REPPERGER RESEARCH INTERN PROGRAM

RESEARCH PROJECT #: AFRL-RHB-27-06

Biosensor Development for Rapid and Non-Invasive Health and Performance Assessment

PROJECT DESCRIPTION: Microelectronic and biosensor advancements have led to an influx of sensor diagnostics in the market; however, their accuracy, form factor, and the data they provide may not be useful to the USAF/SF. These technologies include wearables such as smartwatches, continuous glucose monitors for diabetics, environmental monitoring devices for chemical or biological agents, and point-of-care devices such as rapid antibody tests for illnesses. This project will require research to understand the current technical landscape of sensors/biosensors for health and human performance, determine pathways to advance biofluid sampling and collection, aid in threat recognition, create unique electrode fabrication methods, ruggedize technology for device fielding, and/or create novel (bio)sensors for specific human health and performance objectives. Projects will build upon reported biosensing successes and develop strategies to overcome the challenges that limit their commercialization and practical use in humans.

LEARNING OBJECTIVES: Under the guidance of a mentor, you will gain hands-on experience to complement your education and support your academic and professional goals. Along the way, you will engage in activities and research in several areas, including but not limited to:

1. Apply biology, chemistry, and materials science to produce biosensors and test their effectiveness in biofluids.
2. Analyze biosensing data and perform quality control of biosensing devices.

ACADEMIC LEVEL: Undergraduate; Master's; Doctoral

DISCIPLINES NEEDED: Engineering, Physics, Chemistry, Biochemistry

RESEARCH LOCATION: Wright-Patterson Air Force Base, Dayton, Ohio

RESEARCH MENTOR: Trevor Tilly, Ph. D

Environmental Engineering, University of Florida, 2020



Dr. Trevor Tilly is an aerosol scientist and Research Engineer in the Health and Performance Sensing and Assessment Core Research Area (HPSA), at the 711th Human Performance Wing, Air Force Research Laboratory, Wright-Patterson Air Force Base, Ohio. Dr. Tilly was a recipient of the Science, Math, and Research for Transformation (SMART) Scholarship and is currently focused on advancing electrochemical aptamer-based sensors to wearables and field-deployable health and human performance monitors.

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