

Developing an Automated Protocol for the Wristband Extraction Process Using Opentrons

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Abstract : To better characterize the relationship between complex chemical exposures and disease, our laboratory uses an approach that combines low-cost, polydimethylsiloxane (silicone) wristband samplers that absorb many of the chemicals we are exposed to with untargeted high-resolution mass spectrometry (HRMS) to characterize 1000's of chemicals at a time. In studies with human populations, these wristbands can provide an important measure of our environment: however, there is a need to use this approach in large cohorts to study exposures associated with the disease. To facilitate the use of silicone samplers in large scale population studies, the goal of this research project was to establish automated sample preparation methods that improve throughput, robustness, and scalability of analytical methods for silicone wristbands. Using the Opentron OT2 automated liquid platform, which provides a low-cost and opensource framework for automated pipetting, we created two separate workflows that translate the manual wristband preparation method to a fully automated protocol that requires minor intervention by the operator. These protocols include a sequence generation step, which defines the location of all plates and labware according to user-specified settings, and a transfer protocol that includes all necessary instrument parameters and instructions for automated solvent extraction of wristband samplers. These protocols were written in Python and uploaded to GitHub for use by others in the research community. Results from this project show it is possible to establish automated and open source methods for the preparation of silicone wristband samplers to support profiling of many environmental exposures. Ongoing studies include deployment in longitudinal cohort studies to investigate the relationship between personal chemical exposure and disease.

Keywords : bioinformatics, automation, opentrons, research

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