Rapid Evaluation, Coordination, Observation, Verification, and Environmental Reporting (R.E.C.O.V.E.R.)

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Increasing Flood Prevalence Nationwide

Major flooding predicted to incrase 500% by 2050*

Moderate flooding predicted to increase **1000% by 2050***

133 million Americans impacted by flooding in Spring 2024**

Current Damage Assessment Process:

- Costly ~$300,000/Major Flooding Event
- Labor Intensive
- Time Intensive (Weeks ->Months)
- Personnel Health Risks

Rapid Evaluation

SUVs serve as portable Ground Control Stations driven by trained operators. SUVs house power, computing, and communications infrastructure.

Coordination

Fixed wing and hexacopter drone swarm is deployed from SUV for imaging and water sampling. Data is shared between drones and relayed back to Ground Control Station.

Observation / Verification

High-fidelity map is created and updated in real time with debris and hazard locations, including classifications. Areas of interest are “pinned” and operator/monitor is notified.

Environmental Reporting

Data is aggregated and damage assessments are automatically filled out with GPS coordinates, water sampling data, and images for use by government agencies (e.g. FEMA, EPA)

System Benefits

Reusability & Scalability

System is reusable with minimal maintenance. Additional UAVs can be added to support larger efforts.

Authoritative Source of Truth

Automation ensures consistency and accuracy in reporting. Data is accessible by necessary parties.

Labor, Cost & Time Reduction

Minimizes labor cost and strain on limited personnel. Expedites assessment process so relief funding can be distributed.

Key System Technologies

ML Algorithms

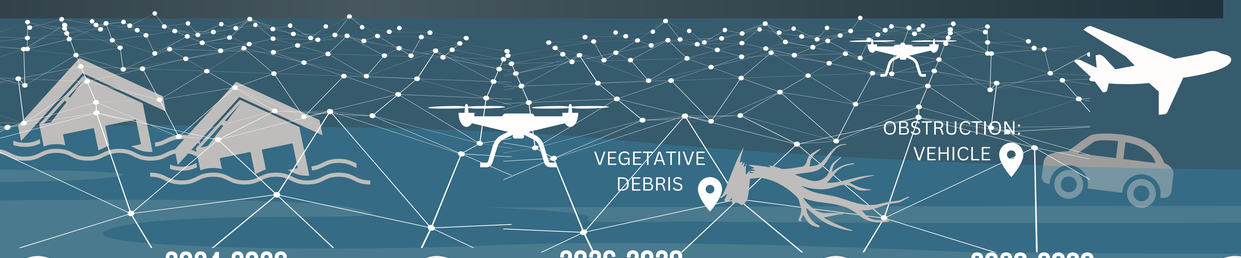
Machine learning algorithms used to create 3D maps, estimate flood water velocity, and classify debris.

Communications Infrastructure

Hybrid communications use both radio and laser comm to ensure reliable and fast data transfer over long ranges despite environmental conditions.

Hardware Architecture

Hardware design allows for stability during flight and water sampling. Integrated with sensing and obstacle avoidance software.



2024-2026

General system hardware for drones and ground control station are complete.

2026-2028

Portable rapid bacteria tests are developed. Sensing is refined and communications network is developed.

2028-2030

Free space optics and event-based sensing technologies are refined.

2030-2032

System integration and user interface testing begins with drone swarms at half-scale.

2032 -2034

FAA waivers are requested, system software and user interfaces are optimized for full-scale swarms.

2034-2035

Field training for operators and final testing is complete

System Deployment

*National Oceanic and Atmospheric Administration ** U.S. Department of Health and Human Services