**AI Based Opto-Lexical Pattern Analysis for Behavior Classification**

During the 2016 – 2017 school year, I expanded upon my previous project – Lexical Syntax Analysis for Hostile Behavior Identification – in order to add more features and make the classification algorithm more robust. While my previous project was focused more upon linguistic queues to identify potentially dangerous accounts, this project also incorporated image recognition to extract features such as the number of people per image, average age, and auto-generated image caption. These parameters (27 in total) where then inputted into an artificial neural network to correctly identify the hostility and threat of an account.

### Lexical Syntax Analysis for Hostile Behaviour Identification

During the 2015 – 2016 school year, I created a machine learning algorithm that would collect user data from Twitter, process that data to determine linguistic patterns, and classify accounts as being related to possible terrorist accounts. This project arose from the necessity of an algorithm to quickly and effectively monitor social media to remove terrorist accounts, especially since 90 percent of terrorist communications happens through that medium. My algorithm analyzed account features such as the most common words, account interaction patterns, and geolocational probability. If implemented, this tool could serve as an early warning system designed to mitigate hostile threats.

### Using IR Sensors to Limit the Screen-On Time of a Computer

During the 2014 – 2015 school year, I created and tested IRES, a device that would intelligently track a user’s presence at a computer in order to limit computer power consumption by automatically issuing a series of commands that would either turn off the computer screen, put the computer to sleep, or hibernate it depending on what function would optimize power savings while minimizing user frustration. IRES consisted of an Arduino Leonardo with an infrared sensor to track the user’s presence; the entire setup was encased a custom 3D printed capsule designed to attach to the top of the user’s computer.

### DrawBoard: A Handwriting Recognition Algorithm

### DrawBoard is a handwriting recognition algorithm implemented in Java. The program uses a Java Swing GUI that allows the user to write letters or words which is then identified by the computer using an artificial neural network that I designed.

### Pittsburgh Forensics Institute Website

### During the summer of 2017, I was responsible for organizing, running, and teaching at Pittsburgh Forensics Institute, which is a Speech &amp; Debate camp for the greater Pittsburgh Area. One of my responsibilities was to develop a new website to replace the old one. This site utilizes dynamic elements in order to automatically update key data using JSON and JavaScript.

### VIRtual eTracker

### VIRtual eTracker is a “proof-of-concept” product designed to monitor a building’s energy consumption by plugging into a wall outlet. This device then uses an Arduino to interface with a computer, which can either use WiFi or Bluetooth to connect to a smartphone to display power consumption data.

### Literatim

### Literatim is a Chrome extension designed to help debaters “cut cards” (create website citations along with a block of text from the site).

### Code One Website

### During the 2016 – 2017 school, I founded an organization called Code One. The organization is designed to increase computer science exposure at the middle school level by offering programming classes around my community. One of the responsibilities that I had was creating a website that would serve as a landing page with logistical information about the program.

### Student Planner

### Student Planner is an Android app designed to act as a virtual assignment book with approximately 10,000 downloads. Some key features of this app include assignment prediction, notifications / assignment reminders, settings, and the ability to archive old assignments.

### Optical Character Recognition Algorithm

### This is an Android application and OCR algorithm that can take pictures of text or numbers and identify what letters of numbers are in that picture. The application and OCR algorithm utilize machine learning (Artificial Neural Networks) and image processing in order to complete this task effectively.

### Word Search Solver and Generator

### This is an Android application designed to both create and solve word searches up to 100 rows by 100 rows.

### Calculator X

### Calculator X was my first programming project ever. It is the first fully functional material design Android calculator app with stunning animations and the ability to solve complex algebraic and trigonometric functions.

**Code One**

Code One is an organization that I started to increase computer science exposure in my community by offering programming classes. So far, we have had sessions at Millvale Community Library and we plan to hold lessons at more locations in the future! Lessons first begin with Scratch, a simple drag and drop programming language designed to familiarize students with computer logic. Students then progress onto Python, a versatile language with easy-to-learn syntax.

**HackNA website**

During the 2017 - 2018 school year, I founded and directed HackNA, a high school hackathon for the Greater Pittsburgh Area. Hosted by North Allegheny, HackNA allows more middle and high schools to become interested in computer science and robotics at an earlier age. One of my responsibilities for this event was to create the website, which would serve as the event's landing page.

**Leadership**

**HackNA**

After noticing a lack of introductory computer science opportunities and programming competitions in the Pittsburgh area, a friend and I co-founded HackNA—a twelve-hour hackathon taking place at my high school. Hackathons are great ways to introduce more people to computer science and robotics—teams have twelve hours to design, develop, and build software or hardware hacks (e.g. websites, robots, Android/iOS apps) on site and compete to win sponsored prizes and awards. The event, on December 16, 2017, brought together over 200 community members from more than 25 school districts across Pittsburgh, including 15 companies and 5 sponsors in order to foster a high school tech community.

The event was specifically designed so that absolutely no prior experience was necessary! We coordinated with local companies who sent professionals to help mentor teams, judge projects, and teach workshops ranging from “Intro to Programming” to “Android Development”—all to help beginners get started and experts excel.

In fact, after receiving an overwhelming amount of positive community support and feedback, we decided to host a “mini” version of HackNA later this year in May specifically for beginners and middle school students.

**Code One**

After competing in numerous computer science and STEM-related events around my community, I noticed that not everyone was represented—many people were lacking the resources to beginning exploring as I did. In response, I founded Code One, an organization centered around increasing computer science exposure in my community. Partnered with Millvale Community Library, Code One organizes programming lessons in public locations every week after school for middle and high school students. Lessons first begin with Scratch, a simple drag and drop programming language designed to familiarize students with computer logic, and then progress onto Python, a versatile language with easy-to-learn syntax.

**Varsity Speech &amp; Debate**

As a four-year member of my school’s Varsity Speech &amp; Debate team, I’ve participated and won countless tournaments at the local, state, and national levels. This year, I’ve stepped up to become an Instructor for Public Forum Debate and Big Questions Debate—two of the largest events offered. With practices three times a week spanning the entire year,

my responsibilities, in addition to competing, include teaching the next generation of debaters, judging tournaments, and coordinating lesson plans with our coach to ensure practices run smoothly.

**Varsity Cross Country**

As a runner for my school’s Cross Country team for three years, I became Varsity Co-Captain of the boy’s team this past season. My responsibilities as Co-Captain included leading almost a hundred teammates during practice and meets as well as helping newer members of the team become accustomed to the intense workload the sport carries.

**Computer Club**

As a three-year Officer and four-year participant of Computer Club, I’m extremely involved with this club. When I joined, our Computer Club only had a meager 15 students; however, through my persistent advocacy for more STEM and computer science activities, I’ve helped this club more than triple in size to have 50 participants. In addition, I help organize biweekly meetings, create lessons plans for competition practices, and coordinate / direct computer science outreach programs at our middle and elementary schools.

**Science Club**

As a two-year Officer of Science Club, I’m heavily invested in conducting my own research projects as well as helping others succeed for various science competitions. I also help keep an open channel of communication between competition administration and participants to ensure that projects are completed on time and deadlines are met. A summary of my projects can be found under the Projects tab.

**Leap@CMU Teaching Assistant**

Leap@CMU is an intensive, seven-week summer camp for high school students. Held at Carnegie Mellon University, Leap allows students to explore computer science and mathematics in a fun and engaging environment. After participating in 2015, I returned as a Teaching Assistant (TA) in 2016 and 2017. As a TA, I directed and taught the Intermediate Programming track, which based in Java, explored concepts ranging from Object Oriented Programming and Recursion to Machine Learning and Data Mining.

**Pittsburgh Forensics Institute**

During the summer of 2017, I was elected to be an organizer for Pittsburgh Forensics Institute (PFI). Held at the University of Pittsburgh, PFI is a summer Speech & Debate camp open to all middle and high school students in the Greater Pittsburgh Area. My role as organizer included key responsibilities such as creating a website, marketing, communicating with Pitt, coordinating instructors, and teaching Public Forum Debate. Intended to serve as a fundraiser for my team’s Speech & Debate team, PFI helped raise nearly $15,000 this past summer!

**Hour of Code**

During my freshman year of high school, I helped organize and direct the Hour of Code event at my school on December 11, 2014. Bringing together 432 students, this event encouraged more participation in computer science by allowing participants to take time off class to learn to code through Code.org.