Territory Coverage Monitoring with Crowd Analysis Mobile Application

Ron Allan N. Salem^{1,a}

¹Faculty, STI College Ortigas-Cainta, Ortigas Ave. Ext., Cainta, Rizal, Philippines

a<ron.salem@sti.edu>

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Abstract. Jehovah's Witnesses are globally known for their house-to-house Bible preaching. This project's objective is to ease the monitoring of the completion of a congregation's territory assignment using mobile technology. Through the use of GPS, it records the whereabouts of a user which gives the Group Overseer information about which streets are covered in a day's field service activity and then send it to the Service Overseer. He can also use this information to know the exact location of each Witness in the field to solve security concerns. Another feature is a crowd analysis of the acceptance of people in the territory. Via crowd sourcing, all users of this mobile application can provide generic information about how the people they talk to responded which will help the Witnesses have an idea regarding which topic will be most interesting to their target audience.

1. Introduction

This project will be designed for use specifically by a group of people known as Jehovah's Witnesses (JW). These people are volunteers who are known worldwide for their zealous ministry which involves preaching the good news of the Bible to people through house to house work. Each individual regularly spends time helping people learn about the Bible and God's Kingdom. Because they witness, or talk, about Jehovah God and His Kingdom, they are known as his Jehovah's Witnesses [1]. To make this activity organized, each congregation assigns an individual who will oversee this activity who is known as the Service Overseer. Then, each congregation is divided into smaller Ministry Groups who is led by a Group Overseer.

This mobile application will be named 'JW Territory'. It will be a great help to Group Overseers who monitor how their assigned territories are covered. Consequently, it also helps the Service Overseer to be able to monitor each group's activity more efficiently therefore helping him in making sure the territory assigned to a local congregation is covered within a reasonable amount of time. Since most people now have access to mobile technology, the project intends to maximize this opportunity by coming up with a mobile application which runs on the most common mobile platform – Android.

This will allow a user to record his movements or whereabouts via GPS. Consequently, it would have an imbedded interactive map which helps the Group Overseer be aware of which streets were covered daily. This helps him in deciding where to start tomorrow. The Group Overseer forwards this report to the Service Overseer for further monitoring. He may also use this information to know the exact location of each individual who is part of a day's Ministry activity in case they are left behind by the group. Instances such as this happen when the Witnesses are welcomed into the houses of people in the area and the Group Overseer is unaware. On another note, since this activity focuses on how to help people learn from the word of God, it is vital for them to catch a person's interest on the first few words they utter in a conversation. With this, it would be a great help if they would have an idea on what specific topics people in a certain area are interested on. This is where crowd analysis helps.

2. Objectives

This project aims to achieve the following:

- 1. Simplify the process of territory coverage monitoring and record-keeping both for the Group Overseer and the Service Overseer.
- 2. Collect necessary information from users to come up with a crowd analysis which would give the Witnesses an idea on which topics are most interesting to people in an area.
- 3. Provide a mobile system which will help Group Overseers monitor the whereabouts of a member while preaching.

3. Literature Review

3.1 Global Positioning System (GPS)

Developers now have access to online providers of maps such as Google Maps API which we can integrate with the GPS capability of mobile phones. This technology is currently undergoing its most significant improvements and manufacturers of mobile devices are all willing to make sure that this technology will always be available in all the devices they produce due to its social significance and relevance [2]. Today's GPS solutions typically have a range of three to five meters, or up to 16 feet away. However, efforts are currently being done to improve this. According to IEEE Spectrum, Broadcom is starting to make a mass-market GPS chip that can pinpoint a device's accuracy to within 30 centimeters, or just under one foot [3].

3.2 Crowd Analysis

Business strategies and processes are affected by crowd analysis as a development in mobile technology. Decades ago, to come up with a good product or service which will directly benefit clients, an organization offering it should conduct a survey which may involve manpower requirement to go through the field and manually gather data from people in an area. Now, crowd sourcing is possible via mobile solutions and crowd analysis reports may also be generated on the fly [4].

3.1 Synthesis

Evidence from these related literature shows that this project will be of great use and help to the zealous efforts put through by the Jehovah's Witnesses as an organization. The studies presented showed evidence that if a solution is to be made for any human activity requirement, it better be made as a mobile solution. The current IT trend shows that accessibility to mobile solutions is a priority in our ever-dynamic society. Integration of GPS in mobile devices to mobile applications became common, or even necessary for marketing purposes. In previous years, access to mobile data is an issue but nowadays, mobile data slowly became a necessity and the demand became too high that even local governments have exerted efforts to improve the services of private internet service providers up to the extent of threatening them of the possibly approving the entry of a competitor to speed up the development efforts of existing providers. This sudden change in the industry landscape led to better access of most of the population to mobile data connectivity. This has also affected the way we communicate. There was a time when solutions to various human activities would involve face to face communications in the process, as is what's currently experienced by the client. However, the advent

of mobile technology is changing the real-time requirement for communication. Chat and Chat groups can now be created, which are all available via mobile data, to ensure real-time communication between concerned parties.

With all being said, now is the best time to introduce a mobile solution for what Jehovah's Witnesses are known for – their house-to-house ministry.

4. Methodology

The research for this particular project started with an interview. This interview was conducted with the Service Overseer. Later on, interviews were conducted with some Group Overseers. Afterwards, a survey was conducted amongst those who are the intended users of the project. The results from these data gathering techniques lead to the ideation of the project – JW Territory.

Below is a block diagram of the system implemented in the project:



Fig. 1. Block Diagram of System Implemented in the Project

The main source of data is the Service Overseer, Mr. Ernesto Salvador. The primary duty and responsibility of a local congregation's Service Overseer includes helping individual members be more mindful of how zealous they are in the ministry or encourage them to do more, if their situation permits, for the love of God and mankind. Monitoring and recording of territory coverage is also part of his tasks. He needs to know daily where different ministry groups of his local congregation has conducted their house to house activity through communicating with respective Group Overseers, record all this information, then inform the Group Overseers for the next day about the territory that needs to be done the next day.

Group Overseers namely, Mr. Jun Francisco, Mr. Jahziel Ancheta, and Mr. Francis Urian also contributed as they answer interview questions. Group Overseers are the ones who physically lead a group in a day's ministry work. He starts where the Service Overseer tells him to start. After which, they would report to the Service Overseer any problem encountered during the day's activity and where they have stopped so it may seamlessly be continued by another group the next day.

At least 50 respondents, all of which are Jehovah's Witnesses from the Karangalan Congregation of Cainta, Rizal, are expected to answer the survey questions.

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Fig. 2. Service Overseer login

The Service Overseer is able to assign a territory to a Ministry Group and select among a list of users who would be the Group Overseer for that specific group. After a day's ministry activity is done, he receives a report which contains information about when a group has started doing a territory and when they were able to finish it.



Fig. 3. Group Overseer login

The group overseer is able to assign members into his group, view their whereabouts for the day's house-to-house ministry activity, and then generate a report for the Service Overseer. He also has the

option to click on the map pins to see the exact location, date, and time when the last checkpoint was generated by the application via the user's GPS in his mobile phone.

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Fig. 4. Member login

All member users are able to provide input regarding the address, gender, and age bracket of an individual for crowd sourcing purposes. This is the same module where a member user would go to check for crowd analysis. Clicking on the Generate button will give the member user the common interests of people in the same area with the same gender and the same age group.

5. Findings

Upon the completion of the project, the Service Overseer as well as three (3) Group Overseers installed the JW Territory application in their mobile devices to check whether this would really help them in simplifying the process of territory coverage monitoring and record-keeping. Another purpose is to check if this mobile application will help them locate their group members at any given time in the event that a member is separated from the group. To do this, the Group overseers have shared this application to a total of fifty (50) members in a day's field service. The group members have also tested the use of the Interest Tracker, the crowd sourcing module of the application, where they are able to input generic information about an individual's preferred topic of conversation. They also tested out the option to generate a report about the common interests of a specific group of people in an area to see if it helps them in coming up with good introductory sentences which will cultivate the interest of the householder.

Results of survey from Service Overseer and Group Overseers							
Questions: Did JW Territory help you						Weighted	Verbal
1n	4	3	2	1	Total	Mean	Interpretation
monitoring the progress of territory							Strongly
completion?	4	0	0	0	4	4	Agree
simplifying your territory coverage							Strongly
record-keeping?	4	0	0	0	4	4	Agree
easily locating a member in case he is							Strongly
separated from the group?	4	0	0	0	4	4	Agree

Table 1

Note: 1.00 - 1.49 (Strongly Disagree); 1.50 - 2.49 (Disagree); 2.50 - 3.49 (Agree); 3.50 - 4.00 (Strongly Agree)

Question 1 = $\frac{(4x4)+(3x0)+(2x0)+(1x0)}{4} = \frac{16}{4} = 4$

Question 2 = $\frac{(4x4)+(3x0)+(2x0)+(1x0)}{4} = \frac{16}{4} = 4$

Question 3 = $\frac{(4x4)+(3x0)+(2x0)+(1x0)}{4} = \frac{16}{4} = 4$

Table 1 shows that all of the respondents, the Service Overseer and three (3) Group Overseers strongly agree that the project, JW Territory, helped them in monitoring the progress of territory completion as well as simplifying their territory coverage record-keeping. It also shows that all of the respondents, the Service Overseer and three (3) Group Overseers strongly agree that the project helped them in easily locating a member in case he is separated from the group.

Table 2 Results of survey from Ministry Group Members

Questions: Did JW Territory help you in	4	3	2	1	Total	Weighted Mean	Verbal Interpretation
recording generic information about							Strongly
an individual's topic of interest?	48	2	0	0	50	3.96	Agree
getting a general overview of an							Strongly
individual's topic of interest?	44	5	1	0	50	3.86	Agree

Note: 1.00 - 1.49 (Strongly Disagree); 1.50 - 2.49 (Disagree); 2.50 - 3.49 (Agree); 3.50 - 4.00 (Strongly Agree)

Question 1 = $\frac{(4x48) + (3x2) + (2x0) + (1x0)}{50} = \frac{198}{50} = 3.96$ Question 2 = $\frac{(4x44) + (3x5) + (2x1) + (1x0)}{50} = \frac{193}{50} = 3.86$

Table 2 shows that Ministry Group members, in general, strongly agree that the project, JW Territory, helped them in recording generic information about an individual's topic of reference. Also,

it shows that Ministry Group members strongly agree that the project helped them in getting a general overview of an individual's topic of interest.

6. Conclusion

Based on the survey results from the Service Overseer, Group Overseer and Member-users:

- 1. The Service Overseer and the three (3) Group Overseers strongly agreed that the process of territory coverage monitoring and record-keeping is now a lot simpler.
- 2. All respondents, who are member-users, strongly agreed that this mobile application helped generate a crowd analysis report which gave them an idea on which topics are most interesting to specific group of people in an area.
- 3. Group Overseers strongly agreed that they are able to monitor the whereabouts of a member at any given time while preaching therefore helping him look for members who are left behind by the group solving security concerns.

7. Recommendations

Based on the comments by respondents who experienced using the application, the following are recommended for further study, and recommendations for change:

- 1. To be able to target all members of the congregation with mobile phones, a cross-platform mobile application is needed.
- 2. The use of a free Google Maps API results in inaccuracy of an address reported. A better, well-maintained, and costly map API may be used to resolve this issue.

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