Final Design and Testing of a Low-Cost Radiation Weather Station (RWS-lite)

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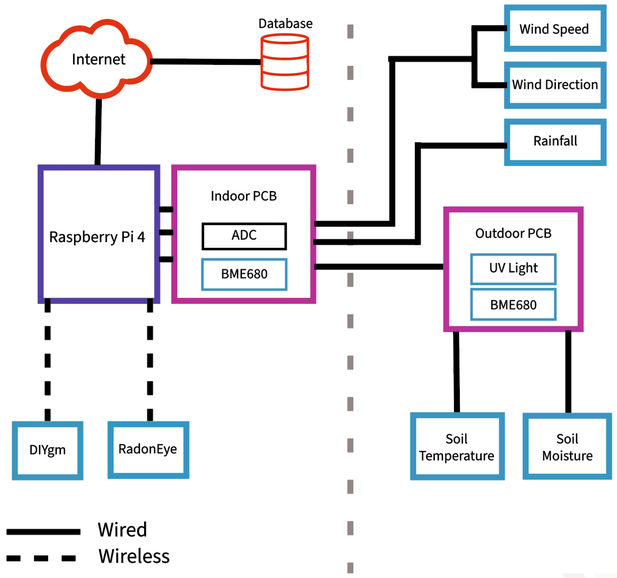
Introduction and Motivation

- Develop effective, low-cost platform for weather and radiation measurements
- Collect big data for machine learning training for education and research
- Correlate measurements for discrimination of natural background radiation fluctuations and atypical radiation releases



▲ Overview of RWS-lite system

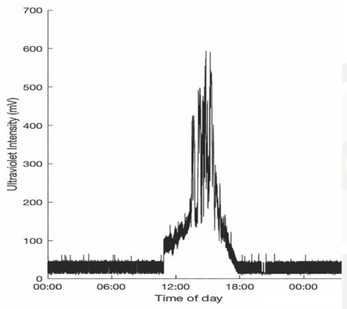
Mission Relevance

- RWS-lite is a platform for nuclear verification
- Better characterization of local background
- Increased number of radiation sampling stations improves nuclear incident localization
- Faster response speed

Technical Approach

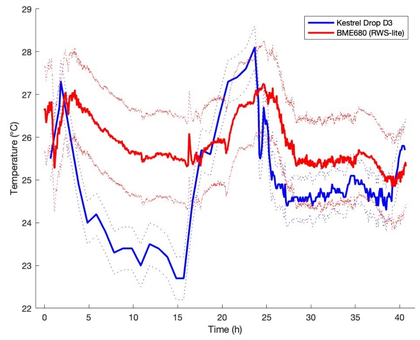
- Deployed full system in residential environment
- Verified all 15 sensors
- Tested case design

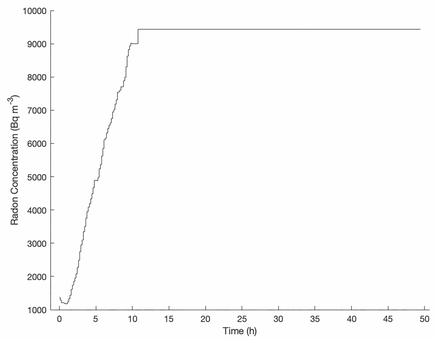
Results



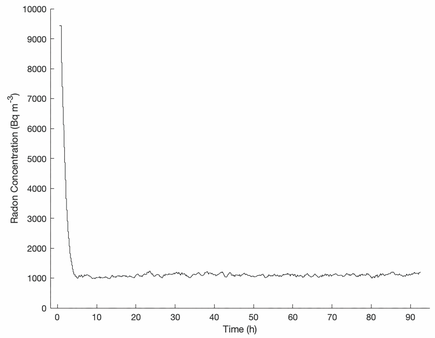
<- UV sensor tracking sunrise

RWS-lite indoor temperature and reference
Pin striped lines are error boundaries ->

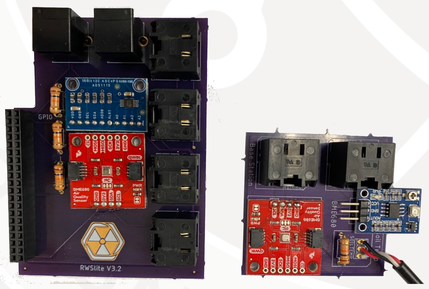




<- RadonEye measurement maximum in radon chamber

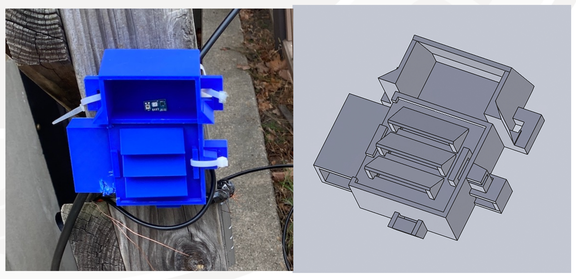


RadonEye washout ->



<- Final RWS-lite indoor/outdoor PCB

Improved outdoor case w/
CAD design ->



MTV Impact

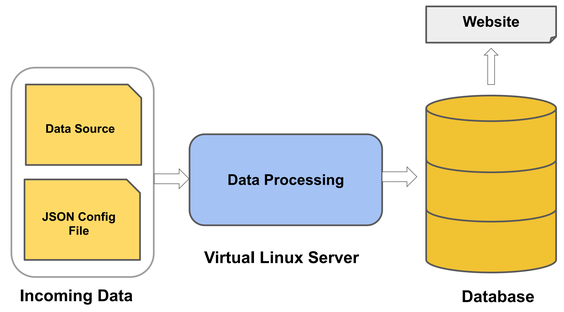
- First author on manuscript submitted to the Health Physics Society Journal
- Financial support for education and research
- Connection between computer science and applications in radiation science

Conclusion

- Selected hardware provides comparable results to calibrated detection equipment
- Data can be sent to data backend reliably
- Outdoor case revised for improved weather resilience to water intrusion
- Sensors sufficiently sensitive to identify events such as sunrise, new calibration coefficients for some sensors

Next Steps

- Documentation for setup and use
- Creation of web-interface for data
- Broad deployment of the system
- Analysis of the data collected by the platform



▲ RWS-lite data-flow diagram

Expected Impact

- Educational outreach for radiation and meteorological science
- Better understanding of background radiation
- Enhanced environmental monitoring

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