# Community Based Approach to Address Contaminants in Drinking Water using Smart Cloud-Connected Electrochemical Sensors

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## Project Challenge

- Millions of people are exposed to unsafe levels of contaminants in drinking water.
- Toxins go undetected due to infrequent testing.
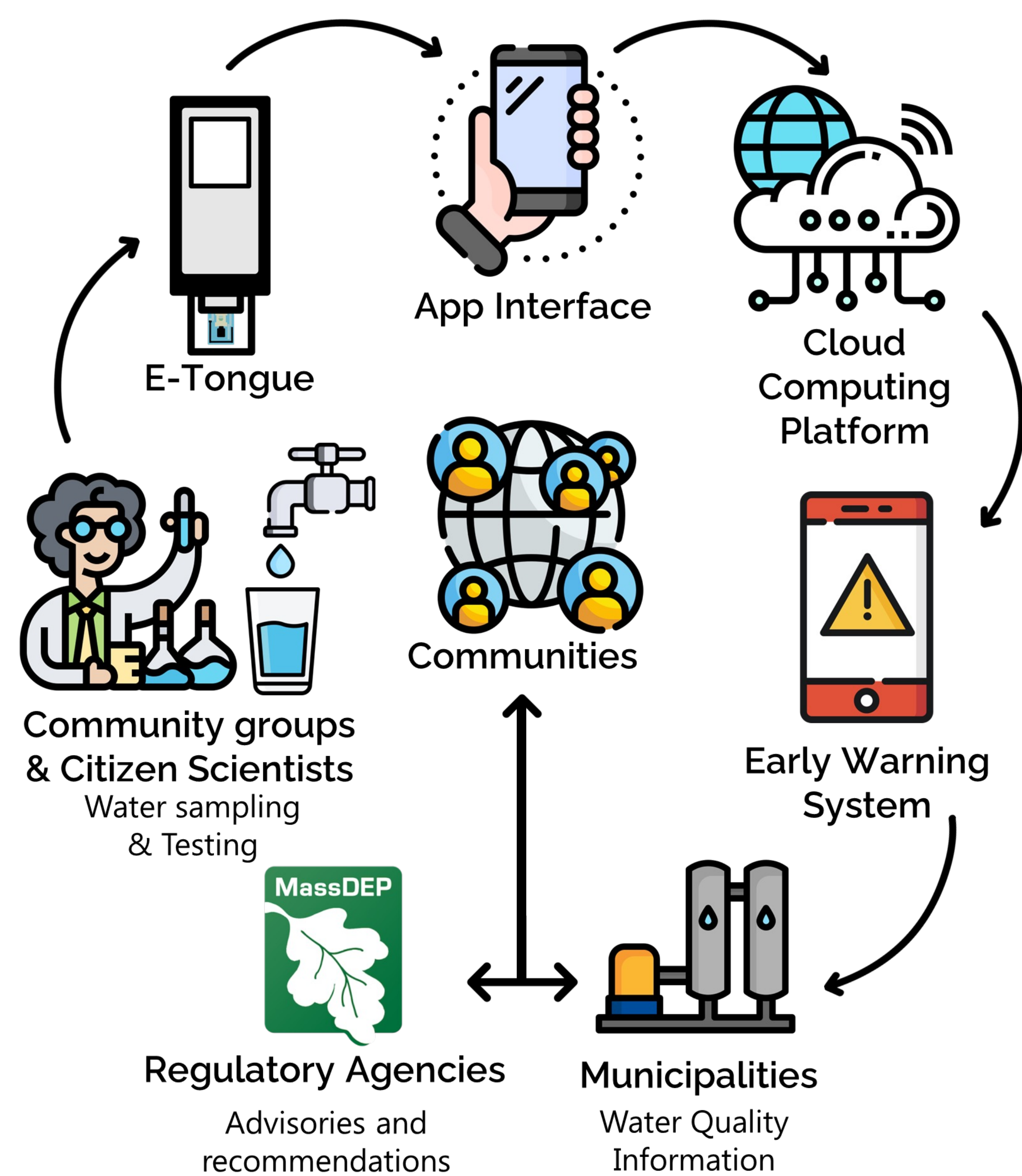- There is a need for community-engaged drinking water testing.

Illustration of the sociotechnical approach

## Intellectual Merit

- Community-engaged water testing.
- Pilot E-Tongue devices in communities.
- AI algorithms on a cloud platform analyze acquired E-Tongue data to identify potential contaminant hotspots.
- Communicate information to water utilities and regulators.

## Major Outcomes/Progress

Community event

Classroom visit

- Established partnerships with MassDEP, the Merrimack River Watershed Council, the YWCA, water utilities in Andover, Dracut, Lawrence, and Lowell, as well as with schools.
- Conducted community outreach through meetings with officials, workshops, lessons at schools, and community events.
- Collected 254 water samples, among which 3 were found to contain lead levels above the EPA's action level.
- Developed AI algorithms for contamination prediction using data from Flint, MI.
- Developed educational materials and refined our sampling kit instructions.
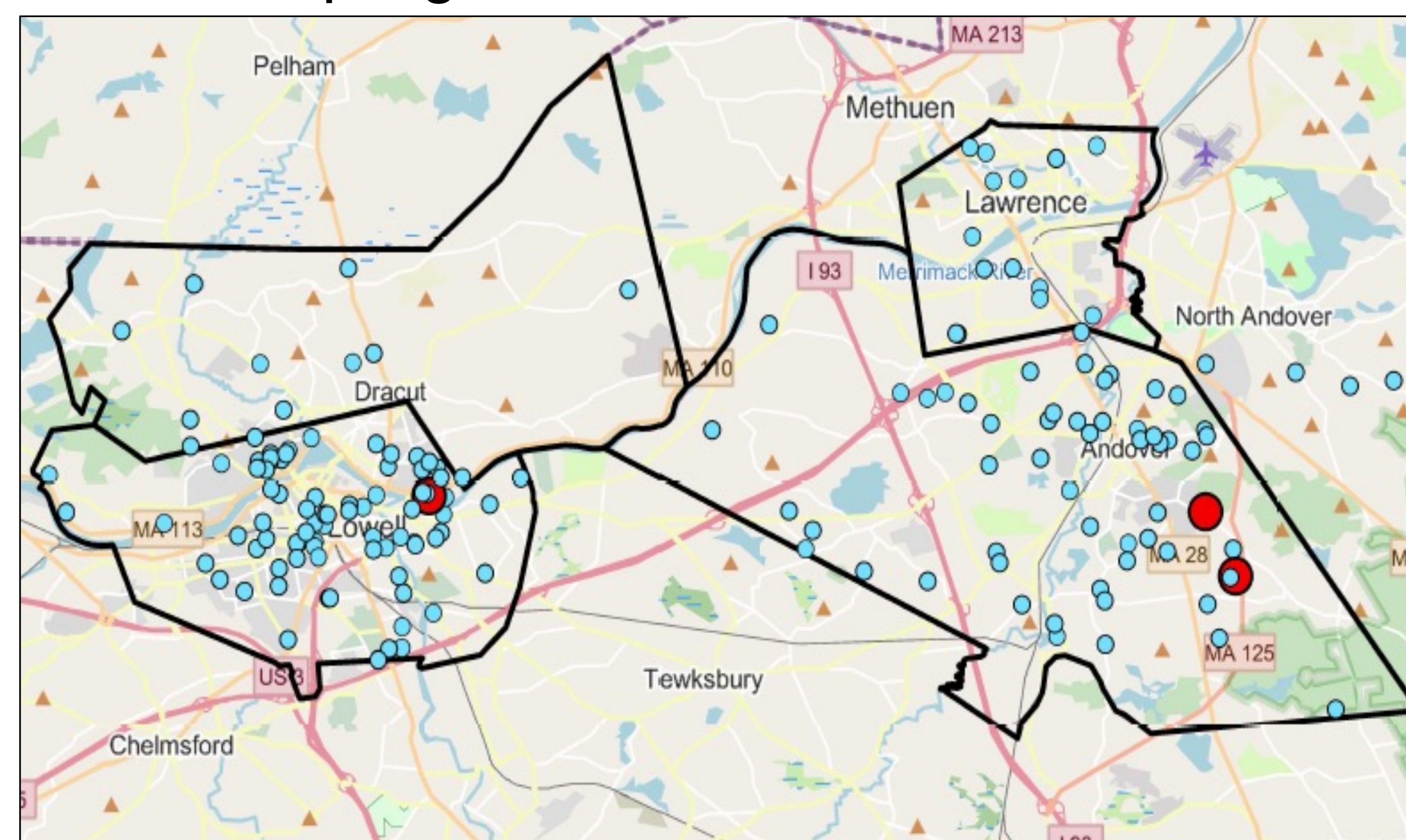
GIS map of samples collected and tested

## Broader Impacts

- Implement community-driven monitoring of water contaminants and ensure swift action for remediation.
- Provide support to disadvantaged communities in areas with aging infrastructure.
- Sustain community vigilance in tracking contaminants and facilitating prompt corrective measures.
- Utilize social science methodologies and cloud-based solutions for citizen science initiatives, including disease and pollution surveillance.
- Expand the application of E-Tongue devices for other environmental monitoring purposes.
- Offer research opportunities to one project manager, six graduate students, and three undergraduate students.

## Future Goals

- Expand outreach to Lawrence community where the sample collection has been minimal.
- Increase the frequency of visits to schools as these have proven to be productive for substantial sample acquisition.
- Implement updates to the E-Tongue device and software to facilitate direct data uploads to our central database.
- Apply transfer learning techniques to leverage Flint's data models for predictive analysis within our own communities.