Versatile GPS Logger

In my recent travels to another country, I found myself...very lost. I recognized home. I recognized the entrance to the village. Place me somewhere in between and I wouldn't know north from south let alone where I lived. Same goes for visited locations; they are recognizable but paths to them are unknown. I would be unable to go back ten years from now and find these places without my travelling guides. The ability to determine current location with respect to another is quite useful; not only for present use but for future use.

GPS is no new idea. It is used worldwide to locate everything on the planet to arm's length precision. Travelling in the US with GPS is amazingly easy. Plot your end location and your device will even tell you where to make the next turn. What makes this process efficient is not just the GPS receiver chip but the continuous effort to keep an updated map of every road, highway, crack and corner of the US. This information is not available, unfortunately, for every location on the planet. If the map doesn't exist, why not allow users to make one on the fly?

A GPS receiver can generate current coordinates upon request assuming acquired GPS lock. If you know the coordinates to home, a path home can be created easily. Quite a few interesting things can be done with just coordinates obtained from GPS. Coordinates can be stored and labeled on demand, or automatically every so often if logging a path. Throw in a calculator and velocities and accelerations can be calculated as well. If saved in transportable media, such as a micro-SD card or a cell phone, the data can be moved to a computer and even plotted against Google Maps for actual images of the location. If the brains of this device are capable of taking pictures, they can be associated with certain locations and viewed in the device itself (ideal: cell phones.)

The objective is to develop such a product that can have standalone capabilities on top of additional functionality if integrated with existing technologies. The Android and iPhone are great examples. If communication (maybe SPI) between the standalone device and the phone can be established, the data can be stored, viewed, modified, etc on the external device. Not only that but production costs and times are reduced dramatically – open source implementations already exist for controlling graphics and other general functionality for these devices, though the iPhone is rather closed in terms of application approval (a tedious process for the Apple market.) The standalone product must at least be compatible with the home computer. The functional possibilities are endless upon transfer of the information to a computer.

It is important to note that some phones already come with GPS. A portion of these phones may not actually have a GPS receiver inside but can use information about nearby cell towers to triangulate a position. This would mean that GPS is available only when cell service is available. A dedicated GPS receiver on the other hand can perform its task anywhere a GPS satellite signal is lockable. Given this information, there is great use for a minimal cost highly compatible yet standalone logging device.

The impact of this device is obvious. People are always exploring new territory. This product would simply be a means for them to retrace their footsteps and engage the exploration process without consequences to their efficiency. In addition, an increasingly larger portion of the population uses cell phones and computers. Given that these technologies already allow desired functions (data storage/graphics/complex app development), why reinvent the wheel and implement from scratch? Why not make use of existing technology to make newer, more adaptable, better technology?

This project idea is practical, depending on what functionality is to be included in the device and how many people are working on it. If every aforementioned feature is to be added, this project will definitely be a two semester project, if not more. There are many skills I lack that would be required to complete this project. We need someone to be supportive with the microcontroller programming, phone programming, computer application design, the soldering, and the marketing analysis. We need components. We need a microcontroller (maybe Arduino will do), an android phone, a GPS receiver chip, and possibly an LCD screen.

Strengths:

This idea has great potential for success but only with time. There will be new concepts and standards encountered that will take time to grasp if never encountered before. Time and efficiency of attack will be crucial to the success of the project. Though the impact of the project may not span the globe, it will certainly provide for a great learning experience for the members of the group.

Weaknesses:

A weak point in the marketing of this idea is that fact that there are many other GPS loggers out there. Someone beat me to it… I have confidence in the group that this two-semester developed product will be much better than any rip-offs currently in production.

Opportunities:

There are many modifications to the product to improve it. The challenge is to minimize the production cost of the product to keep costs low. The caveat is that too many “unfinished

additions” would take away from the quality of this product. It must be considered that time is limited, as are other resources.

Threats:

As always, the unknowns are the weakness. With each new unknown, the time to completion increases. This is unavoidable but must be accounted for beforehand. As for utterly failing, there is a possibility that external device attachment to certain phones is not allowed, though application development is. This would be rather unfortunate.

In general, this would be an excellent project to pursue.