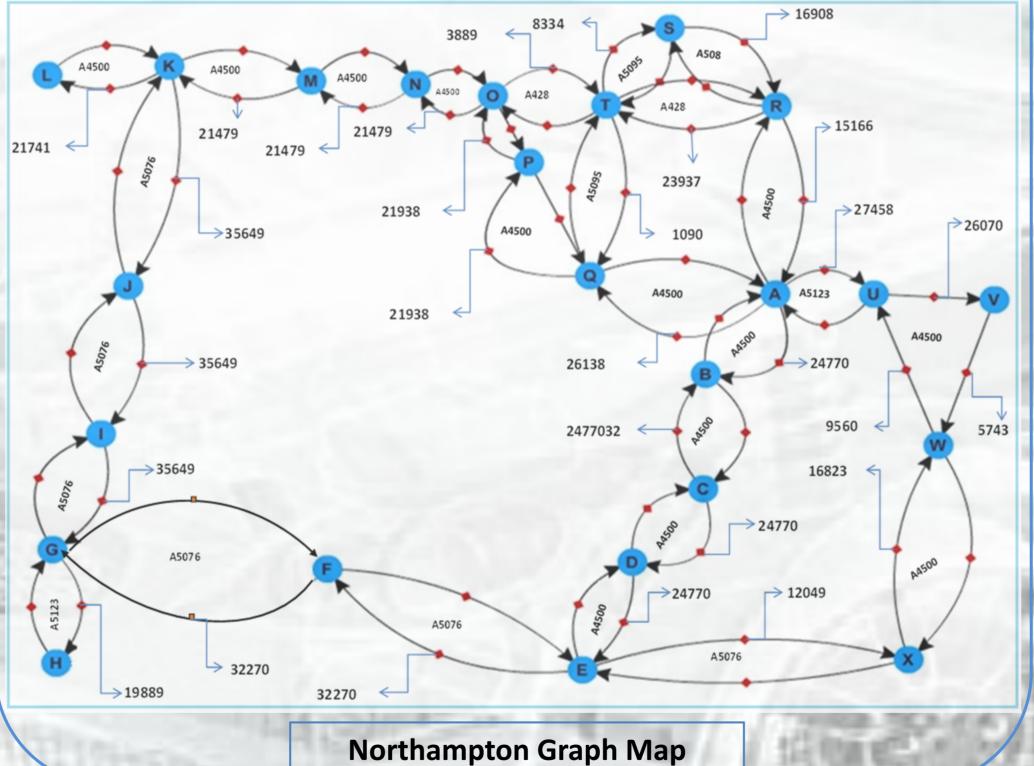
#### **2. Aim**

Design a novel algorithm for Intelligent Transportation System (ITS) using Vehicular Ad Hoc Network. The proposal model will help to reduce congestion and fuel consumption, decrease CO2 emission and saving money.

## 3. Methodology

In this Research, we will choose a section of real road map (main local roads) from Northampton map as a case study. linitially, the case study map is converted into 2-D graphic as shown in figure below, where the blue node represent intersection (junction or roundabout) while the black arrow represent edges (roads) between intersections. The data on each edge represent the number of vehicles per day that pass through this road. Then, we will generate several matrices in order to deal with the graph mathematically.

Finally, we will design a new algorithm or modifying on the existing algorithms based on graph theory and formulate or modifying mathematical equations using specific tools MATLAB in order for getting throughput value for each road or intersection and to find the best path to the destination.



## 4. Objectives

- To simulate VANET technology and graph theory in ITS to identify a suitable approach for modelling roads mathematically.
- To simulate data obtained from the Department of Transport using simulations software (Omnet++, SUMO and Veins) in order to assess the validity of the proposed algorithm

## 5. Project Components

- Part 1 (between Vehicles and RSU): to collect the traffic road information through RSUs deployed along the road.
- Part 2 (between RSU and Control room): send and receive data through employ a suitable routing protocols.
- Part 3 ( Server ): The server at the Control Room collects vehicles/ roads instantaneous information and, in the case of incidence or accidents, the sever will be ready to make a decision based on the proposed artificial intelligent algorithms and (a) to Identify the roads to be closed to avoid traffic congestion and (b) to determine alternative itineraries and send it to the relevant vehicles through RSUs devices.



### 6. Who are the Beneficiaries?

- Department of Transport planners.
- Drivers.
- **Environment.**
- **Mobile Operators**