REPPERGER RESEARCH INTERN PROGRAM

RESEARCH PROJECT #: AFRL-RHW-25-01

Analysis of Human Perception of Sound in Different Data Collection Paradigms

PROJECT DESCRIPTION: Humans receive a continual stream of auditory information that is processed real-time that does not require responses to continue (free-response). Many psychophysical data collection methods present clearly defined stimuli within clearly defined intervals and require the participant to respond before moving to the next trial (forced choice). Auditory detection of aircraft-like sounds has been presented to a collection of participants in both free-response and forced choice paradigms. This effort will: 1) create a unified, cleansed dataset; 2) extract human performance metrics for both paradigms; and 3) model the changes in human performance based on the diverse presentation methods. From this data and analysis, a transfer function will be created to determine temporal, spectral, and cognitive adjustments that are required for models currently in use constructed from the forced choice methodology to assist warfighters in determining when detection occurs.

LEARNING OBJECTIVE: Interns will be exposed to data organization and cleansing to produce the final dataset that will then be analyzed. Data analytics will be applied to the data through programming in Python. Students will use visual analytics to examine the relationships between the two presentation paradigms, machine learning will be used to model the interaction of the stimuli and the human responses.

ACADEMIC LEVEL: Undergraduate; Masters; Doctoral

DISCIPLINE NEEDED:

- Data Science
- Psychology
- Physics

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

RESEARCH MENTOR: Frank S. Mobley, Ph.D.
Mechanical Engineering, University of Dayton, 2012

Dr. Mobley has been working with RH for 23 years and has focused on physical acoustics and descriptions of the aircraft sound emissions. Dr. Mobley completed a graduate certificate in Data Mining from The Ohio State University in 2019. With this knowledge, he has explored relationships between physical and psychophysical phenomenon and acoustic information, to understand how to build more accurate and robust models of human performance. He currently leads the line of effort research portfolio that focuses on designing holistic models of cognition for the purpose of constructing models of decision-making at different levels of authority.