



Pilot: WEARABLE ACTIVITY RECOGNITION MODELING FOR LOGGING SAFETY

FINAL REPORT

Year 3 of 3 (2019-2021)

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Challenge

Logging consistently has among the highest fatality rates in the US. While increased mechanization has improved safety for loggers, ground crews, rigging workers, and hand fallers are still at risk. Emerging technologies that enable real-time positioning, activity recognition, and data sharing in remote areas have the potential to improve safety for loggers, aiding situational awareness and rapid emergency response.

Project Overview

This small project pilots the integration of geospatial technology and activity recognition modeling into a Garmin smartwatch and smartphone application for rigging crew workers in the logging industry. We aim to improve loggers' situational awareness by providing real-time updates of their coworkers' work activity status, location, and smart alerts. Time and motion studies and designed experiments are used to develop and test wearable-based activity recognition models and smart alerts. We then code the resulting models into a smartphone application so that smart alert features can eventually be available to anyone using a Garmin smartwatch.

Findings to Date

- Model testing has demonstrated 80% accuracy in predicting work activity and person-down status.
- Results from the Idaho logger evaluations indicate favorable intent to adopt wearable-based activity recognition systems.

Accomplishments

- Through a presentation to the Council on Forest Engineering and International Symposium on Forest Mechanization (FORMEC), the project team initiated a broader discussion on ethical considerations associated with using wearable data in the workplace in forestry.
- This research presented at FORMEC 2021 was selected by the scientific committee for the 'Best Presentation' award from among 120 talks given globally.
- These results are peer-reviewed and published in PLOS One on May 12, 2021. Associated Random Forest models have been published via University of Idaho Northwest Knowledge Network data repository.

Next Steps

Strategic planning has begun that will merge the pilot project model into a broader project framework to develop enhanced functionality over the next 5 years. This pilot is now expanding to a larger project, which will include the release of an app.

Resources



<https://bit.ly/PNASH-Logging-Activity-Recognition>



Zimbelman, E. G., & Keefe, R. F. (2021). [Development and validation of smartwatch-based activity recognition models for rigging crew workers on cable logging operations.](#) Plos one, 16(5), e0250624.