

# Design a Mobile Application for Children's Tracking in Crowded Environments

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## Abstract

Child Tracking System is a mobile application where the parent can monitor their children location in crowded environments. In addition to children, there is also the elderly people, and the disabled people, so the guidance or the person responsible of them can use this application to track their location. The parent or guidance side will have the application in which they can track, and on the other side, the child or the old person or the disabled person will have device that includes the GPS chip. The main goal of this research is to design an application with system that will help parents to keep track of their children, eventually reducing the cases in which the children or the other mentioned categories of people could be lost. The current used solution to this problem is that the children first have a wearable hand wrist in which they print their parent phone number, so when the child is lost there is a center in which the child is being taken and dealt with care till they contact the parent to come and pick the child up. The problem with the current way that it takes time, and there is a risk that child get totally lost or kidnapped before even reaching to any help, so the new way is better to even prevent them to go far away or to be lost for hours, thus the recovery here will be fast unlike the regular used way nowadays. That goal will be achieved throw systematically objectives starting from studying the existed systems, to planning and analysing, going to designing and implementing, and lastly, testing our own system.

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**Keywords:** Mobile Application, Tracking System, Global Positioning System, Crowd Management, Smart Devices.

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## I. INTRODUCTION

Over the years, parents and family greatest concerns when visiting Makkah and Madinah cities for worship was not to lose the child. The very crowded large area with constant movement and relocation of people is very prone to losing a child or an old weak person among the crowd, or even the disabled people. This becomes a major inconvenience to the worshipers who spend a lot of time worrying as well as searching.

The technology revolution has made it very easy to acquire devices for all ages and of many shapes and sizes. This can be positively used by visitors to locate and find their loved ones. The child tracking system

on smart devices will help the parents track the movement of the children using GPS technology.

One of the reasons why a person may get lost is due the large numbers of people that come to this holy place every year, for example, in 2019, 2.4 million pilgrims came to perform al-hajj [1]. Moreover, the Ramadan season, and Umrah seasons, and not to mention the people who regularly visit Haram from Madinah itself, the residents of Madinah city. The large numbers keep the place busy with people all the time and the population of people traffic varies, reaching 1 million at peak according to [2].

Generally, the loss of persons is an event that could occur in any crowded place. Children, or elders, or disabled people being missed in Al Masjid Al

Nabawi is a primary concern in Madinah, it's important for every parent that has children, or someone who has people to look after.

Currently, the used way is to monitor and watch back after the person who is lost, through using the records from the cameras on the walls, or by guiding the loose children to a child handling place where they try to contact their parents through the already given band which had the number of parent's phone. But the time in which the child is lost and to be driven to the place could be crucial, in the worst case the child could be kidnapped before someone take him/her there.

In 2019 the average number of children missing was approximately 1000 per day according to [3]. They were reunited with their parents because of the use of a band that had the number of the parent contacts in case the child was lost, also there is a centre for lost children where they provide them with the best care until they are reunited. Now the maximum technology of this solution is a community based not individual-based, so there is one centre where the child waits. The proposed solution is equally available to the individual as well as organizations. the most important thing, it can track the current location of the missing person. The parent can track the child, and the person who is responsible for elders can track them, and the companion of disabled people can know the precise location of the person. This step could avoid even losing them before they even get lost. The most crucial and critical moments is when the missing person is missing and there is no need for the other parties to be involved to locate him or her thus saving time energy and other resources. This is where the tracking overcomes the normal solution, and cover the abnormal areas that the current solution doesn't.

In this research, the goal we are trying to achieve is to create a system to allow the parents or guardians to keep track their kids or elderly or disabled people when the person is out of sight in the Al-Haram area, to overall not let them be lost, or to recover them fast. The main objective of the Child Tracking System is to design the tracking system using GPS to prevent child missing events in the haram.

-Study some of the available features used in the child tracking system that fits with the needs of the parent.

-Implement and develop the application that has features and suitably designed, which will be able to assist the parent to monitor the children location in real-time.

-Accredit and verify the developed system by performing unit testing and user interface testing alongside having it tested by the user in the Al-Haram to ensure user satisfaction with the application and system provided.

-Guardians need to register an account before using the application and the system.

-Guardians will need to submit their detail to begin using the system.

-The other side (Child or Elder or Disabled Person) will have the GPS.

The android application and system will mainly be targeting the average adult citizen who is guardian to children between the age of 4-12 years of age or elders between 75-90 years or disabled peoples.

The system and application will be working on an Android platform. GPS tracking technology will be used between different devices. The mobile application is responsible for keeping track of the location of the device and showing on the map. We chose the Android platform because it is a free and open-source platform in which the library is easily accessible, whereas the GPS is used for locating the device with the help of the cellular mobile. The application in the device will update the location of the child using the GPS and GLONASS or GPRS technology.

In this introductory section, we gave an overview of the research. We intend to create an Android application that's about tracking either children or old people or disabled people who live position will be tracked using a GPS chip, and on the other hand, the guardian will use the application to monitor them. The goal is to keep the visitors of Haram together and not their beloved ones are lost because the place may be overcrowded, and the chances of losing are high. That goal will be achieved to throw systematically objectives starting from studying the

existed systems, to plan and design and implement and test our system.

The following sections will be covering the rest; starting from a literature review for the existing systems first. Then we will set up our methodology to develop our system and plan for it. Further, we will discuss the requirements in detail and conduct surveys for that. Then we will start to design the system using the UML diagrams. After that, we will start to implement the system. Next will be testing what we have implemented and verified it. Lastly, we will drive to some conclusions and future work that could be done.

### **Implementation of Children Tracking System on Android Mobile Terminals**

Here, the paper focuses on implementing children tracking location system for every time school attending is done by the child. Nowadays more children getting lost, Sen. Charles Schumer (an American politician serving as the senior United States Senator from New York) has proposed that the federal provide funding for tracking devices for autistic children so that

they do not go missing. These proposed tracking devices could also be worn as wristwatches, anklets or in I-cards. the child module includes ARDUINO, Global Positioning System, Global System for Mobile Communication, and a receiver include parent's movable. it is very useful for women safety [15].

#### **Questionnaire**

We distributed questionnaires among 30 random peoples in the area of Al-Masjid Al-Nabawi to gather information and data that will serve us in the basis of knowing the users of the application and their opinion towards the idea, and if they have any recommendation.

Our questionnaire is divided into four parts :the first three parts each contains three questions, while the last part is for suggestions.

#### **3.1.2.1 First Part**

First Part contains questions to know about users' categories, backgrounds, and ages.

The first question is "Please choose from the following categories to indicate which kind of

persons you are responsible to take care of the child, old person, a disabled person. "

The results in Figure 6 show that there is a dominant amount of people that have a child to look after with a percentage of 61%, then in the second place comes the old people. Lastly, there is a proportionally little amount of disabled people who are being taken care of by someone.

The second question is "Do you have children to take care of from age 4-12? "

The third question is "Are you suitable with simple English language as a language for the application?

#### **3.1.2.2 Second Part**

Second Part contains questions to acquire knowledge about users' experiences in the area of having someone being drifted

The fourth question is "Have you ever experienced having your child or old person or disabled person being lost in Al-Masjid Al-Nabawi before? "

In figure 9, we can see that 17 out of 30 peoples experienced having the one they care about to be lost in Al-Masjid Al-Nabawi, regardless of how do they get them back, or if it was a simple drift that happened out of the sight.

The fifth question is "Have you ever witnessed someone else having their child or old person or disabled person being lost in Al-Masjid Al-Nabawi before? "**METHODOLOGIES**

This section will discuss the methodology that will be used in the research. In order to assure creating and having a high-quality software, the research is required to follow a certain software development life cycle (SDLC) framework. The framework properly defines the task to be performed at each step in the software development process which will make sure our work is planned, organized, and following the schedule.

There are various software development life cycle models in which the step sequence is unique to its type, therefore the models that our research will be using is incremental prototyping model [22]. The reason behind us using the incremental prototyping model is because it is so far suiting best considering

the time and cost constraints. This way the functionality of the system will be divided into subdivision modules. Every single developed model will be assigned on each iteration and thus each iteration will depict the completion of the required functionality.

With the user involvement at the end of each iteration, this will increase the user satisfactory of the product.

Furthermore, the model enables the module or functionality with the highest priority place into the

## CONCLUSION

This system does not include indoor positioning solutions where it uses to locate the child indoor. Our application requires an active connection between the internet and need to operate on an active phone. Lastly, a web view is not provided. It decrease the cases of missing persons, especially the children. It gives a tracking solution for the parent to keep tracking their children location in the Al-Haram by using GPS with GLONASS to improve the tracking accuracy and availability.

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