Section 1: Title and Abstract

Title: GPS as a safety device
Abstract:

Prevention is better than a cure. "GPS as a safety device" is one of those devices that keeps us away from danger, rather than giving a solution to the danger.

Past solutions to personal safety have for the most part been ineffective. Physical and chemical weapons can help to take on dangers, but isn't it better to be on the safe side rather than tackling those dangers?

Our proposed solution will keep users away from danger and crime by warning them about certain areas. That could potentially prevent them from walking into a trap by giving them real time information on a smart phone or GPS device. Our device will prove to be very effective because it will also contain a SOS (Security of State). This feature will gather the location and other information about user state, and would send this information alert to local public safety officers, and could also potentially contact family and friends connected through social networks. This device will benefit everyone, particularly those who live or travel in areas in which crime indices are high.

Section 2: Introduction

Would you like your GPS to do more? What if your GPS could keep you from harm? If safety is an issue while traveling, what if it could notify you about crime instances around you, or give you real time information about crime indices in your area? In this project we plan to design a device that enhances the use of a GPS to also provide personal safety information.

"The Global Positioning System (GPS) is a satellite-based navigation system made up of a network of 24 satellites placed into orbit by the U.S. Department of Defense," according to the definition of Garmin. Today, a good GPS will tell you how to get from point A to point B. It is used as a device to guide for travel purposes. What they don't have is proper safety guidance in a new place. Most of the times, we are unaware of new places we are at in context to crimes, hotels, natural disaster, anything related to safety.

The old GPS doesn’t give any information about the personal safety. We propose to add many safety features to the GPS, which would not only get you to your destination, but also get you there safely. Some of the features included would be friend tracking through social networks in case of emergencies, crime updates and crime reports. There would be a user-rated database for hotels, neighborhoods, and other public areas. Finally, natural disaster alerts and reroutes in case of roadblocks would help users to get home faster than with a regular GPS.

These ideas are not completely new, because there already exists a GPS, and there already are websites like crime reports, which tell how safe an area is. Our proposal would incorporate many different ideas to create the perfect GPS. It basically works as a platform where you can access all the safety features into one place while still traveling into the new place with proper guidance.
Section 3: Background/Review of Past Work

Newer GPS devices feature newer receivers with upwards of 40-channels, which enables them to track more satellites for better accuracy. Other devices (such as GPS-enabled smart phones) use a system called assisted-GPS (A-GPS) which utilizes the fixed location of connected cellular towers or Wi-Fi hot spots to triangulate an approximate location, speeding up 3D fix times [13]. Basically, GPS will tell you how you get from place to place. Other than that, automotive GPS systems may also integrate features to entertain the driver on and off of the road, such as MP3 and audio book playback, image viewers, and hands free calling capabilities. There is not any GPS device existing in the market that will give you real time crime report or any natural disaster report on time even though people face problem while traveling. For example, from the Travel Tips Posts web page I found many true incidents about crime while traveling. One example is that a guy’s laptop got lifted from hotel room and nobody took care of that[7]. Another example is that a person only made it as far as D.C. on his round-the-world trip because he got stabbed and had to come back home[8]. From the research I found that there are websites like city-data.com and Travel safety tips where people can write reviews about city, county and even about hotels and restaurants. It is very helpful only if person checks before they go on the trip. There are government website to help travelers and to avoid crimes that basically provides some tips for traveling. It also has information about crime rates but other than it won’t provide information about real time crimes[10].

As stated above, past solutions to the problem of personal safety devices have lacked an essential component which is to keep users as far away as possible from danger. Any kind of weapon encourages the user to approach the attacker instead of keeping them away from the attacker. Worse yet, while many of these personal safety devices may be illegal in your state, the ones that aren’t could potentially worsen your situation by making your attacker very mad [1]. This is what our GPS feature will aim to solve. By providing real time crime information it will help our GPS users to stay away from danger. A related service has been implemented at the University of Maryland called UMD Alerts[2].

According to independent research on child location devices held in July 2007, “93% of adults think the Child Tracker concept is useful” [3] with regard to their little ones “to monitor their whereabouts in crowds or in your yard” [4]. Well, what if we could use the same tactics with everyone who had a handheld device in which our GPS was installed on? The same kind of idea will be implemented in our system, which will periodically track the whereabouts a person and store that information over the network. In case a person is kidnapped or gets lost, public safety officers could use this information to track them down, or at least pull the record to see where the user was tracked last time.

Current GPS signals are very limited when it comes to indoor situations. This could be an issue if danger is indoors, like at a stadium any other large scale building. GPS is based on a network of 24 satellites spread evenly across Earth’s 6 orbital planes, so at any given time each plane consists of 4 satellites. The signal from these satellites are received by a GPS receiver, which decodes the signal and using the triangulation method (connected to at least 3 satellites) locates the receiver. This method fails in areas of tall buildings and inside buildings because the receiver is not able to get a strong signal. To accommodate for this problem GPS Reradiating
technology was created, which involves using a large to receiver to retrieve the signal, typically a large antenna, then amplifying that signal so that it can be broadcasted inside buildings [5].

The use of Wifi can also aid in GPS signals inside buildings. There is a method that creates a road map of all the access points and their radio signal strength indicator (RSSI) values in that building; as a result, this mode does not accurately display the location of the user. It shows not only the road map with all the access terminals and their RSSI values, but uses these values, as they update, to localize a probable location of the user. [6]

Section 4: Target Users

The “GPS with personal safety” is useful for everyone who travels. It could be useful for students to walk around the campus premises safely, to the people who want to drive around the country, or the person who want to find the safe bus routes to their way home. Basically, it is useful for all the groups like students, traveling with friends and family, commuters. All the travelers who are driving long distances frequently, for example a marketer, or salesperson, or someone on a business trip are in great need of good GPS with safety information. With this device, they can first find their destination, find a safe hotel to stay at, and can safely move around the city they are in.

Also for all the people who like to travel by bus or train, they can find a best combination of the two, because some buses might have a route that go through bad neighborhood. Through this device, they can avoid those areas as long as there is a good alternative.

Section 5: Scenario Walk through

Our product proposes a solution for a traveller using a GPS. There are multiple uses of this product, but we are describing a scenario where a business man is traveling on a business trip, and has to find a safe place to stay on the way.

We suppose two people are traveling to the same place, one using the normal GPS that exists now, and the other using our GPS. Both people are driving to the destination with two different devices. On the way, they get tired and want to stay in a hotel. Both of them are looking for hotels in the GPS. The first person finds a hotel nearby on the way and heads there to stay for the night. Unfortunately, he wasn’t aware that the crime rates in the area was high. While carrying his luggage to his room, he gets stabbed and the robber steals all of his money and luggage.

The other person is using the GPS we propose and finds the same hotel listed in the GPS, along with the crime report. Because of our GPS, he avoids that hotel and finds a safer one nearby.

With this new device, the person stayed safe in the hotel where the other person using a normal GPS got mugged even though they were both leaving from the same place and going to the same destination. Safety is an important fact in one’s life, and as explained in this scenario, our GPS can help people with safety issues in every step of their life.
Section 7: Appendix

Title: Personal safety information in GPS device during traveling
It’s a major issue everyone is concerned about. We want to be safe everywhere we go and everything we do. But what happen if you are in a new place? I know GPS helps to guide us for the travel purpose. But can we modify it so that is can be useful for our personal safety as well. I want a GPS that includes the crime rate about the place I am in. About the geographical destruction in the way I am going in, about the nearest hospital, about the secure place I can stay overnight? GPS is great feature we can use for our personal safety. I guess we can definitely feature some login data information with some kind of social network so that my family or friends who cares about me knows where I am or, what I am doing? In addition, we can use GPS as some kind of hand device or hand watch along with adjustable design to stick in the front of drives so that we not only keep the GPS in the car, but we carry that all the time during the travel? This design will be applicable to all the travelers. I believe everyone love to use GPS with personal safety information.

The original idea of GPS was for those travelers who drive, but now we have modified the GPS so that it is useful for all different kind of users, like those who want to walk safely, travel in the bus or train safely. We have defined our users more precisely as stated in the “Target Users” section. Otherwise, the goal of the proposal is still the same, i.e. personal safety embedded in the GPS.