Fuzz Sensoring Project

Authors: Youssra Benaddi[1], Sean Johnston[2], Fraz Muhammad[1], Paul Vilain[3], Justyna Zasada[4]
Supervisors: Jordi Garcia[1], Josep Farré[5]

1 – EPSEVG; 2 - Glasgow Caledonian University; 3 - ESIReims; 4 - Lodz University of Technology; 5 - Neapolis

Escola Politècnica Superior d'Enginyeria de Vilanova i la Geltrú
UNIVERSITAT POLITÈCNICA DE CATALUNYA

Abstract

Traffic congestion is a significant problem which affects smoothness in transportation in many cities around the world. It is unavoidable due to increasing numbers of vehicles and overuse of roads in large and growing metropolises. Although, there are several policies that are implemented to reduce traffic congestion, such as improvement of public transport, car and motorcycle restriction on several roads, and an even-odd license plate policy, the major problem involves getting data in order to predict and avoid traffic. Information can be collected from many sources such as: city sensors, GPS, as well as, from many application programming interfaces (API) provided by different companies. The project involves gathering sources and information about traffic congestion in order to create guidelines which can be essential in creating a traffic map of Vilanova i la Geltrú in the future. Eventually, the guidelines to the city of Vilanova i la Geltrú are provided, consisting of analysis of traffic inside the city, IoT management, choices of APIs, effective selection of sensors, and cost analysis to vastly improve traffic flow.

Introduction

"Fuzz Sensoring" is a project aimed to achieve live "real time" traffic data of Vilanova i la Geltrú. For that reason, it is essential to use software applications in order to provide traffic data of the city. However, there is an issue involving areas where the data is not accessed.

In order to create a more efficient traffic network in Vilanova i la Geltrú, more detailed data is needed to be provided.

To combat this problem, sensors and API will have to be used, but in this case we are going to work under the assumption we are limited to a set few. Once research has been conducted guidelines will be set to support choice of API's and what kind of set of sensors are needed to improve the city of Vilanova. The specialty task is to discover effective ways to achieve data where none is achieved through API's and sensor use.

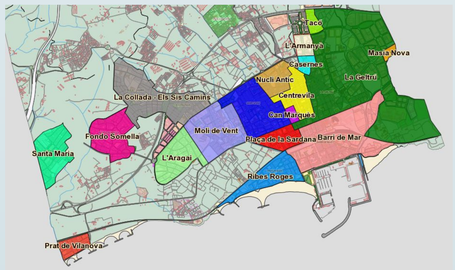

Fig.1. Map of Vilanova i la Geltrú- neighborhoods division.

Research & Results

Firstly, it was necessary to study the current situation of the city, to know where and what kind of improvements should be implemented. One part of the studies was focused on sensors, what kind of the sensors are used for monitoring the traffic and where they are situated. What is more, it was essential to check the location of the main roads and mostly frequently used ones.

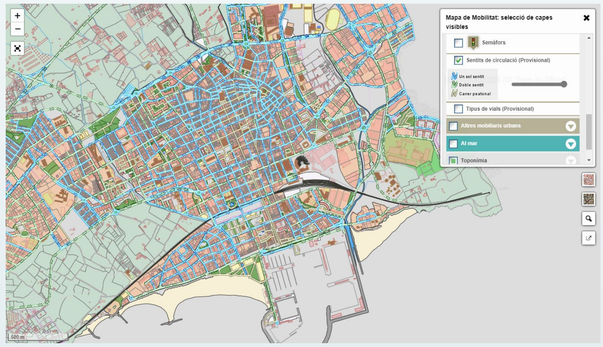

Fig.2. Map of Vilanova i la Geltrú- main streets.

Further researchers included contacting with API' companies, in order to understand the traffic management system, know the price of data and establish cooperation in future perspective. Table below shows the comparison of API (tab.1).

Tab.1. Comparison table of different API.

API	It is free?	Are they available in Vilanova?	Do they have real-time data for Vilanova?	Can we use their real-time data?
Google Maps	200$ free	Yes	Yes	Yes
Waze	Yes	Yes	Yes	Yes
Tomtom	No	Yes	Yes	No *
Ontonomo	No	Yes	Yes	Yes
SCT	Yes	Yes	No	---

* We contacted TomTom and they said they couldn't provide us data

Another factor considered was local public transportation, bus lines and trains. Based on the council information from city sensors, historical record data and thanks to the map of acoustic, the proposition of location of the new sensors was made (fig.3). For that reason the budget plan had to be taken into consideration.

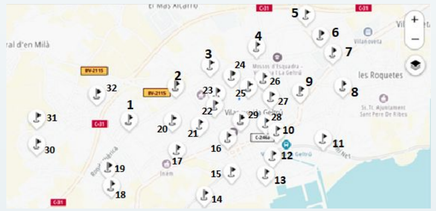

Fig.3. Sensors locations proposition.

Moreover, traffic management systems in different countries and cities were analysed and compared. Depending on the size of the population and the stage of the development different systems are applied. Although, in each case, style of management is aimed to make the city smarter, safer and more eco friendly.

Conclusions

Finally, based on all gathered information and research, the guidelines for Vilanova i la Geltrú were created. They would enable the city to manage their traffic using IoT technologies and could help in reducing traffic by implementation of described solutions. The plan consists of 6 stages: basic IoT-based smart city platform, monitoring and basic analytics, deep analytics, smart control, instant interaction with citizens via user applications and Integrating several solutions.

The first stage is focused on designing the basic architecture for future enhancements of the smart city. It involves four components like: the network of smart things, gateway, data lake and big data warehouse. Simply it is focused on collecting, storing and extracting data in order to manage traffic.

The second and third stage is to monitor and analyze the data from sensors. Whereas the fourth one is about controlling what ensures better automation of smart cities. Next stage allows citizens to connect to the central management platform to monitor and control IoT devices, as well as receive notifications and alerts. The last step is integration of the solutions.

Tab.2. The relevance of IoT applications for smaller smart cities.

THE RELEVANCE OF IOT APPLICATIONS FOR SMALLER SMART CITIES	Highly relevant	Can be implemented with certain restrictions	The value is questionable
Traffic management			✓
Parking	✓		
Public transport		✓	
Utilities			✓
Street lightning	✓		
Waste management	✓		
Environment		✓	
Public safety		✓	

What is more, it consists of further recommendations for Vilanova i la Geltrú considering: free public transport, encouraging biking, heavy traffic ban and the old town policy. For reducing the traffic, optimisation of the road network is recommended. Solutions consist of: widening streets, adding on/off ramps, squeezing in roundabouts and designing new interchanges.

Future perspectives

What is the future of this project?

1. Build a relationship with the Traffic Api company.
   - Prioritise Waze then respectively if needed proceed to seek and build a relationship with the following, Google Traffic, TomTom, Servei Català de Trànsit & Ontonomo.
2. Build and Design a Programmable System to display useful traffic information to make traffic management decisions with the support of Waze and Fuzzy Traffic Sensors.
3. After testing the system on Vilanova, analyse and discover what are the most cost effective traffic management decisions that can be made to improve traffic under different circumstances, scenarios and events in Vilanova.

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