

# **Chapter 1: Introduction.**

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Ideally, doing an observation for social experiment should not require the social scientist to set up an artificial environment, unless it is meant to. The problem with traditional method of data gathering is that the technologies, those are used to leverage the process, make the observation less natural. Moreover, the process is not scalable for multiple instances of data gathering. Specifically for naturalistic kind of social observation, the most ideal practice is to keep the environment untouched as well as having ubiquitous method for data gathering. However, the latter part is, traditionally, contrary to the distance within the observation object and the social scientists. There are two sensible solutions for this problem. The first solution is to have both social scientists and their data gathering tools to be outside of the observation environment, let say this is similar as a park ranger using binoculars to observe wildlife from watch tower. Whereas, the second solution is to have both social scientists and their data gathering tools blended into the observation environment. With, nowadays, everything can be connected into the Internet, observation can be done in any part of the world. Now the problem, then, how to make the social sensor that blends into the observational environment. Specifically, for established and closed area like conference or office environment, I set my spotlight on developing a wearable social sensor as an ubiquitous data gathering tools.

There are two main inspirations for this project: Sociometric Badge and Rhythm Open Badge. Historically, Sociometric Badge is the latest attempt to create augmented name tag that is used in busy teamwork oriented place like in general office space or meeting room. The development of this badge looks back into 1992's Active Badge from Olivetti Research as its root inspiration. After through DIY - approach iterations, Sociometric Badge is now trying to set off as the first commercialized wearable device to enhance how people interact to each other.

Since Sociometric Badge went commercial, there are little to no documentations available on its recent development. This suggests the main motivation for Rhythm Open Badge. I think, as far as similarities on features, Rhythm Open Badge is an open solution for Sociometric Badge. There are codes, schematics, and documentation available. However, looking at Rhythm Open Badge project repository the tools used to make one are not common. The first version of Rhythm Open Badge uses RFDuino and programmed with Arduino C as its development suite. Whereas the its latest version uses nRF51 and coded in C. After comparing each keywords in Google Trends, currently, between nRF51 and RFDuino has 26:10 interest over time, which means that nRF51 is more popular thing to search. Now comparing nRF51 to recent popular development boards between Arduino Uno, Raspberry PI 3, Raspberry PI Zero, and nRF51 results in 16:42:25:0. Although RFDuino is a modified Arduino with focus on radio communication, I never heard nRF51 before. However, the result from Google Trends suggests that nRF51 is indeed unpopular choice compared to other popular development boards.

The study of social sciences live in different spectrum to knowledges necessary to make Rhythm Open Badge. Hence, in case social scientists want to leverage their social observation with such tool like Rhythm Open Badge, they need to find another person that has experiences with the components and the tools those are used to make Rhythm Badge. Considering the low search queries on tools those are used to create Rhythm Open Badge from Google Trends, finding such person would be an uneasy task.

This project is set to please both makers and those who wants to do social observation in closed group. The scenario is that for both makers and the social scientists to work together to make a tool similar to Sociometric Badge. With regard to the Rhythm Open Badge, the components and tools chosen for this project need to be as accessible as possible to the makers in term of how easy they are to find and to be studied. This project aims to kick start the development by setting an example of an alternative Sociometric Badge for both makers and social scientist that can easily be tweaked based on their needs.

This paper start with the State of the Art of previous to recent implementations. Then, this paper defines who are the user group and the goal for each user groups. Ideally this project would like to satisfy all possible user groups. However, since I am also inside a user group, there will be bias, although I will try to keep as neutral as possible. After the design goals are determined, then the next thing to formulate is the Project Requirements. Here, I will define limitations, aspects those are not being part of this project and the reasons. Furthermore in Project Requirements, I will discuss my tools of choice and why it is better than the other options. The next chapter will discuss about project implementations. These implementations will be based on the complexity of the result. There are minimal implementation for testing, realistic implementation, and ideal implementation. The last lengthy chapter will be about testings and its results. Before concluded in final Advice for Future Works.

- State of the art introduction.
  - What is state of the art?
  - Why it is necessary?
  - How to make state of the art.
  - What is the implementations for this project?
  - Any good categories?
  - What things to analyze?
  - What to look when looking into implementations?
- State of the art introduction paragraph.

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- In this chapter, previous to recent technologies those are similar to Sociometric Badge will be discussed.
- This is a state of the art. Usually state of the art is about showing similar researches those had been done.
- The state of the art in this paper is for discussion which devices share similarities to the Sociometric Badge.
- These devices will be then shown its features.
- These features across different implementation will be combined.

In order for one to cook the best cuisine, they need to know what is the best ingredients as well as the best techniques. In this chapter I will delve into some relevant implementations similar to what this project is trying to make.

From my perspective, there are four aspects to look and to learn from these previous to recent implementation of Sociometric Badge. These aspects are hardware, software, storage, and all the logics to glue all of them together. However, this chapter will look specifically into the hardware aspect, since it is the only aspect that can be known for sure.

This project aims to create a social data gathering tools similar to Sociometric Badge. Both Sociometric Badge and Rhythm Open Badge comes with their own limitations. For example with Sociometric Badge, its user cannot see on what is happening behind the badge itself, like what kind of process it runs and inability to adjust based on specific needs, unless, perhaps, the user contacts the company behind sociometric badge. Rhythm Open Badge is currently still in development. There are minimal documentations as well as broken links in their website. Nevertheless, personally, I consider Rhythm Open Badge seems like solid solution, with it uses low powered controller that can be turned on with only a coin battery. This project would like to make an alternative with providing minimal....

For an individual to cook good foods, they needs to use the best ingredients as well as to know how to cook properly. In this chapter, I would like to delve through previous to recent implementations of devices those are similar to Sociometric Badge to determine what are the suitable ingredients to create an alternative version to the Sociometric Badge.

I think there are four classifications to look into, when determining what are the components and the tools to make implementations listed in this chapter.

From my perspective, there are four categories to fill when determining components and tools used to make each of the implementations. The first one is hardware, then software, storage, and finally all logics that glue these all together. For these implementations, the hardware would be likely the sensors and the main processing unit for each of the implementations. The software will be any binaries that is used to support each of the implementations, for example infrared input output manager and web administration panel. The storage is about on how each of these implementations

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store its data. And finally there will be the main interface for client and server that wired all of these components together.

However, the only thing that can be looked into without being specified otherwise is the hardware. Hence, that is why this chapter will look closely on what kind of hardware used to help and to make each of the implementations.

This chapter will discuss on what are the previous to recent implementations of the Sociometric Badge. This chapter will look into aspects those help to make the badge as well as aspects....

This project aims to make an alternative social data gathering tools similar to Sociometric Badge. There are some similar implementations those can be looked to determine what are the features.

This chapter will discuss about any other similar devices to the Sociometric Badge. The devices I put here has at least one function that the Sociometric Badge might benefit from. There four aspects that can be looked from these devices: hardware, software, storage, and logics that glue these together.

The hardwares are mainly the main processing unit of the device as well as the input and output. For the processing unit, this paper only looks whether it is low powered or not and which programming language used to program the board. Since this project deals with ubiquitous technology, the hardwares those will be looked into are mainly the input units. These input units are mostly sensors that capable to take one or two features from analog data it receives. For example microphone will be able to get pitch and volume features for every sound it receives.

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This chapter is about other devices that shares similarities to the Sociometric Badge. In order to satisfy this project goal to make an alternative version of the Sociometric Badge that can be easily fit into the user's needs, this project needs to look on what is already there to be studied. The Sociometric Badge itself takes inspiration from its previous iterations and from these iterations there are some features those are added and also removed. This chapter will look into these features and then determine what is this project's requirement for the alternative Sociometric Badge.

From my perspective there are five categories to look into form these implementations. They are the hardware, the software, what storage each devices uses to store its data, what kind of connectivity it has, and how it was programmed.

Since this project is dealing on ubiquitous technology the output should be physically minimal to none. Then, the main point on hardwares are the main processing unit and the sensors used to take analog data. There are three qualities that this project is looking on processing unit: whether or not it is a low power processing unit, how popular the development board is, and finally which programming language used to program the development board. For sensors this project looks into how many features each sensors can take from one stream of analog data. For example a microphone can take pitch and volume of sound it received.

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The softwares are more like into what kind of application need to be used to develop the device as well to complement the device during run - time. There are two qualities to look into, which are, whether the software is open source and what are the requirements to install and run the software. For example if there are administration interface to manage client as well as web server.

Considering the nature of social data gathering tools, the only output necessary is where the received data is stored. There are no specification aside from how the data can be looked.

The last qualities to look is the connectivity. Sociometric Badge generally inform each others by delivering ID through infrared transceiver. Then, the data moved manually into the main computer. There are other possibilities as well, like peer to peer connection between badge and bi - directional connection to the main server where the badge can then store its data.