

Literature Review

mah60

July 2019

Contents

1	Introduction	3
2	Literature Reviews	3
2.1	RSSI	3
2.2	Access Points	3
2.3	Mac Address	3
2.4	Tomographic Reconstruction	4
2.5	Relatable Projects	4
2.5.1	Smart Bins	4
2.5.2	Position Tracking Using Arduino Wifi Shield	5
3	Version	5

1 Introduction

This document will record the references and research articles found within this project. As well as recording the key details for the reference to the original document or site. Then state the reason for recording this resource and why it is useful towards the project.

Within the literature review chapter of this document the key features for research will be split into sub chapters. Then the pieces of literature or websites will be referenced inside those sub chapters. For each reference there will be a review, the importance and a summary of the contents.

2 Literature Reviews

2.1 RSSI

EnGenius; RSSI; 02/07/2019;

<https://helpcenter.engenustech.com/hc/en-us/articles/234761008-What-is-RSSI-and-its-acceptable-signal-strength->

This reference discusses what the Received Signal Strength Indicator (RSSI) is. This is the strength of the connection between the wifi access point and the device it is trying to connect to. The stronger the signal the faster the wifi received.

RSSI will be used in the project as a parameter to perform different calculations, this could be to calculate the location of a device through tomographic reconstruction.

2.2 Access Points

LinkSYS; Access Points ; 13/07/2019;

<https://www.linksys.com/us/r/what-is-a-wifi-range-extender/what-is-a-wifi-access-point/>

This site talks about the differences between access points and range extenders. The tells us that an access point is the device that creates a wireless local area network. Each of the devices located in the system will be created a local area network and retrieving signals to calculate dwelling time and the locations of different mobile devices within the network anonymously.

2.3 Mac Address

Lifewire; Uses of Mac Address; 02/07/2019;

<https://www.lifewire.com/tracing-mac-address-stolen-computer-3971329>

This site discusses how mac address cannot be used to be used to track someones personal information and only the vendors information, this is the details of what company made the device. This resource is useful to declare that even though the mac address are being recorded and are key to tracking a device, the overall data that could be collected from a mac address is the nothing to do with the devices holder personal information.

2.4 Tomographic Reconstruction

Wikipedia; Tomographic Reconstruction; 02/07/2019;
https://en.wikipedia.org/wiki/Tomographic_reconstruction

This site gives a basic introduction into what Tomographic Reconstruction and summarizes how the method works to calculate the position of objects in the given area. The page also demonstrates different formulas that could be used in different scenarios.

This site could be used to discover new articles or sites that will further the knowledge into this area for potential data gathering techniques for position tracking techniques.

2.5 Relatable Projects

2.5.1 Smart Bins

BBC News; Smart Bins News Report; 02/07/2019;
<https://www.bbc.co.uk/news/technology-23665490>

This news report explores the problem of the 'Smart' bins that were located around east London by Renew and how they entered a legal 'grey area' in this research field. The smart bins were devices that used wifi tracking to count the footfall around the bins, however, as well as doing this the 'Smart' bins would record the mac addresses of mobile devices and where they went. This specification was not included within the report given to the council. The main problem occurred with the data that the 'smart' bins collected was that they were sold to provide advertising to other companies. This was done through tracking where the mobile devices went and advertising products from stores that they entered and that provided support for the project to continue. As a results the processed was stopped due to this invasion of privacy.

This article presents a method in which wifi tracking can be used and the power that it holds. On top of this, the article also provides evidence that this subject matter can boarder between legal and ethical boundaries.

Quartz; Smart Bins Technology; 02/07/2019;
<https://qz.com/112873/this-recycling-bin-is-following-you/>

This article goes into more details about the 'Smart' bins and Renew as a company. Initially the article talks about how the 'Smart' bins was inspired by the technique of cookies for internet tracking, then through they wanted to bring cookies to real life scenarios. Where the 'Smart' bins uses wifi tracking to track individuals and what they are doing. The 'Smart' bins were set up in east London and Renew wanted to expand to other countries, however, the article states that in European countries it is required to inform users that you are tracking and recording people wifi devices. The 'Smart' bins record the mac address of the mobile device and through tracking the mobile device they can learn the habits of the device owner. Therefore, through this Renew can provide select advertising towards the specified mobile device.

This article was useful for research as it went into more details about the project and the ideas behind the device. The article also states that a 'MAC addresses, while unique, don't reveal the owner's name or other identifying information.'. This article also discusses different environments that they are planning to use this technology within and even though it only knows the mac address, the device can determine a users gender and daily patterns of a user. Therefore if set up correctly you could detect where the owner of the mobile device lives or works due to the 'dwelling time' that could be collected. As a result this project shows us how powerful wifi tracking is and its potential, however, depending how you use wifi tracking it can lie on the boarder of ethical and legal boundaries. As the device can invade the privacy of a mobile device holder, even though they do not know the owners name.

2.5.2 Position Tracking Using Arduino Wifi Shield

Western Michigan University; Nathan Conrad; Position Tracking using wifi; 02/07/2019;
<https://pdfs.semanticscholar.org/c369/f4ea8cf81b14e445ac45fd4f2fa72d3f8c3f.pdf>

This report describes a method to create a tracking system that will locate selected personal and objects within a building. This will be done by placing tracking devices inside the employee badges or inside the objects that want to be tracked. The central system was created using Arduino Uno with a wifi shield. The aim of this project was to create a more efficient tracking system than GPS within a building, the system set up would allow for a more accurate picture of where a user or item is located inside a building. Therefore the system will be able to provide a map to location of the item or person being tracked. The network that is set up between the different devices and the server provides for simple communication between devices and users.

There were some flaws within the system these errors were found during the development process. An error that was found was due to the amount of access points that were located around the testing environment. This caused the wifi adapter, CC 3000, on the Arduino Uno to become confused and this effected the signal strength indicator to be less accurate. The wifi adapter was changed later on in the project to the Arduino wifi shield that produced better results when handling multiple access points.

This report demonstrates how important testing is to the development of these systems and to see the possible errors that could occur. The report also display future problems that could occur during the development process of this wifi tracking project. Therefor steps should be taken to avoid these or to test how multiple access points would affect the system being created. You could also learn from this report is to apply suitable resource testing on the system that is being developed to learn the limits of the system and adapt the project it if required.

3 Version

Version	Description	Date
0.1.0	Created the initial design for the document and created the introduction chapter.	01/07/2019
0.2.1	Literature reviews chapters that have been joined up are; RSSI, Mac Address, tomographic reconstruction. Relatable Projects; smart bins, position tracking using arduino wifi shields.	02/07/2019
0.2.2	proofread created chapters	06/07/2019
0.2.3	Completed reading on Position Tracking Using Arduino Wifi Shield, added access points	13/07/2019