

THE PROBLEM

Exposure to the elements is a serious health concern — particularly when the victim is an infant or elderly. For this reason, it is imperative that search teams are able to quickly locate people who go missing in the wilderness.

Unfortunately, rural municipalities where exposure poses the largest threat often cannot fund large emergency response staff, and often need to depend on volunteers or staff from other areas, which can delay rescue time. A similar problem is faced by towns after natural disasters, who need large amounts of manpower to survey a large area for survivors.

In order to maximize the chance of a successful rescue, it is imperative that the human resources available to search teams are maximized.



IMPACT

Over one thousand people die each year in the United States due to exposure to cold.¹ Millions more are displaced and stranded by natural disasters.²

Asura leverages technology to reduce the amount of time needed to find and rescue displaced people, significantly improving their survival rate. It also reduces the risk to disaster relief personnel, who are no longer exposed to the elements during the search process.

By reducing the risk to rescue workers, and finding survivors more quickly, Asura saves lives.

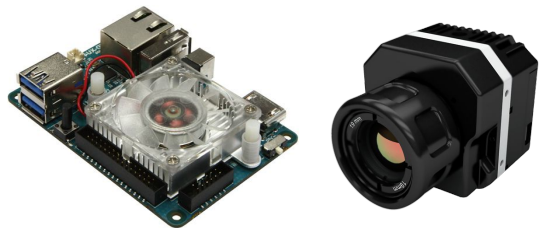


1. Berko J, Ingram DD, Saha S, Parker JD. Deaths attributed to heat, cold, and other weather events in the United States, 2006– 2010. National health statistics reports; no 76. Hyattsville, MD: National Center for Health Statistics. 2014.

2. 2015 disasters in numbers. Geneva, Switzerland: The United Nations Office for Disaster Risk Reduction. 2016.

TECHNICAL SOLUTION: unmanned aerial search and rescue assistant

The **asura** system will unite UAVs, cutting edge thermal sensing and computer vision functionality, and an intuitive user interface to provide a cohesive aerial drone system for searching and post-disaster assessment.



A **professional grade FLIR thermal camera** is mounted on an **UAV** equipped with **Pixhawk stability control** and **GPS**. The **ODROID processing unit** maintains connection with a laptop **base station** over WiFi, sending video, and receiving user flight commands.

The base station serves a **mobile friendly web app**, where users can view flight video, receive automated alerts, and send flight path commands. Behind the scenes, the server performs **computer vision analysis** to aid users in their search, and does sophisticated **path planning** to most efficiently survey areas of interest.



PROJECT TIMELINE

Current Status:

Physical integration nearly complete, team is familiar with FLIR camera operations, ODROID wireless connection established with server, UAV flies autonomously to waypoints

Milestone 1 (end date: Feb. 18th):

Complete test flights and weight calibrations, ensure data can be sent from cameras to ODROID and ODROID can send camera data to server

Milestone 2 (end date: Mar. 3rd):

Refine computer vision processing, ensure ODROID can receive waypoints from server, complete path planning processing

Milestone 3 (end date: Apr. 7th)

Construct mobile-accessible user interface for programming search regions, continue test flights and refine code

Plans for future development:

Create mobile applications for iPhone and Android, develop system for multi-agent search, improve physical product design, implement obstacle avoidance algorithms, design elegant charging solution



MeET THE asura Team



Catherine Yee
EE 2016, Robotics

Catherine has been working on physical drone integration and power electronics for Asura. Next year, she will complete her Masters Degree in Robotics at Penn.



Vincent Pacelli
EE 2016, Robotics

Vincent has been working on planning and navigation algorithms for Asura — topics he is familiar with from work done at NASA. Next year, he will complete his Masters Degree in Robotics at Penn.



Sarah Dean
EE, Math 2016

Sarah has been focusing on FLIR camera interface and computer vision. Next year, she plans to start a PhD program in Electrical Engineering.



Billy Clarke
CMPE 2016

Billy has been working on communications between the UAV and ground station. Next year, he will be working as a software engineer at Two Sigma.