

## Project Summary: Compact GPS system integrating with mapping software to facilitate search and rescue operations.

In a missing person's case time is of the essence, and in many rural areas law enforcement are few and far in-between. Search and rescue teams, abbreviated to SAR teams, can respond to these crises faster than local law enforcement and can field more trained and experienced personnel. In America many communities have volunteer search and rescue teams. Because the service is comprised of volunteers, many SAR teams do not receive federal or state funding. Consequently, members must purchase their own equipment and pay their own travel costs. They cannot afford to fund large development projects for technology and systems tailored to their needs. Teams have coped with this by using a combination of multiple devices and computer software, such as mapping tools in conjunction with GPS receivers. However, GPS devices vary from rescue group to rescue group, and even team member to team member creating inconsistencies in reliability and location precision. Any mapping software used is generally expensive and not simple to use meaning few people can afford and know how to use the software.

The objective of this project is to create a unified system involving field devices and mapping software designed specifically for use in search and rescue operations. With a tailored system there would be less time lost to small mistakes and it would make the entire operation more efficient. The system would consist of two separate parts, the GPS transmitting device handed out to SAR teams, and the mapping software used to track searched areas, team locations and areas that cannot be searched. The main components of the device would be, a GPS receiver, a wireless communication system, and a long lasting battery system. These devices would be given to a single team of five to ten individuals, depending on the situation. As rescuers comb an area, the device would acquire the team's GPS location and send that information back to a command computer at base camp. The command computer would be running a mapping software showing a topographical representation of the area. When it receives information from a device, it then updates the map and shows what areas have been searched as well as the path the team is taking. The mapping program will also display areas that rescuers can and cannot enter. Since they are not law enforcement, they do not have the jurisdiction to enter certain private property. The program would track and warn the base commander when a team is nearing a restricted area. Using a combination of programming algorithms and hardware design, devices would be made to use as little energy as possible to give a run time of roughly 10 hours. The software would pull map information using open source libraries to speed up the project and reduce development costs. It would also have a simple clean interface so that inexperienced or non tech savvy users can set up the system quickly and easily.

***Intellectual merit:*** There is always a high demand for cheap and power efficient devices such as mobile phones. Everyone from mobile phone companies to the military are looking for devices that fit these requirements.

***Broader Impacts:*** This system would help an important part of our emergency services and would increase the chances of finding lost individuals in a timely manner. The algorithms and technical designs that would be developed in this project would further that research and could be applied to commercial or military devices.