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Draft of Project Initiation Document

Author : Tarikh Chouhan

Supervisor: Dimitris Drocopolous

Summary

This project aims to ease users frustration when parking their car by providing real time update to car parking spots.

Purpose

Identification and discussion for the scope of the project

Aims + Objectives/ Goals

Identification and justification of project aims and objectives that are related to the project

Identification of activities and sources required to satisfy initial investigation relating to related works and literature review.

Identification and reasoning of initial list of requirements from initial project investigation.

Project Deliverables

Supporting Project Plan indicating and detailing activities, timescales and deliverables.

Risks

Identification and discussion of the project problem

Ethics

Form

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Agile, Git

Using IoT to simulate a car parking bay and provide real time updates via an app based on external factors.

# Project Initiation Document

## Author: Tarikh Chouhan - w1481217

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**General Scope of Project**

Finding a car parking bay can be very frustrating to drivers. As a result of this frustration, drivers tend to park illegally and end up having to pay a penalty/fine. Local councils are generating massive amounts of revenue by handing out parking fines. The following statistics paint a picture on how significant the car parking industry is:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Surplus in £(millions) made in parking fines per local council [[1]](#footnote-1) | | | | | |
| Local authority | **2010/11** | **2011/12** | **2012/13** | **2013/14** | **2014/15** |
| Westminster | 38.2 | 41.6 | 39.7 | 51 | 46.4 |
| Kensington & Chelsea | 21.1 | 28.1 | 30.4 | 33.5 | 33 |
| Camden | 21.1 | 25 | 23.5 | 24.9 | 24.5 |
| Hammersmith & Fulham | 16.6 | 19.5 | 19.4 | 23 | 23.8 |
| Wandsworth | 14.4 | 16.1 | 15.9 | 19.7 | 20.4 |
| Brighton & Hove UA | 12.7 | 14.4 | 16.3 | 18.1 | 18.6 |
| Haringey | 3.3 | 5.3 | 5.2 | 5.7 | 16.1 |
| Islington | 5.6 | 10.9 | 8.2 | 10.4 | 13.7 |
| Nottingham City UA | 3.7 | 3.3 | 11.8 | 12.1 | 13.3 |
| Hackney | 4.7 | 5.9 | 7.8 | 8.2 | 10.8 |
| Brent | 3.9 | 2.7 | 2.7 | 8.3 | 10.5 |
| Tower Hamlets | 6 | 5.8 | 7 | 8.3 | 10 |
| Birmingham | 5.1 | 5.5 | 6.9 | 7.8 | 9.7 |
| Lambeth | 7 | 5.8 | 12 | 7.2 | 9.7 |
| Milton Keynes UA | 6 | 6.6 | 6.7 | 8.2 | 9 |
| Cornwall UA | 8.2 | 7.9 | 8.1 | 8 | 8.7 |
| Manchester | 1.9 | 6.3 | 8.8 | 8 | 7.9 |
| Hounslow | 6 | 7.3 | 6.4 | 7.8 | 7.7 |
| Newham | 3.9 | 7.3 | 8.2 | 7.2 | 7.3 |
| Merton | 4.4 | 5.7 | 6.9 | 7 | 7.2 |

The aim of this project is to help solve an on-going problem most car drivers face daily; finding an available bay to park in. This project will aid and help car drivers find a car parking bay that they’ll be able to park in without driving further than necessary, searching for an available space to park in. This will be achieved by creating a sensor that will record the data from an ultrasonic sensor and thermistor module. Once the modules acknowledge a drastic change in these two external factors, the results will be shown to the user via an app hence indicating whether or not the bay is vacant or occupied. As well as that, the app will learn how the data correlates to the bay being vacant or occupied, essentially machine learning. This will be achieved by implementing the concept, neural network. By implementing this feature, the app will be able to predict whether or not the bay is being used and will come in handy if for some reason the sensor cannot fulfil its purpose (e.g. if there are networking issues, wiring issues, external factors such as rain etc.).

Upon preliminary research, it shows that this type of concept does exist but is still in its infancy. An example of this is Google Maps. In their latest update to the app (August 2017), they are using historic data with machine learning to predict the availability of car parking bays[[2]](#footnote-2). Whilst this is a step in the right direction to solving the problem described, it is not as accurate as having a physical sensor embedded to the parking bays. As the world progresses further in technology, more and more devices are being connected to the internet, the concept of IoT (internet of things) will be greatly beneficial here and will outperform the use of machine learning. With this in mind, I believe my project will perform greatly as it has the concept of IoT and will be able to serve its purpose with accurate results whilst fulfilling its requirements.

Aims + Objectives/ Goals

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**Aims and Objectives**

In order to successfully complete this project and have a live working sensor and app, there will be strict aims and objectives that will have to be met set against the listed requirements. Failure to do so would result in the sensor and/or app not performing as intended or worse, not performing at all. In order to prioritise my aims and goals, the MoSCoW principle will be used. The MoSCoW principle is widely used as a prioritization technique and is heavily used in field of business analysis, project management and software development. The capital letters in the term ‘MoSCoW’ is an acronym coming from the first letter of each prioritization groups:

M – Must

S – Should

C – Could

W - Would

Firstly, my main aim is to build the sensor as this project resolves around solving the described problem using the concept of IoT. The sensor must take readings from external factors such as temperature and distance from an object. This will be achieved by acquiring components that will be able to record these factors; thermistor to measure the temperature and an ultrasonic sensor to measure distance. The reason for recording external factors such as temperature and distance is because this will indicate that a car has been driven on top of the sensor; effectively indicating that the bay is now being occupied. The base of the car will be hot since the engine will have been running, and so there will be a drastic temperature change to the sensor as well as the base of the car being close to the sensor, effectively being detected by the ultrasonic sensor.

Moreover, in order for the sensor to be connected to the internet and be a part of the IoT category, it must be able to send and receive data over some form of network protocol. Ideally, this will be in HTTP as this form of protocol is widely used to send and receive data. In order to achieve this, a microcontroller (the sensor) will be used and will be capable of connecting to WiFi by wiring a wifi module to it. The sensor will register external changes every 30 seconds and send the data to a server.

Furthermore, the user must be able to know whether the parking bay is being occupied or not. An effective way of showing this will be from an app. This will be achieved by incorporating the data from the sensor with the Google Maps API. By using Google Maps API, I will be able to show the location of the sensor to the user as well as the status of the parking bay. As of now, the app will be an android app.

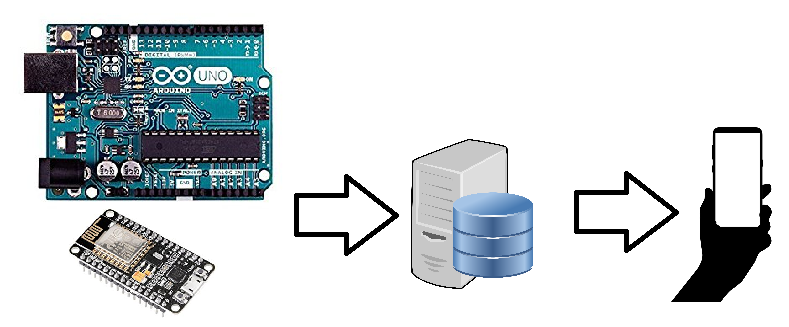
Even more, a server must be created so that the sensor and app will be able to communicate together. An effective way of communicating to this server will be over the REST architecture. REST is widely used in servers and web services as it caters a wide array of different formats for the response, i.e. JSON, CSV, XML etc. REST is widely chosen over SOAP as parsing through XML and the friction between Javascript and XML can cause issues[[3]](#footnote-3).

GPS – write in must category

MENTION ARDUINO

Project Deliverables

I will be using the Agile pr



1. RAC Foundation, December 2015, Council parking 'profits' up again in England, Available at: http://www.racfoundation.org/media-centre/council-parking-profits-up-again-in-england-2014-15 [↑](#footnote-ref-1)
2. Google Blogs, August 2017, Put it in park with new features in Google Maps, Available at:https://www.blog.google/products/maps/put-it-park-new-features-google-maps/

   [↑](#footnote-ref-2)
3. John Mueller, January 2013, Understanding SOAP and REST Basics And Difference, Available at: https://blog.smartbear.com/apis/understanding-soap-and-rest-basics/ [↑](#footnote-ref-3)