Project Abstracts

- **Elijah Hernandez, "Early Notes"**
  Early Notes is a childhood education application focused on engaging families in beginning their child's education before school. Musical exposure at a young age has proven to expand early childhood brain development. Early brain development is a crucial factor in academic success, especially in an education system made for certain children to fail. Due to this, my senior project will be to make a free early childhood development Android application that will foster essential life skills through the wonders of music. Early Notes will allow toddlers to participate and complete a sequence of original and imaginative lessons that will demonstrate the basic foundations of music theory. The expectation for this application is that it will support and promote the fun and creativity education has to offer while giving communities an equal chance at receiving a beneficial start to their education.

- **Selina Ortiz, "E-ventory - Online Inventory System for Technology in Public Schools"**
  E-ventory is a web-based inventory system that is designed to store a virtual inventory of laptops for a public-school. Using an online database, the inventory will hold detailed entries containing descriptive information of the school's laptops. E-ventory's system is made up of two components, a website and a mobile companion Android application. The website interface will be used to view, edit, and maintain the inventory and its barcode scanner application scans barcode tags on the laptops to identify misplaced laptops. The aim of this system is to ease the burden of maintaining an inventory of electronic devices for administrations in public schools who are already doing other tasks. This system is to serve as a free, efficient service that is specifically tailored to the necessities and functions of a public-school.

- **Clear Tavarez, "P.A.T - The Portable Artistic Tutor"**
  This iOS application is an educational interactive tutorial geared towards budding artists with little-to-no background in visual arts. It will lend a helping hand as a useful artistic resource. Through it, users can learn basic color theory and human anatomy through a series of levels. These levels prompt them to grasp and understand the concept before advancing. Even when the students have gone through all the levels, they will be able to go back and replay levels as well as reread the instructions originally given to them. The final objective of this app is to allow its users to have a foundational background in visual arts as well as begin creating art and becoming artists themselves. After using the app, users should feel some sort of independence in their ability to create art and will hopefully pursue further education in the visual arts. They should also know the primary, secondary, and tertiary colors as well as about color tone, hue, and shade. Furthermore, they will have some knowledge on color compliments and how to draw a human figure.

- **Jin Pyo Jeon, "Chat-with-a-bot"**
  Since the early days of artificial intelligence, developing a bot that can hold a human-like communication have been and still remains to be one of the frontiers of artificial intelligence. However, due to the difficulty of generating and understanding human voice, the medium for the communication have primarily been restricted to a text-based communication. Recent advances in speech-to-text transcription (and vice versa) now allows for real-time voice communication between a chatbot and a human. This project aims to explores that possibility by developing a chatbot that can communicate through the medium of voice. Utilizing technologies and techniques such as natural language processing, pattern matching and text-to-speech generation, this project allows the users to call a phone number to speak to a chatbot.

- **Chris LoBianco, "BioKit: An Application for Analyzing Gene Expression Data"**
  The emerging field of bioinformatics combines DNA, RNA, and protein data sets from molecular biology with processing and analytical tools from computer science and statistics. These tools are widely available, but many biology faculty and students lack the computer science domain knowledge to fully utilize these databases, algorithms, and statistical techniques. This project, BioKit, overcomes this obstacle by packaging key tools for gene expression data analysis inside an easy to navigate interface. A Java based desktop application, this project utilizes R code modules sourced from BioConductor, an open source repository of bioinformatics tools and algorithms. These modules allow a user to upload a file and (i) normalize, (ii) statistically cluster, and (iii) visualize the results of gene expression experiments. By encapsulating the technical implementation of these modules inside a clean user interface, this application allows Trinity College faculty and students to more efficiently analyze and process experimental data while giving them access to tools they previously had poor technical familiarity with.

- **Samuel Oyebefun, "Quantitative Finance Platform"**
  Most records and observations nowadays are captured electronically by devices connected to the internet. This, in principle, allows investors to access a broad range of market relevant data in real time. Given the amount of data that is available, a skilled quantitative investor can nowadays in theory have near real time macro or company specific data not available from traditional data sources. Analysis of large datasets is often done with the use of statistical libraries to design quantitative strategies. QFP provides an analysis solution that allows users to research, develop and analyze trading strategies by providing users with immediate access to a ready-built research and testing environment. QFP will allow investors to develop better strategies for individual companies and entire industries faster and more efficiently than their competition, therefore increasing returns.

- **Ha Tran, "BantamBot"**
  The project aims at creating a chatbot named BantamBot, a software program that can chat with prospective students in a simple, understandable, helpful and friendly way on texting platforms to provide them with the most up-to-date answers to general questions about the admission process of Trinity College. BantamBot is expected to have a number of features that can engage prospective students in using the program to learn about the admission process. BantamBot's personality is knowledgeable, dependable, and friendly. It will be pre-trained to handle many questions with different styles in a human-like, short and simple approach. It may ask students clarifying questions or encourage them to ask questions. It can ask and answer questions with emojis. The answers can be messages, forms and documents, links to Trinity websites, or multiple choices on which students can click to proceed. The questions that BantamBot can answer are restricted to the admission domain, i.e, application forms and materials, application fee, deadlines, essays and standardized tests, and so on. BantamBot is going to make the Trinity admission process more simple and fun for both students and Trinity counselors.

- **Drew Lewis, "Plectr - On Demand Tutoring"**
  Tutoring aids are made available to college students on campus through services like domain-specific tutoring rooms or teaching assistants in labs and classes. This system is limited and has much room for improvement with regards to the scheduling and availability of tutors beyond such environments. As it stands, tutors are either bound physically to certain locations in order to be found by students or are only available during class periods. Within these

limitations, I find that there is the potential for tutors to have a wider reach of students and likewise for students to have better access to tutors. As an Android application, Plectr aims to be the platform that enables these potentials by creating a real-time network of tutors. Plectr grants students access to this campus tutoring network and allows for on-demand tutoring sessions, live availability and scheduling. Within the Plectr network, text data is attained from student's reviews on tutors and is used to rank tutors according to domain specific categories extracted from these reviews. Natural language processing is implemented in order to achieve these features, as well as mobile GPS location services and geo-querying. To complete this project, I implemented word tokenization and classification using the Python spacy NLP module. Sentiment is extracted by a monkeyLearn sentiment classification API, and localization functionality was built using the Google maps API and Firebase geo-fire. Plectr combined these features and technologies to establish a trusted platform for connecting students and tutors on campus in much more efficient system.

- **Watson Peng, "Menu System Using Domain Driven Design Theory"**
  This project is about a menu system with an app and a related website which are mainly designed for restaurants and wait staff. The menu app is designed to provide a specific sorting function on the meals of the menu, including food type and caloric value. The app can be used to view the menu and make orders to improve customer experience and provide more information on menu items. It will have a search bar at the top for finding specific meals that meet the requirements. It will also have a list of meals below the search bar for the user to view each meal. The user can tap on each meal to take a look at the description of that meal. This app is only available on Android platform. It is mainly designed using Android Studio. The website is designed to complement the menu app and will provide some extra features. The restaurant can upload the menu to the website and add detailed information to each meal of the menu. Since both the app and the website are using the same database, every change on the website will be reflected on the app. The website will collect information, so it will provide extra features. It will have a side bar for the user to choose to view the menu and the order history. Based on the order history, it can help the user to count out profit within certain time range. It can also export those data out for the restaurant to support its own managing system.

- **James Rodiger, "Compression Using Massively Parallel Processing"**
  Compression is ordinarily done by one or two threads running on an average CPU containing two to four cores. This is time consuming as only a small amount of data can be processed at a single time, by running this same operation on a GPU which consists of many thousands of cores running in parallel, the amount of data which can be processed at once is far greater and therefore the time needed to compress large files can be reduced. The DEFLATE compression algorithm is used in the popular tools Gzip and png. By porting the DEFLATE algorithm to OpenCL and licensing it as open source this version of DEFLATE could be used to speed up Gzip when compressing certain large files. Many industries could benefit from this especially ones which involve large data storage where quick storage and retrieval of data is necessary.

- **Binh Vo, "Plan-t a Pomodoro" - Increase Productivity Rate with the Pomodoro Technique**
  We live in an age where patterns of procrastination are pervasive in our society. It would not be common to say that we don't get interrupted by notifications while concentrating. As the pace of modern life increases, people start to feel anxious and stressed out. Common procrastination behavior makes people seek out time management solution to increase their

productivity rate. One of the most effective methods is the Pomodoro Technique, created by Francesco Cirillo. The project is aimed to build an app that implements the Pomodoro Technique in a two semesters development cycle. The app will be built on Android with the goal to satisfy users through the stages of planning, visualizing, tracking and recording. Designs and features/components of the app will be implemented in XML and Java in Android Studio. Open Libraries such as MPAndroidChart and JSoup use for graph plotting and parsing website's data. Backend service will be provided by Google Cloud-Based API Firebase to handle user's authentication and app's data. Plan-t a Pomodoro is an app that builds off the Pomodoro method's philosophy. The objective is to achieve more with less, but also move through tasks quickly and consistently. The reduced complexity lets users focus solely on their efforts in their activities.

- **Brian Cieplicki, "Witam - Connecting ESL Learners and Senior Citizens"**
  Loneliness among senior citizens in the United States affects approximately 8 million seniors and is known to play a major role in the development of depression for many. English as a Second Language (ESL) learners, who have extremely high levels of understanding and proficiency, struggle to reach a point of flawless communication in English. They have difficulty finding high quality help in improving their language ability. Witam is an Android application that will serve to help each of these groups of people by addressing the aforementioned issues simultaneously. Witam will connect senior citizens and advanced ESL learners to facilitate the establishment of communication between members of these two groups. Their conversations will help resolve the issue of loneliness by providing seniors with meaningful social interaction, and will provide a means by which ESL learners can easily access conversation with lifelong native English speaker to perfect their language ability.

- **Simran Sheth, "Robin Food - An App to Connect Food Donors to Volunteers"**
  23% of India's population ($\tilde{2}$70 million people) is below the poverty line of $1.25 a day. On the other hand, due to the lack of storage facilities, tropical temperatures and religious restrictions, restaurants, social gatherings and households throw away extra food instead of storing it overnight. This Senior Project impacts the community we live in and helps people who cannot afford that help. The Robin Food android app connects restaurants, households, parties or family gatherings to volunteers (either individual or part of NGOs). This app is based on an honor system, where users share the same ideology of helping those who need food the most. Both donors and volunteers sign food safety disclaimers to ensure secure donation and transportation of food. Donors offer tasks consisting of contact information, details about the food they are donating - quantity, storage requirements and their location details. Volunteers see a list of all available donations and the distance from their current location. They have the ability to choose the one they want. Once a donation task is chosen, the volunteer is given more information about the donor, such as contact details and then is led to a map which shows directions from the current location to the donors location. Finding people who are in need of the food is not hard, most areas have homeless people living on the sidewalks. This benefits the needy as they now can get access to food without needing to own a smartphone that has an active internet connection. This project can also be extended to directly helping orphanages, assisted living homes, and homeless shelters. This application encourages donors to help the people who need the help and donate food instead of throwing it away.

- **Tess Starr, "Trinity College Campus Navigation App"**
  The Trinity College Campus Navigation Application is a mobile tool for people to gain infor-

mation about campus. Despite its small size, Trinity's campus can be hard to navigate, and it is challenging to find out detailed information about locations on campus. The goal of this application is to give people on this campus, including students, faculty, and staff, as much information as possible about campus to aid them in their day to day life. On top of that, this application provides anyone visiting with information about campus prior to their visitation. It includes information regarding all locations on campus, along with faculty members and their office location It includes a search tool which enables users to quickly and easily find the location or faculty member they're looking for. Walking directions can be shown in order to guide a user to any location on campus. This application has the potential to be a valuable resource for both people here at Trinity and interested incoming students to explore campus from afar.

- **Joyce Zhan, "Tristy Mobile App"**
  Striving to be a residential college that currently houses over 90 percent of matriculated students in college-owned and -operated housing, Trinity requires all these students to be enrolled in meal plans. However, most of the students are disappointed with the dining services on campus. Though the school is starting to pay close attention to students' feelings, for now, they don't have an efficient way to collect all the feedback. There's no such platform for the voices of students to be heard and for the school to know how to fit the students' needs. My solution is to create an Android mobile app called Tristy which publishes ratings and reviews of all dishes on Trinity campus. It's portable and user-friendly. Authorized Trinity users can view everyday menus on the app. Users will be able to rate, write reviews and post pictures under each dish. For the authorized Chartwells staff members, the Tristy app will generate a report of top 3 most popular dishes and top 3 least popular dishes. They can analyze and study the data based on the report and furthermore, improve the dining services.