

Community Based Approach to Address Heavy Metal Contamination in Drinking Water using Cloud-Connected Smart Electrochemical Sensors

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Community Identified Problem:

In the United States, 18 million people are exposed to contaminated drinking water violating the lead and copper rule, and 13 million people use water from arsenic contaminated wells.

This project addresses the unmet need for a smart user-friendly technology for citizens to test and determine the quality of their drinking water, and municipalities to take corrective action.

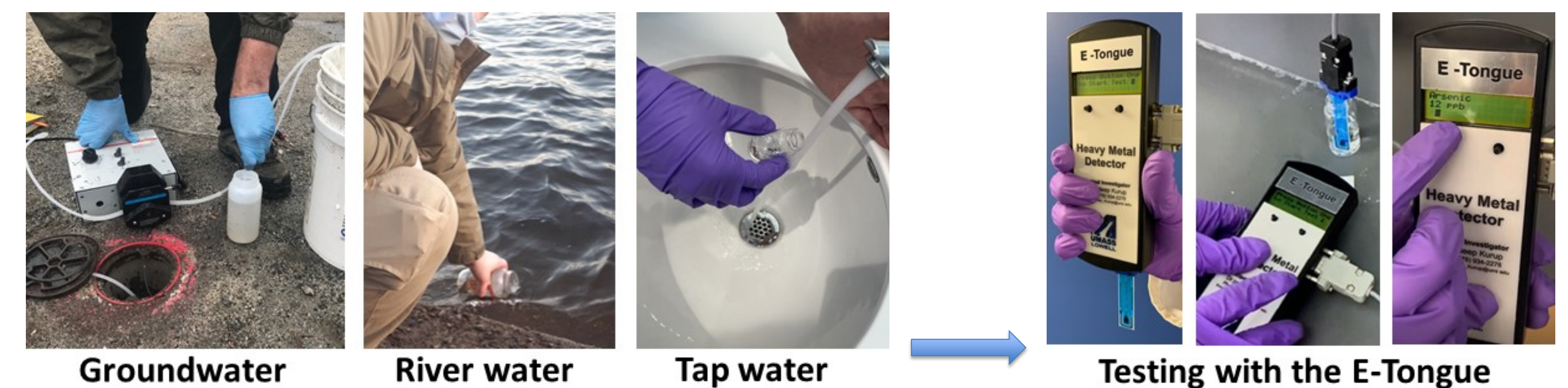
Intellectual Merit: Engineers, computer scientists, and social scientists from UMass Lowell will work closely with the communities of Lowell, Lawrence, Dracut, Westford, and Chelmsford, in Massachusetts, to pilot smart Electronic Tongue devices for evaluating toxic metals (lead, arsenic, hexavalent chromium etc.) in drinking water.

Cloud-based machine learning algorithms will acquire the responses from the individual E-Tongue devices and produce predictions about the extent and source of the detected contaminants. This information will be used to quickly notify the public health authorities for intervention and alert affected residents to take appropriate actions such as using bottled water or approved water filters.

Project Activities to Date:

- Team building: Added new community: Lexington, and researchers from Social Science, Computer Science, & Environmental Engineering
- Community outreach workshops and meetings (ongoing):
 - To identify key stakeholders.
 - Enhancing awareness through social media, infographics, videos.
 - Improve user-friendliness of the technology for communities.
- Meetings with MassDEP and Town Engineers regarding the new revisions to the “Lead and Copper Rule” in drinking water.

- Tested the E-Tongue with real-world water samples.



Immediate Broader Impact:

This project will have a profound effect in protecting the health of citizens, the environment, and drinking water infrastructure. Water utility managers will also benefit from real-time water quality data, that will enable them to adjust water treatment processes, and make infrastructure upgrades.

Long-Term Broader Impact:

The smart technology will be expanded to include other drinking water contaminants such as organics, pesticides, PFAS, and harmful pathogens. This transdisciplinary research model will be scaled-up and transferred to other communities in the US.

Next Steps:

- Submit IRG Proposal.
- Continue team building
- Community engagement workshops
 - Educational Planning Workshop with Community Stakeholders
 - Experimental Workshop (refine research concepts based on feedback)
- Development of apps & web interface