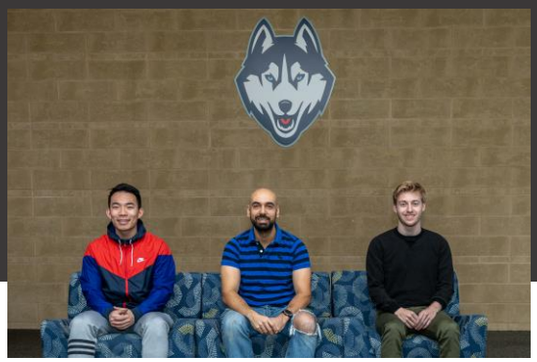


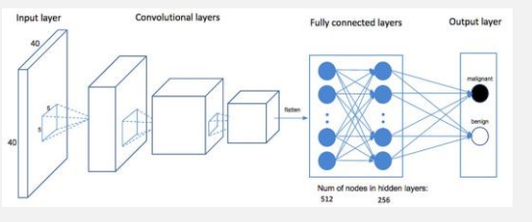
From left to right: Alan Kan, Frank Zappulla, Chris Dipietro

COMPUTER SCIENCE & ENGINEERING

TEAM: 40
SPONSOR: Naval Sea Warfare Center
SPONSOR ADVISOR: Gary Huntress
FACULTY ADVISOR: Dr. Wei Wei

Drone Detection via Acoustic Processing with Machine Learning

NAVSEA WARFARE CENTERS
NEWPORT



In the modern day technological landscape there has been a drastic increase in both the accessibility of data and the processing power of computers. These two factors have thusly enhanced the ability of machine learning systems to provide otherwise unavailable insights into the underlying patterns of the data of businesses, government, and our everyday lives. With support from the Naval Undersea Warfare Center (NUWC) our team is developing a project to apply a machine learning model to detect drones via acoustic information. Presently, drones are used by civilians as well as the military. Civilian drones are often relatively safe and used for the purposes of photography and videography, whereas military grade drones can carry out precision attacks remotely, removing the risk of injury or death to a human pilot. The Navy is thus highly motivated to develop a system to detecting drones and alert military personal of their presence. Making use of the machine learning libraries Tensorflow and Keras, our project aims to develop an acoustic classification system capable of identifying drones. In order to achieve a high level of accuracy we will employ the use many deep learning and advanced data preprocessing techniques.

Our model's structure will be that of a supervised learning classification algorithm. We will collect and process acoustic drone data using our own Autel X-Star Premium quadcopter and audio data available on websites such as *youtube.com*. The model will be trained on said data and return a discrete output indicating the presence, or lack thereof, of a drone in a specific audio sample. Our hope is to eventually use a similar approach for identifying the location of the drone using closely related image classification techniques. We have elected to utilize a convolutional neural network (CNN) as the deep learning model for our project. This CNN will be built on top of an existing model designed to accomplish a similar task. Such a process is called transfer learning. This will reduce the time and data costs of training and will allow us to produce highly accurate results and a model that should easily generalize to the needs of the NUWC in their own future drone detection endeavors.