



Citations

<https://shorturl.at/LuBN9>, <https://shorturl.at/h8jM0>,
<https://shorturl.at/WkpE8> <https://rb.gy/wj0gz2>, <https://rb.gy/r5rptv>,
<https://rb.gy/j3vmdq>, <https://rb.gy/p3rsl3> <https://rb.gy/rsprqu>,
<https://short-link.me/Y-AZ>

Problem Statement

Flooded roads endanger public safety, especially for essential workers and families, as current infrastructure lacks timely, location-specific flood data. A reliable system is urgently needed to guide safe, informed travel.

Objectives

- Protect Public Safety: Provide real-time flood alerts and speed guidance to prevent accidents like hydroplaning.
- Support Essential Workers: Help people like Sam travel safely and avoid lost wages during floods.
- Address Inequity: Assist underserved communities that are most vulnerable to flood-related transportation issues.
- Expand Access: Share live flood data beyond Dade City to reduce stress and damage in more at-risk areas.

User Requirements

Explicit

Reliable access to the hospital

Equal access to safety tools, regardless of income or vehicle type

Quick re-routing around flooded areas

Implicit

Alerts systems around flooded areas

Free accessibility to civilians with the mapping feature from the website and text alert

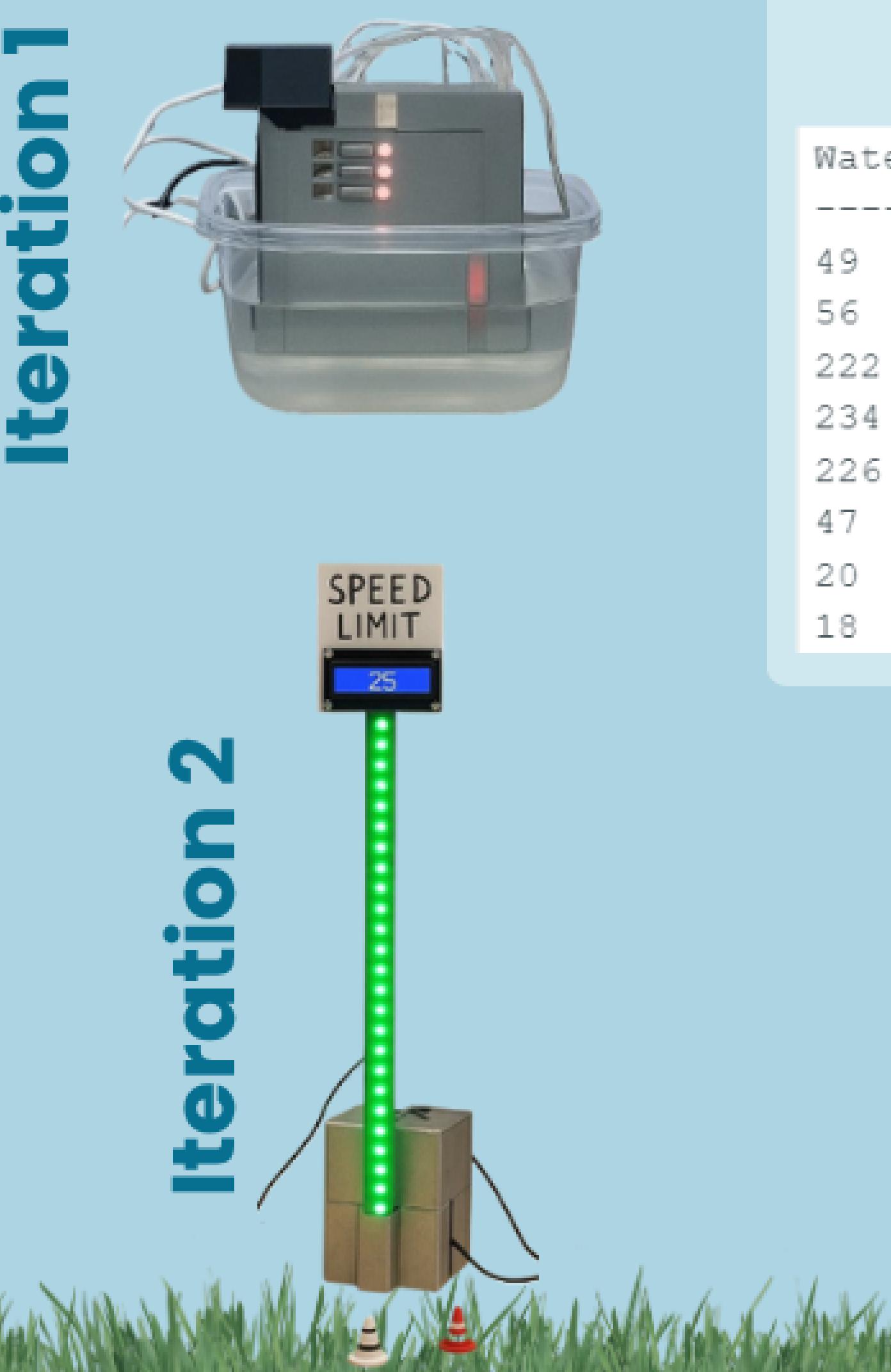
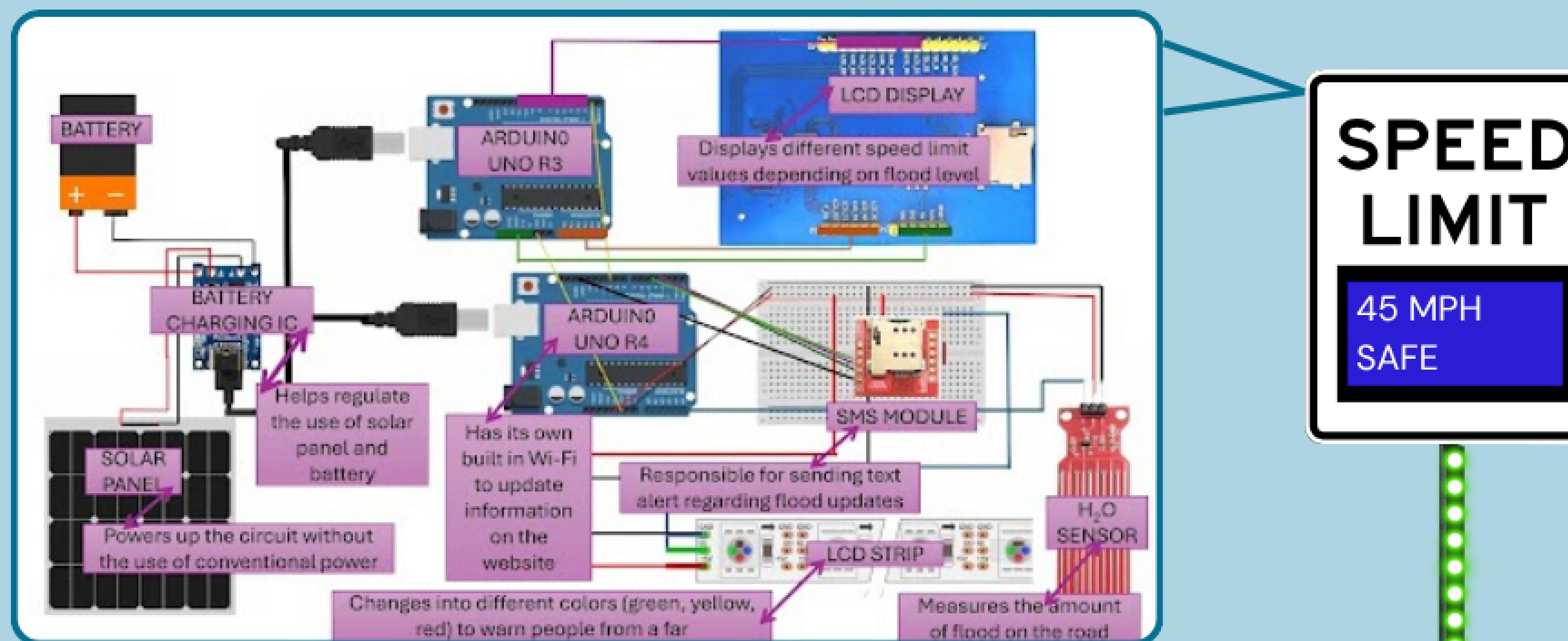
Confidence in road safety before leaving home
Make a map to show detours

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 Alexis DeBona | Angeline Garcia | Dylan Matthews | Laurny James
 Sponsors: Kamila Miranda | Justice Palavra

HydroAware ALERT SYSTEM

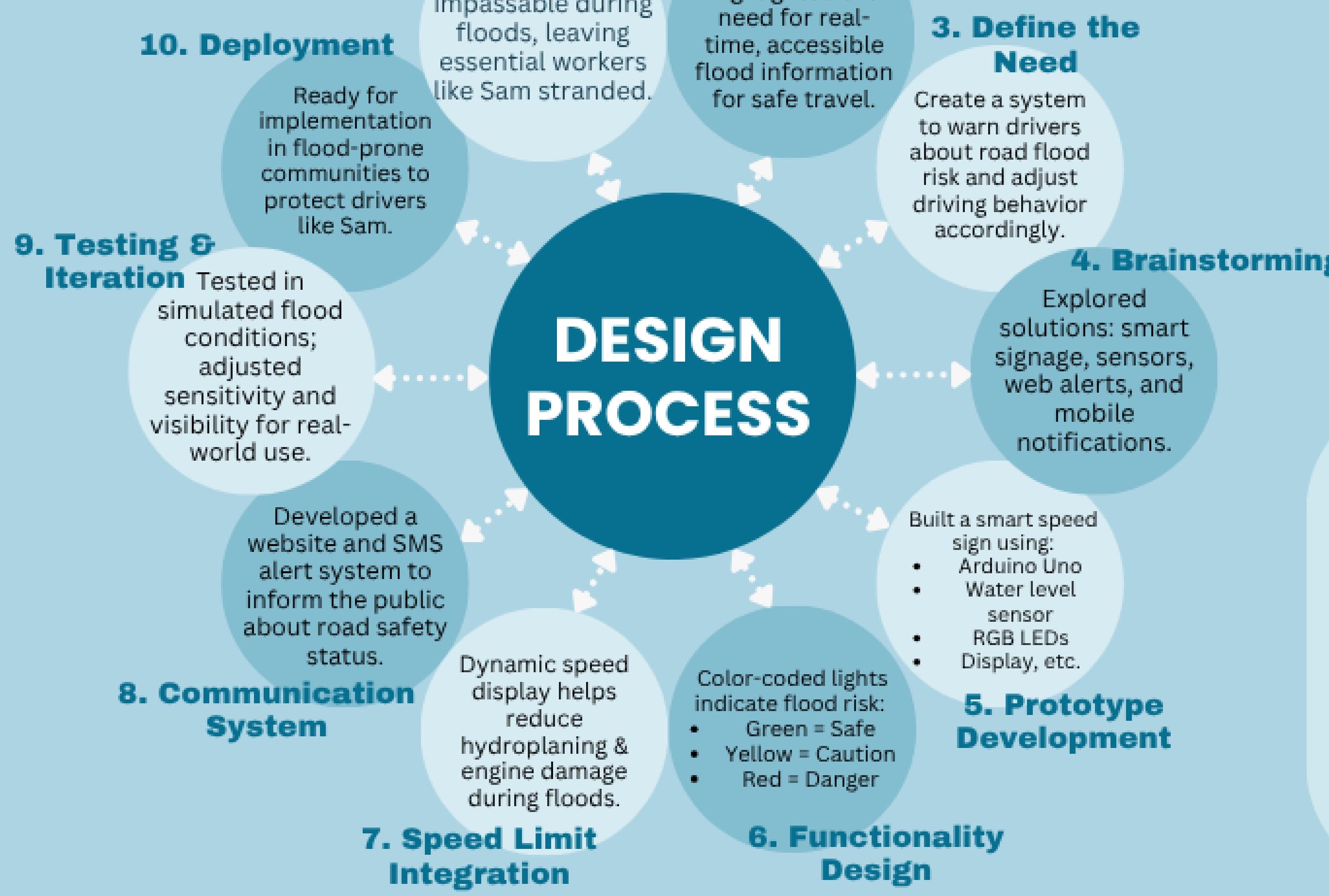
Because Every Second Counts, Smart Flood Alerts for Safer Roads and Smart Choices

Final Prototype Iteration



Design Iteration

ITERATION	DESCRIPTION
1. Initial Prototype	<ul style="list-style-type: none"> Goal: Detect floodwater using a basic water level sensor Build: Arduino Uno + water sensor + RGB LEDs Result: Successfully showed water levels, but... Issue: LEDs too simple can't be seen from a far.
2. Improved Visibility	<ul style="list-style-type: none"> Change: Upgraded and added Solar panel and added more LED Test Result: Better because it creates clean energy but... New Issue: LED became unstable due to so many wires.
3. Addition of New Parts	<ul style="list-style-type: none"> Change: Changed individual LED to LED Strip and added LCD Display Test Result: Better because lights are more stable and LCD helps change speed limit for safer driving but... New Issue: We need to make it communicate these results to people
4. Communicating Results	<ul style="list-style-type: none"> Final Additions: <ul style="list-style-type: none"> Location-based text alerts Flood map on the website Outcome: Safer, more informed travel decisions for users like Sam



TEST STAGE	PURPOSE	EXAMPLES	DURATION	ACHIEVED
1. Component Testing	Verify each part works properly.	Water sensor, LEDs, display, Arduino.	Bench test with flood simulation and multimeter	Components respond correctly
2. Component Testing	Confirm system works.	Sensor-to-LED/display logic.	Simulated water rise and real-time monitoring	System responds accurately to water depth
3. Communication Testing	Ensure timely, accurate alerts.	Website and SMS alerts.	Simulated water rise and real-time monitoring	Instant, error-free alerts
4. User Testing	Collect user feedback.	System usability and alert clarity.	Test with essential workers and surveys	Clear, trusted by users

Visual Data

Water Level	LED Color	LCD Display
49	Green	Safe=45mph
56	Green	Safe=45mph
222	Yellow	SUV & Truck=20mph
234	Red	No Crossing=0mph
226	Yellow	SUV & Truck=20mph
47	Green	Safe=45mph
20	Green	Safe=45mph
18	Green	Safe=45mph

Results

- Accurately detected water levels and adjusted speed limits in real time
- RGB LEDs and 7-segment display effectively communicated flood risk
- Web interface was user-friendly; SMS alerts arrived within 30 seconds and free
- Location-based alerts helped with early trip planning
- Users felt more confident, understood the alerts, and design improvements boosted visibility
- Alleviates financial burden for Low-income family

Conclusions

Our flood-aware sign uses solar-powered Arduino tech to alert drivers in real time, helping essential workers like Sam travel safely and avoid costly flood damage