**PROBLEM**

In order to make outdoor and wilderness navigation safer and more reliable, GPS navigation is replacing compasses and maps, which are prone to human error.

However, since GPS technology relies on a clear view of orbiting satellites in space, GPS devices are unreliable in some of the most dangerous locations on earth. Obstructions such as mountains, caves, heavy tree cover, and tall skyscrapers can block GPS signals, causing a GPS device to stop tracking position. This can be deadly.

**SOLUTION**

Team SHERPA’s goal was to improve the reliability of handheld GPS devices. The design includes micro-scale sensors, including accelerometers, gyroscopes, and magnetometers. These sensors continuously detect the orientation and movement of the device, and from this collected data, absolute position can be determined. A GPS module is included in the design in order to take advantage of its accuracy when satellite signals are available.

The design also includes software which collects sensor data, converts it to position information, and updates the user interface.

**RESULTS**

A custom, fully-working printed circuit board (PCB) was constructed (see below), including a touchscreen and removable battery. The prototype successfully collected inertial data from the sensors. However, it was concluded that this platform does not have the reliability required for inertial navigation: more accurate consumer-grade sensors and better algorithms are needed.

**TEAM**

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