Use of RFIDS and GPS to Track Children

Name

Institution

## Honor Pledge

On my honor, I have neither given nor received aid on this assignment

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## **Project Plan**

In order to undertake this project, there are various tasks that need to be conducted so as to attain the desired objective and outcome. The planned schedule captured in Table 1highlights these activities as well as their timeframes

## **Table 1Project Plan Schedule**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | 09/21/2019- weeks | | | | | | | | | | | |
| ID | Task to be done | Start | Finish | Duration | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 1 | Project topic selection and discussion with supervisor | Week 1 | Week 2 | 1 Week |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 | Research Proposal due. | Week 2 | week 6 | 4 weeks |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 | Literature Review due | Week 6 | Week8 | 2 weeks |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 | Data Collection and Analysis Report due. | Week8 | week10 | 2 weeks |  |  |  |  |  |  |  |  |  |  |  |  |
| 5 | Final IT Capstone Project: (Capstone) Thesis due. | Week 10 | week 14 | 4 weeks |  |  |  |  |  |  |  |  |  |  |  |  |

## **Resources**

In order to conduct this research project, there are a number of resources that will be instrumental in ensuring its success. The resources in table 2 highlights the resources and their approximate budgetary costs

## **Table 2 Resources Table**

|  |  |
| --- | --- |
| **ITEM** | **COST IN $** |
| Research resources for the project | **30** |
| To administer questionnaires | **20** |
| Writing materials | **10** |
| Communication costs | **20** |
| Miscellaneous costs | **20** |
| **Total** | **100.00** |

# The objective of the Paper

One of the scariest times for a parent is when they have no idea when their children are. Worst of all is that there is no parenting manual, which means that every parent has to invents and adopt as they continue bringing up their children. The more they grow, the harder it gets to keep an eye on them. They have to go to school, hand out with friends, and the parents had responsibilities like work, among others, which means that they are not always in sight of their children. Like that, some parents have taken it upon themselves to find various ways in which they can keep track of their children as a source of security. The issue of tracking is global and has even led to the government in China, issuing tracking devices to elementary children. They give the children watches that are equipped with location `positions, and they sent it to their parent’s smartphones. What this means is that the tracking of children is gaining momentum fast and is a potential growing issue. As such, we should ensure that we understand fully what it entails and, most of all, the most effective and efficient tracking methods. Therefore, the objective of this paper is to critically assess not only the effectiveness but also the efficiency of RFDIs and GPS tracking on children by parents. To cover this, I will be looking at products that use RFIDs and GPD to compare the different ways that they work, their merits as well as demerits. With all these, it will be possible to give recommendations and settle on how effective the tow are and if one is indeed more preferable compared to the other.

**Introduction**

Parenting can, in a way, be seen as care though it has no guiding manual, and what works for one parent may not work for another parent. Even then, in most cases, the hardships and challenges that parents face while raising their children are the same. One of the issues that are similar to all parents is that they would like to know where their children are at least until they are of legal age. Seeing as they cannot follow each other and spend every minute together, this can be quite difficult to achieve. As such, the idea of tracking devices used on the follow up on children is very much welcome by the parents. We will be looking at the use of RFIDs and GPS incorporated devices in the tracking of children, how effective they are as well as the upside and downside of them. RFIDs that are Radio-Frequency Identification is a system that uses radio frequencies to read the information that is stored tags within an object. It is divided into two sections: a tag and a reader. As for the GPS is the Global Positioning System which shows exactly where one is located within a map of a state or any place. The United Nations Convention on Rights of the Child does agree that the children should be allowed to enjoy their childhood. For that to happen, they have to be safe, and tracking them ensures that. When they are referred to, they can track any location globally as ling s the satellites are working as they should. We will be looking to understand this better.

## **Timeline**

This project aims to understand the effectiveness of RFIDs and GPS in tracking children. It has been enacted in some states and schools, and we intend to find out how well or bad it is working. In addition to this, we have to look at how the two interact, their comparison before we can note which of the two is more preferable. As such, the project will take about four weeks as the draft and proposal have been forwarded.

## **Literature Review**

In order to deal with the challenge of children's security and provide ways that parents can use to track and keep their children safe, numerous technologies have been proposed and adopted. This paper aims to undertake a review of various scholarly articles and assess how Radio-frequency identification (RFID) and Global Positioning System (GPS) technologies have been utilized as well as their effectiveness.

The effectiveness of the RFID technology is acknowledged by the Organization for Economic Co-operation and Development (2008), which takes an in-depth look at it an seeks to help interest parties understand its operations and its effectiveness. In their article, they assert that its deployment in various areas is promising. The article shows how RFID is a convenient technology with many facets. They show how it enables the process of data collection from electronic tags that do not need contact and transmitters that are wireless and that enabling the tracking process. The article also shows the importance of understanding the strengths of RFID technologies as well as the limitations which bedevil its application so that the technology can be effectively used. The article shows how different types of RFID technologies can be used and how they differ depending on the context of implementation. It offers information on RFID elements such as its hardware and software components, standards, operation ranges, modes, security aspects of its information, and so forth. It shows the potential security challenges that are faced in the use of RFID technologies, which interfere with its integrity, availability, and confidentiality. Some of the examples it offers include cloning, jamming, eavesdropping, denial of services, malware, and so forth. This article is significant to my study because it shed pertinent information about the RFID technology making the process of assessing its effectiveness and operation a success

Numerous scholars have undertaken studies to determine the effectiveness of this technology. Anusha and Naidu (2016), in their study, identified the challenges that parents with students face, not knowing whether their children attend their college classes or not. They proposed the use of a tracking system that allows parents to track their children's movement and whether they attended school at the proper time or not. This system relies on tracking children who get into the bus and their movement whether they go to college and home or they alight at certain points. Their proposed system uses processor technologies with RFID, GPS, ARM, and GSM (Global System for Mobile Communications). This paper is critical to the study because it shows the reliability of the various system as they are used to track the movement of the student, helping in identifying the most effective.

Building upon this, Pang, Ding, Liu, and Fang (2018) in their study identified the importance of enabling parents to track their children since approximately 800,000 children in the US are reported missing annually. Their solution to the challenge was a child tracking system based on RFID technology. These scholars designed a system of their own prompted by the cost and energy limitation that dogged the existing systems. In the study, the scholars proposed the use of RFID tags the children can have, which works together with a tracking system that allows the users that have been deployed to aggregate the readings and track the children. This study is significant because it shows that RFID technology can be successfully employed in the process of successfully and reliably tracking children.

Still, in support of the RFID technology and its effectiveness, Muli (2016), in his study, identifies the challenges that are related to child security and the need for tracking them in order to keep tabs. The scholar proposed the use of Radio Frequency Identification (RFID) to resolve the challenge. The technology which is proposed to work hand in hand with a geotag frequently notifies the parent of the location of their children with a timestamp through an SMS system. Further, the identified system can help the parents identify the location of their children by querying their whereabouts. This article shed light on how an RFID system can be utilized to ensure the security of children through a tracking system

This is similar to Lina, Lub, Kwana, and Shenb (2010), who, in their study, propose an RFID system that can help parents track their children in an amusement park as well as crowded public venues. In this proposal, different parties have to come together to allows for tracking. RIFD readers, the control center, visitors in a park, employees as well as storage nodes work together. The child information from their RFID tag is read by RFID readers who are posted throughout the park; the information is sent to the storage node where it is accessed by the employee and then communicated to the parent who is park visitor. This system also seeks to ensure information privacy (child's identity) even as they track the child and relate it only to their guardian. This paper shows how the RFID technology can practically be used in tracking children in public place showing the technology’s effectiveness

On the contrary, Hedefine (2006) indicated that, even though technologies that track a person have experienced drastic growth and development, they come with challenges and threats to personal privacy. The article shows how RFID technology can be used to identify the location of a person as well as continuously track them even without having the proper consent from the individual. The article seeks to determine how a person's privacy can be ensured while still making use of the technology. It proposes that there should be an option where a person does not have to link their identity to the tag's number in order to bring about a balance between the tracking desired, especially for children and the privacy of individuals. This article is important for my study because it shows the challenges that come with the application of RFID technologies in tracking someone where they undermine their privacy and touch on certain legal control and ethical issues.

The other technology that can be applied in the process of tracking Children is GPS. However, in comparison to RFID, GPS has not received as much attention as the later. The studies conducted mostly show that GPS is preferred in tracking vehicles, while RFID is the preferred technology in tracking children. Bajaj and Gupta (2012), in their article, identified how vehicle tracking could be done with the use of GPS services. In this article, they show how car owners can make use of tracking services that are made possible through the use of GPS services and which enable them to know the particular location of their property and safeguard them from various security threats. This article is important to my study because it shows how the GPS security system can be used to track and identify the particular location of something effectively. Relating to my study, it shows the effectiveness of GPS technology it tracking and its possible applicability in tracking children, helping parents know their whereabouts, relieving anxiety and ensuring their safety

The two technologies can, however, be used together for better tracking of children. As scholars Fathima, Nivedha, Sangavi, Selvalakshmi, and Chitra (2016) illustrate. In their study, they highlight the critical necessity of tracking children among Indian parents since a child is reported missing every eight minutes. The scholars then propose the merging of RFID and GPS technologies in order to keep track of children. The two technologies are proposed to work hand in hand to identify when the child gets into the bus and where they exit. This information is then sent to their respective authority or guardian via SMS, which enables them to keep tabs on them. While on the one hand, the RFID lets the people know the areas the vehicle has passed, GPS provides a real-time location. This article is important to my study because it shows how the two technologies can work together in pursuit of the most reliable child tracking system.

In line with this, Sankaranarayanan and Hamilton (2014) identify how the RFID technology has been widely looked at in the public transport arena where it is used to track passengers as they board and alight. They highlight how both GPS and RFID technology have been employed in the process of bus tracking and reporting their expected arrival times. The scholar shows how these technologies can be used to track the movement of buses in order to let their users know exactly when they will arrive. This article is important for my study because it highlights a case study of how the technologies have been used and their reliability helping to make the decision of their effectiveness and how they can be successfully implemented in the process of tracking children.

This view also receives support from Shyam, Kumar, Shashi, and Kumar (2015) in their article, which seeks to show how tracking systems can be used to help parents know the whereabouts of their children enhancing their security. They allude to the rise in kidnapping, accidents, and the ways parents are driven to worry since they do not know the locations of their children. The scholars propose a tracking system that is SMS based that will enable parents to know where their children are in real-time. Based on their proposal, the scholars opted for a system that combined both RFID and GPS with the former being part of the module kit located in a child's bag giving parents the GPS coordinates of their children. The child's location is sent to the parents via an SMS without requiring internet services. The scholars concluded that RFID technology is practical when it comes to tracking children. This article and the information it provides is pertinent to my study since it shows the effectiveness and reliability of RFID technologies when they are employed in tracking children and helping parents ensure the safety of their children. It also identifies the strength that comes with the application of RFID to communicate to the parents since it does not need internet connectivity.

In conclusion, this review shows that different scholars have looked at how RFID and GPS tracking systems can be used to determine the location of a child and help a parent in ensuring the security of their children. A majority of the scholars support the use of RFID technology and its effectiveness in the tracking process. The use of GPS technologies has been relegated more to tracking vehicle movement and not necessary for the child. There are, however, scholars who are convinced that two technologies can be combined and used to improve the tracking process in general. Therefore as this study embarks on looking at children tracking using either the RFID or GPS technologies, determining the most effective and making the necessary recommendations, insight gathered from previous studies will be used to inform the approach as well as the methodology applied.

## **Advantages**

Additionally, as mentioned above, various companies have taken up the act of producing and manufacturing these devices that use RFIDs and GPS in the tracking process. In our case here, we will be looking at five products that he incorporated this processor as part of their products. One is the bus tracking system which, as mentioned above, monitors when the children get on the bus, when they alight and where it is that they alight. One advantage is that they can help in keeping track of when the children attend schools and when they skip schools. The main aspect and idea with tracking are that parents can keep an eye on their children. All the products that use the RFID and GPS have this advantage as it is one of their main objectives. This means that the parents are in a better position to protect their children and feel safe as they know where they always are (Sankaranarayanan, S. and Hamilton, P. 2014). With the high number of missing kids annually in the United States, this comes with a sense of hope and security for the parents. Also, we have the fact that they have incorporated the newest and latest technology, which means that connectivity is good with smartphones. The fact that the parents can access the tracking device at any point that they are in is a bonus which builds upon the feeling of safety. They provide information about the presence of a student within the school premises, even if they do not attend a certain class.

When GPS trackers work alone, and the RFIDs work alone too, there are more limitations that they can overcome by combining the two processors. Another advantage that has been seen with this devices is that they involve less human intervention as the data collected is transferred directly through the tags and satellites. As such, there are minimal susceptibilities to errors, unlike in the case that the data is human controlled. This means that the data transmitted is reliable and trustworthy, free of any changes (Lina, X., Lub, R., Kwana, D. and Shenb, X. S. 2010). No line of sight factor when dealing with the RFIDs, which means that parents can monitor their children from a distance. Unlike GPS, it is affordable for most parents and can fit in a plan. With the two, they help in emergency management, especially in the case that a child has been abducted, which makes things easier, and we cannot ignore the fact that GPS is connected to the smart devices, which makes it easier for the parents and school to track them. When a student is lost, there is always the issue of who to blame, especially when they had left school as there is the parent, the school as well as the driver of the bus that they were on.

## **Disadvantages**

However, we have to acknowledge that a series of demerits do accompany the tracking devices. Everyone has access to the internet and technology and how they work and is such, the wring people can use the tracking devices to track the children. Therefore, this factor remains open unless taken care of. There is the vulnerability to hackers if their devices are not well secured. They promote a feeling of mistrust with some children, and with time, this grows to be emotional distress, which affects them even as adults (Muli, M, E. 2016)). There is also the aspect that children may get very secretive as well as grow too dependent on their parents. All in all, RFIDs, seems more reliable for tracking devices when compared to the GPS tracking devices. The GPS is more suitable with the tracking of objects like a vehicle.

**Tracking devices**

Several devices have been released in a bid to help to increase safety and security for children in school. Below are five products that use GPS and RFID for tracking children and how they have revolutionized society. We have Republic Wireless, Relay AngelSense, DokiWatch S, B'zT Washable Tracker T-Shirt, KidsConnect KC2.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Republic Wireless | Relay AngelSense | DokiWatch S | B'zT Washable Tracker T-Shirt | KidsConnect KC2. |
| Water Resistance | Splash-resistant | Splash-resistant | Splash-resistant | Water- proof | None |
| Compatibility | Android, IoS | Android, IoS, Web | Android, IoS | Android, IoS | Web |
| Bluetooth | Yes | No | Yes | Yes | No |
| Video calling | Yes | Yes | Yes | No | Yes |
| Cellular Network | T-Mobile, Sprint, | Verizon | AT &T | None | T-Mobile |

## Table 3

## Recommendations for Tracking Devices

Each device here works in a bid toprovide security and safety for children while their parents receive notifications of their whereabouts. For any of the devices, they have been successful for those who have been using them. Even then, some, like the B'zT Washable Tracker T-Shirt, lack the option of calling. When parents can easily communicate with their parents, it increases the feeling of safety. Also, they should all have geofencing as well as an option to contact 911 incase they find themselves in danger. Children have a way 0of messing up and playing too much as such, and the devices should incorporate a water resistance aspect so that at every chance they remain viable. The table below shows a summary of the pros and cons of the two processors.

|  |  |
| --- | --- |
| RFIDS Tracking | GPS tracking |
| **Advantages** : | **Advantages :** |
| Minimal human contact | Immediate notification once the child has arrived at a location |
| No line of sight necessary | No line of sight necessary |
| Contains a longer read compared to their processors | Can be connected to the smart devices that parents have |
| Has data storage which helps in data capturing | Some have the option of calling, which is very helpful. |
| It can simultaneously read more than one tag. | Provide the exact location of the child |
| It makes emergency management easier. | It helps in safety issues and cases of emergency management like an abduction. |
| Affordable | Covers long range |

### Table 4

# Research Methodology

Research within this project was essential as it covered how we got the data and information necessitated for the projected. As such, one of the sources of the data gotten was on secondary data on studies done on the enactment of tracking in children, studied how they were applied as well as how efficient they had found the process. There's also the study on the different areas and schools that had already adopted the ideologies and data were collected to check on how effective and efficient the process was. Additionally, there was the use of Rapid Application development, which involves the sampling, data collection, and analysis in line with the project. There was the incorporation of exploratory research, especially o the tracking device use in the bus system. With this came a survey that allowed for the understanding and well scrutiny of the tracking system for children how the communities received it, its advantages as well as the observable disadvantages, and the overall outcome expected with the use of RFIDs and GPS tracking devices.

## **Data Collection**

Data collection was a summation of RFIDs and GPS prototypes in use. Different interviews were conducted on teachers who were in schools that had adopted the tracking method, parents as well as parents, both the supporters of the idea and those who opposed it. Notably, most of the parents love the idea of having a tracking device on their children and even admitted that they did not mind even if their children were above eighteen years as long as they were still under their care. With this, the statistics and data ontheir usage and effectiveness were documented and analyzed to come up with workable inferences.

## **Data Analysis**

To analyze information based on the percentage of outcomes and frequencies, the qualitative data analysis was used. To understand the prototypes and test them, there is essential so that we could not ignore the readers and tags within RFIDs and Geo-tagging(Muli, 2016). Individual units were tested and implemented individually to check hor properly they worked. For the who;e system to be checked and tested, there is the need for configuration and integration to be done within the whole system.

## **System Requirements and Designs**

According to Arduino integrated development, in the research analysis, there wasthe provision that some skills were necessitated for the development of the RFID systems. Withthe availability of Bluetooth in Android devices, the RFID and GPS had to be incorporated within this system.With MySQL application, there is a higher generation of a user interface within the integration community: the right user. The main focus here was the working of the RFID and GPS towards providing the primary goals by providing a system that would ensure that the children's safety came first.

### **Comparison between RFIDs and GPS**

|  |  |  |  |
| --- | --- | --- | --- |
|  | RFID Technology | Satellite GPS | Cellular GPS |
| Applications | IT assets management, remote monitoring, asset tracking, and construction. | Freight, gas, and oil industry. | Tracking mobile assets, gas, and oil industry. |
| Appropriate Areas of Use | Tracking facility or building. | Tracking assets of high value. | Tracking cellular infrastructure. |
| Power | Battery operated | yes | Yes |
| Communication Range | Short | Long | Very long |
| Cost per Tag | $5 | $300 | $100 |
| Tag Size | Adjustable with applications | Large | Medium |
| Cost Per Size | Lower | Much Higher | Higher |

## **Table 5**

## **Results, Analysis and Discussion**

The research methodology led to a lot of facts in light. First,it was clear that most parents indeed preferred having the ability to track theirchildren andknowing what they were up to and where they were. With that, the small devices that were readily available are what parents preferred, but there was the part of them who felt that microchipping was more reliable as the children would always have the chip and not manage to remove them. Also, in as much as there is the argument of privacy of the children, the parents feel that privacy is not worth much if the children end up abducted or go missing. Therefore, even as much as the parents have to consider that this might not be good for their children, the downside of it all is minimal in comparison to the advantages that they bring (Shyam, N., Kumar, N. Shashi, M. and Kumar, D. 2015). Tracking if children are an ideology that is very welcome with the current trends within the globe as well as the technologies that have emerged;in the world today, everyone is in the working category, which leaves next to no time with the children. The little time that they spend together is limited to the meals that they have at home, whereby in some places, they do not even get to have this. As such, the tracking methodology helps so much for the parents to feel that they have a connection with their children and can manage them by knowing where they are. Every parent wants to know that their child is safe, especially if they are not there to keep them safe, and with this, they have found that opportunity.

With the use of RFIDs, there are aspects like affordability that overshadow the use of GPS. Also, GPS is overly preferred for the tracking of things like vehicles and not people (Surve, P., Ballal, B., Phatak, H., Gade, P. Nirbhavane, G. 2015). The tracking device is greatly spread within the state to so many families. Some students, especially those above the age of nineteen, said that they hated the fact that they had to be tracked, even then, given that there was no way that it would change they had found the silver lining in the scenario. Most admitted that with the tracking devices came the chance for them to spy on their parents too and know where they were located. Therefore, even if the child is at home, and their parents’ location reads a further distance, they can engage in their activities even though they are illegal. They turned the tracking apps to work for their benefit.

# Conclusion

## **Contributions made by the project**

Remarkably, the use of RFIDs and GPS can trigger location notifications hence the primary purpose of the paper achieved. The test prototype enables the information to be transmitted and notified to the parent about the child's whereabouts. With the improvement of the new advances system, stakeholders and parents gave positive feedbacks. In a bid to provide security and safety solutions for parents, technology has become more usableand reliable.

## **Recommendations**

As long as the issue of tracking children is acceptable, various changes can be made so that it can benefit both the parents and the children. One is the proper taking and induction of the children to track. Some children may take the act of being tracked as an act of mistrust, and it may, in turn, affect them emotionally (Hedefine, E. K., 2006). As such, there is the necessity to inform and educate them on the importance of having a tracking device within them. Another recommendation is the fact that other than the devices having either the RFIDS or the GPS, they can both be equipped with the two processors, when the two processors are combined, they work better and have better advantages unlike when they are working alone. Establishing a set of rules to accompany the idea of tracking to the children would work well to have some boundaries, for instance, how many people within the school should have access to the tracking devices of the students. In as much as they are all in the school, it does not mean that they have the best intentions for the children. Also, more access to many people increase the vulnerability of the children’s so many people can monitor their whereabouts, and it could lead insecurity for the children in a bid to feel safe for the parents.

## **Limitations and Assumptions**

For such a projectto be successful, various assumptions had to be made, as well as limitations met. For instance, there is the fact that the RFID readers can be affected by dust and heat. Also, there was the assumption that the 4G connectivity was reliable enough.

## **Future work**

From where we stand, the future will be too industrialized and globalized that even as much as we want to spend time with our children, we will have duties to attend to. Remember, as the technologies are advancing within our society, we should use the advancements and make them beneficial to us. As such, the two systems are open to more developments that will meet the needs of the future. One sector that could be very helpful in development would be the electromagnetic field with the RFIDs. Another aspect that we have to improve in the future is the swiftness in which notifications are made from the readers to the parents. The use of GPS and RFIDs has changed a lot in the lives of parents, and as such, the project will help the schools and institutions of educations to improve security and safety for children.

Undoubtedly, society is changing, and we must change with it. When technology advances, it brings out new perspectives to light, and tracking of children is what we are dealing with now. How right is it to track one's child? There is a portion of people who will argue that the act should be left for animals and other devices like cars, and people should be exempted (Bajaj, D. and Gupta, N. 2012). But then again, with the position of the globe now and the trends within it, does that make sense? Why would a parent opt-out of tracking their children when it works for the best for both of them? Tracking children in as much as it might have some unpleasant aspects, the upside is way above it; as such, all we can do is improve on the issue and make it work and profitable to all. Handle the backlashes that come with it. The use of GPS and RFIDs are a great step towards revolutionizing this area.

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