

Abstract

Purpose of project P.A.L: Parking Auto Locator is to address the needs of motorist in a cost effective manner. P.A.L will provide assistance in locating a person's vehicle no matter its location, but will be especially effective in densely packed automotive areas such as parking garages, large parking lots, and urban streets.

The goal and the main problem to be addressed are the one in the same. The first problem is to easily locate the automobile within a specified region. The goal is for the user of P.A.L to locate his or her vehicle using a Handspring personal digital assistant (PDA) in conjunction with a global positioning system (GPS). The device will be effective worldwide in a variety of environments anywhere from small parking lots, to large multi level parking garages found in commercial areas such as football stadiums and shopping malls.

At the conclusion of Project P.A.L the major expected results include a working hand held proto-type with an intuitive interface that meets the design specifications, which include the ability to locate an automobile within a certain parking range and to consistently maintain operability of the device using an automobile based recharging base. All of these features are to be found in a user friendly as well as small package device making it a worthwhile yet unobtrusive addition to any individual's electronic portfolio.

Project Progress

As a result the design team's continuing research throughout the semester, the feasibility of the original design has proven impossible due to a restricted knowledge base and an inadequate monetary supply. Originally, the design of the Parking Auto Locator (PAL) was to build a device that would have enabled an individual to quickly and simply locate his or her vehicle anywhere within a radius of approximately one-quarter to two miles. The PAL would have employed two transceivers, one located on a base station mounted in user's automobile and another located on a small, portable handheld device which would have been carried by the user. These transceivers would have communicated with one another to display the location of the automobile on the handheld's LCD screen.

This design was based on the simple fact that very few designs for a device of this type have been developed and that the United States Patent Office has issued no patents for a commercial automobile location-finding system. Based on market research, demand clearly existed for such a product, especially in areas of high population density with endless parking lots and city streets packed bumper-to-bumper with automobiles. Pursuing the original PAL concept seemed prudent.

The challenges the PAL system had to overcome however were many. In areas of high population density such as cities, signals are limited in how far they will travel before a building, a highway overpass, or other type of obstruction blocks them. Consequently, the team felt that if an appropriate frequency band and power rating was selected, multipath problems could be overcome. After continued research, the problems of overcoming multipath interference mounted until the project was no longer convenient nor cost-effective. Estimates placed the final cost of

the design well above \$1000 for an incomplete product. In the end, no consumer would purchase this device for its convenience.

The team then decided to review its initial requirements. Originally, a decision was made to avoid the use of GPS because of its high cost. After weighing the \$1000 cost of the original design and looking further into GPS systems, it was decided to reconsider that decision. GPS devices can be found on the market for a little as \$120, are compact and portable, and can operate worldwide in any outdoor condition and many enclosed areas with line-of-sight to the sky.

That being the case, GPS was a valuable tool to allow not only one's parking location but also route tracking. The team's only concern was the addition of another electronic device to an individual's already extensive portfolio, which normally consists of a cellular telephone, a PDA, and sometimes a third device. Being faced with carrying a fourth electronic device, the team was sure no one would be willing to carry such a product no matter the benefit of doing so. The search was on to find a solution to this dilemma. The answer was found in the Handspring series of personal digital assistants which have a port for additional units, including GPS units. One such unit, which has been purchased by the team for testing, is the HandGPS Pro with Rand McNally's StreetFinder. Used in conjunction the device will operate as follows:

The user will be required to own or purchase one of the many available Handspring Visor unit. He or she will then have to purchase a compatible GPS module. The aim of the PAL is to allow the user to record the traveling and resting position of his or her vehicle. This will be done when the user sets the Handspring unit in a cradle inside the car which will also act as a recharging base. When the ignition is turned on, a signal will be sent to the Handspring to begin tracking the user's location. This signal can be sent either via the physical port at the bottom of

the Handspring or via the infrared port. VB programming will be necessary to allow the Handspring to interpret these signals. When the engine is turned off (ignition to the accessory position), a signal will be sent to the Handspring to stop recording and denote the user's final position. The cradle will also be a recharging unit so that the Handspring's batteries do not drain during long drives.

This will be a "set it and forget it" device. The user will not have to intervene with the operation of the Handspring/GPS during the drive. The purpose of the continual recording is to prevent the user from becoming totally lost in the event that he or she enters a covered area, such as a parking garage, where the GPS signal will cannot be received. Once parked, the user will remove the Handspring from the cradle and go about his or her business. When the user wishes to return to his or her automobile, the Handspring unit will direct the user resting position of the car using simple directions such as "turn left" or "turn right." Since GPS also records altitude, it will be possible for the GPS unit to direct the user to different levels of a parking garage.

At the present time, the Handspring unit and GPS module have been ordered. An interface has been written using a Palm OS emulator (compatible with the Handspring) that will be downloaded to the PDA for testing. The next phase of the design will be to modify the base to allow for simple communication with the ignition system on the automobile.

Conclusion

Despite the design having been drastically altered in the past semester, progress on the PAL has been steady and determined, and will lead to the successful completion of a working prototype by the end of the term. Early designs were based too much on scientific discovery and too little on engineering a new device beneficial to society. The design of the PAL at present uses technologies in new and inventive ways which, upon the completion of a working prototype, will remove some unneeded stresses from daily life.