

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

In America many communities have volunteer search and rescue teams. In a missing persons case time is of the essence, and in many rural areas law enforcement are few and far 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. Because the service is comprised of volunteers, many SAR teams do not receive federal or state money. So members must fund their own equipment, and in most cases, their own travel costs, which in turn also means that there are few dedicated systems that are designed for SAR operations. Teams are able to get by using a combination of multiple devices and computer software, such as mapping tools in conjunction with GPS devices. However, GPS devices vary in cost, reliability and functional and faulty or expensive software can limit the effectiveness of teams.

The objective of this project is to create a unified system involving field devices and mapping software designed specifically with search and rescue in mind that would greatly improve SAR operations by reducing the frequency of errors and decreasing the time it takes to locate lost individuals. 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 and team locations. 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 its GPS location and send that information back to a command computer back 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 technically not law enforcement, they do not have the jurisdiction to enter certain private property. The program would track and warn the user when a team is nearing or appears to be heading toward 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 help reduce costs. It would also have a simple clean interface so that even inexperienced users can set up the system quickly and easily.

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

**Broader Impacts:** Search and rescue is a commonly overlooked area. For many it is simply assumed to be a natural part of our current emergency services and so is rarely thought about. Companies seldom make products for search and rescue, as there is no money to be made. This system would help an important part of our emergency services and would increase the chances of finding lost individuals in a timely manner. In an emergency when lives are on the line, every second counts, so if a team were to possess this system it would benefit not only them but society as a whole.