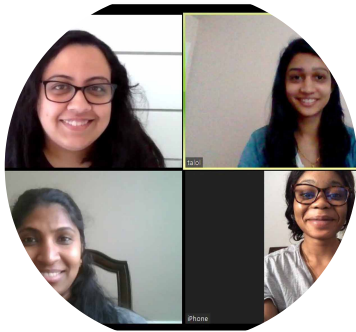


College of Computing and Software Engineering / Computing Showcase /
Spring 2020 C-Day Winners

Spring 2020 C-Day Winners

Category: Graduate Capstone Project



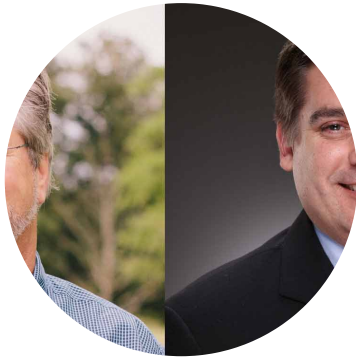
1st place GC-06 CCSE Project Management System

by Geetika Bajaj (MSIT), Nikita Talole (MSIT), Elizabeth Gladstone (MSIT), Casiana Mba Maye (MSIT)
Advisor: Prof. Dawn Tatum

2nd place GC-02 Backdoor Attacks

by Bhavana Pateriya (MSCS), Sowmya Kari (MSCS), Priyanka Velu (MSCS)
Advisor: Dr. Xiaohua Xu





3d place GC-05 Smart Traffic Light

by Tony Niebank (MSAS), Andrew Henshaw (PhD. Data Science)

Advisor: Dr. Mohammad Aledhari

Category: Graduate Research Project



1st place GR-07 Analysis of Mental Illness with VR

by Christopher Baxter (MSSWE)

Advisor: Dr Joy Li

2nd place GR-02 Group Key Exchange without TTP

by Youdom Kemmoe Victor (MSCS), Yongseok Kwo Kwon, Seunghyeon Shin (MSCS), Rasheed Hussain, Sunghyun Cho

Advisor: Dr. Junggab Son

3d place GR-05 OutlierDetection using RandomForest

by Divya Pramasani Mohandoss (MSCS)

Advisor: Dr. Yong Shi

Category: Undergraduate Capstone Project



1st place UC-20 The Clarity Project

by Jacob Barnett (BSIT), Henry Colomb (BASIT), Amari McGee (BSIT), Christian Moore (BSIT), Jack Wengert (BSIT)
Advisor: Dr. Ying Xie



2nd place UC-23 Enlightenment

by Jim Sizemore (BSCGDD), Logan Thompson (BSCGDD), Matt Dwyer (BSCGDD), Chase Peery (BSCGDD)
Advisor: Dr. Joy Li



3d place UC-04 Anti-COVID-19 Assistant

by Ava Podrazhansky (BSCS), Jay Bhatt (BSCS), Hao Zhang (BSCS)
Advisor: Dr. Meng Han, Dr. Selena He

Category: Undergraduate Research Project

1st place UR-12n App Ordinal Classification

by Kayla Dougal (BSIT), Jean Rodriguez (BSIT), Jovanny Duran Salgado (BASIT), David Hinojos (BSIT)

Advisor: Dr. Ying Xie

2nd place UR-18n Edge Computation for SDR-SDN

by Samuel Helwig (BASIT), Brandon Gocool (BASIT), Olutayo Taiwo (BASIT), Daniel Pierce (BASIT), Brad Barnett (BASIT)

Advisor(s): Dr. Sumit Chakravarty and Dr. Ying Xie

3rd UR-04 Vehicle License Plate Recognition

by Zekai Fei (BSCS)

Advisor: Dr. Selena He and Dr. Meng Han



Contact Info

Kennesaw Campus
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Resources For

Current Students

Related Links

- Libraries
- Housing
- Financial Aid
- Campus Security
- Global Education

Spring 2020 C-Day Program

April 23, 2020

Location: Virtual. *Please scroll down to find the links to the presentations and virtual QA session rooms.*



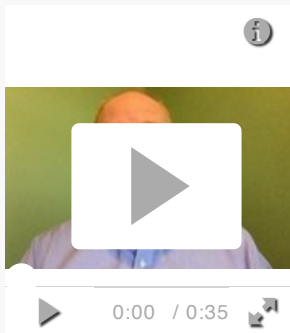
C-Day Home Page

Return to the C-Day home page.



Spring 2020 Winners

View the Spring 2020 C-Day winners.

TIME	EVENT
Welcome from Dean Preston	

Tuesday, April 21, 2020, students' prerecorded presentations will be linked to this page.	Student Showcase for Projects, Research, and Innovation. Presentations will be linked to the program.
Thursday, April 23, 2020, 5:00 pm - 6:00 pm	Students who would like to provide QA session for their project will be available online. Virtual rooms will be linked to the program.
Monday, April 27, 2020	Winners of the Awards announced <ul style="list-style-type: none"> ◦ Best Undergraduate Project ◦ Best Graduate Project ◦ Best Undergraduate Research Project ◦ Best Graduate Research Project

Mark your calendar for Fall 2020 C-Day: Thursday, December 3, 5-8pm

Follow us on LinkedIn <https://www.linkedin.com/company/kennesaw-state-university-college-of-computing-and-software-engineering>

Spring 2020 C-Day Projects

Judges

- Katina Cunningham - CEO & Founder - C3 Innovations LLC - Georgia (Tech Consultants)
- Andrew Hamilton - CTO - Cybriant
- Wes Hogarth - Associate Director - IT Operations - ELSYS - Georgia Tech Research Institute
- Charles Chidi Igwilo - Partner - upSTART Venture Partners
- Roger N. Mahler - AT&T Public Sector/AT&T IoT Solutions - AT&T
- David McCampbell - Developer Relations, Customer Support and IT - Sertainty
- Suneel Mendiratta - VP - Product Development, HRO - ADP
- Daniel Omuto - Video Engineer - Cox Communications
- Vladimir Rusanov - Development Manager - Stanley Black & Decker, CribMaster
- Jaspal S Sagoo - CTO - CDC
- Abbie Sheffield - Technology Development Program Leader - AT&T
- Bruce Skillin - Technology Innovator - Georgia-Pacific
- Torre Sledge - Research Technologist I - GTRI
- Abdul Wahab - Software Developer - State Farm Enterprise Technology
- John Zimmerman - Director, NA Professional Services - Aderant

Rubrics and Acceptance Rate

Best Project in Each Category Rubric

Undergraduate and graduate projects: scale 0- 10with 0representing "Poor" and 10representation "Exceeds Expectations"

- o Successfully completed stated project goals and reported deliverables (0-10)
- o Methodology/Approach: All required elements are clearly visible, organized, and articulated (0-10)
- o Effective presentation (0-10)
- o Evidence of Rigor (0-10)
- o Merit and Broader impact (0-10)

Games: scale 0 - 10 with 0 representing "Poor" and 10 representation "Awesome"

- o TECHNICAL: Technically sound with appropriate visual & audio fidelity(0-10)
- o GAMEPLAY: Engaging & Fun, with an intuitive UI. Rules of play are clear. Includes a win/lose state(0-10)
- o ORIGINALITY: Sound, Art, Design, or Code(0-10)
- o Evidence of Rigor (0-10)
- o Merit and Broader impact (0-10)

Alumni's Choice Award Rubric

Alumni Judges will judge the Undergraduate Capstone projects to determine the “best” from those presented. Undergraduate Capstone Project titles start with the letters “UC –“ on their poster.

1. Team Approach: 20 pts (did the team work together effectively to meet goals)
2. Presentation: 20 pts (did the team sell the idea)
3. Use of Technology: 40 pts (is technology being used an effective way)
4. Feasibility/Impact for Business/Industry: 20 pts (doable/valuable/effective)

Academic courses undergraduate (e.g. capstones, games, innovative special topics projects, other course projects) (27)

* Candidates for the best project award

- o **UC-01 Vertical Shift, A VR Esport**
by [Sean Feeser](#) (BSCGDD), [Ben Snowden](#) (BSCGDD), [Jacob Walton](#) (BSSWE), [Connor McClelland](#) (BSCGDD), [Noah Shultz](#) (BSCGDD),
Advisor: Dr. Michael Franklin
Description: Vertical Shift is a multiplayer VR game where you fly through a city using grappling hooks, jetpacks, wings, and other innovative locomotions. The game features hand-crafted maps for the players to swing around and fly through, emphasizing the unique variety of gameplay mechanics. The game types emulate competitive sports, such as Tag, Capture the Flag, and Racing.

We aim to create a new and engaging experience that will keep players coming back to play with their friends.

Merit: Esports are the largest genre in gaming to date, but have few releases on the rapidly growing VR platform. As an early adopter, Vertical Shift has the opportunity to pioneer VR esports, which will one day overwhelm its predecessor.

[Presentation / More information](#)

o *** UC-02 Bat Out Of Hell**

by [Jim Sizemore](#) (BSCGDD), [Logan Thompson](#) (BSCGDD), Matt Dwyer (BSCGDD), Cody Ducleroir (BSCGDD), Tucker Ramey (BSCGDD), Advisor: Dr. Michael Franklin

Description: Bat Out Of Hell is a PC game where the player takes control of a bat attempting to escape the labyrinths of Hell. In order to do so, players must navigate a series of dark, maze-like tunnels using echo-location to navigate. The levels are filled with impish enemies that will provide a challenge to players trying to escape, for if they take too long in a level, a rising pool of lava will come up and be their downfall.

Merit: This project shows a new innovation in sight and navigation in video games with its unique echo-location mechanic being applied to a maze-like structure. Additionally, this project can be modified to be sold on major PC game distribution platforms.

[Presentation / More information](#)

o **UC-03 Cityscapes AR Educational App**

by [Brannan Vitek](#) (BSCGDD), Advisor: Dr. Michael Franklin

Description: Cityscapes is an Augmented Reality software tool where users can learn the basic concepts of city management on a mobile device in a fascinating and modern way. Through an camera on a mobile device, Cityscapes projects a virtual city construction game onto the real world. The blueprint “sticks” to flat surfaces, allowing users to analyze their virtual city from all angles. Rules for a building happy and healthy city come in the form of profit, power, safety, happiness, and population. Different buildings (offices, police stations, houses, etc) raise and lower these resources as they are constructed. Internal algorithms are used to compute these resources in real-time and display the information back to the user- forming a virtual economy system they can use to determine what their city needs next.

Merit: Early childhood education has grown painfully stale in today’s modern world. Every day, more and more elementary students claim they are bored in class, and behavior/engagement reports reflect this. The answer for this is simple, and it revolves around a psychology concept known as Self-Actualized Learning. Children, namely those under the age of 10, mature their minds out of egocentrism at different rates. If a concept does not apply to the student directly, it is vastly more difficult to for them learn it. Cityscapes is designed to teach a child the high level concepts of economy, strict resource management, and urban planning through a game they can see in front of them.

[Presentation](#)

o *** UC-04 Anti-COVID-19 Assistant**

by [Ava Podrazhansky](#) (BSCS), [Jay Bhatt](#) (BSCS), [Hao Zhang](#) (BSCS) Advisor: Dr. Meng Han, Dr. Selena He

Description: This project is a mobile application for Android and iOS that predicts whether or not a user has COVID-19. Additionally, this project tracks how many people are confirmed to have COVID-19, recovered from COVID-19, and killed by COVID-19 within the United States of America. Furthermore, this mobile application displays the latest news relating to COVID-19 and the

nearest national health centers on a map.

Merit: Our project is used to predict whether or not an individual has COVID-19 and if he/she should visit a medical professional. The goal is to decrease the high volume of patients that the hospitals are currently facing. Finally, we also want to spread accurate information regarding COVID-19 and direct users to the nearest national health center if they are predicted to have a high probability of carrying COVID-19.

[Presentation](#)

- o *** UC-05 Autonomous Digital Cartography**

by [Jose Fabregas](#) (BSCS), [Antonio Barrios](#) (BSCS), [Noah Huck](#) (BSCS), Advisor: Dr. Jose Garrido

Description: Self-Driven Car capable of mapping a room. Vehicle will use on-board ultrasonic sensors to map and navigate the room independently.

Merit: Autonomous Home Appliances; Self-Delivery Hospital Robots; Autonomous Seafloor Mapping

[Presentation](#)

- o *** UC-06 Chest X-Ray Disease Detection w/ DL**

by [Jonathan Knobloch](#) (BSCS), [David Amanze](#) (BAACS), Advisor: Dr. Mohammed Aledhari

Description: Detecting diseases using Chest X-Rays and CNN deep learning techniques. This project harnesses deep learning methods to identify 14 different diseases by evaluating chest x-ray images.

Merit: This project looks to further the machine learning field in improving detection for diseases by using nothing more than an x-ray image and a computer. This could lead to further advancements in the medical field.

[Presentation](#)

- o *** UC-07 ChordScore**

by [Ruth Bearden](#) (BSCS), [Zsavaughn Daniel](#) (BSCS), Tadiwa Mangadze (BSCS), [Daisy Hernandez](#) (BSCS), [Austin Roberts](#) (BSCS), Advisor(s): Dr. Donghyun Kim, Dr. Jeffrey Yunek

Description: This project is a web application that automatically grades handwritten music notation for student music theory homework. It is designed to grade small, weekly assignments that contain relatively simple music excerpts common in introductory music theory classes. It will allow music theory class instructors to fill out an assignment sheet as an answer key, upload it, assign it to a class, and review the automatic grading results that ChordScore generates. For students, it will allow them to receive feedback for submitted assignments immediately on the assignment due date. ChordScore will generate grades using object detection and identification implemented with a neural network applying principles and methods used in the field of Optical Music Recognition (OMR).

Merit: To the best of our knowledge, Optical Music Recognition (OMR) has not yet been applied outside this project to music score transcription for grading music theory homework. The ChordScore application has potential to streamline the music score grading process and to spark interest in this application of OMR among college and high-school music educators.

[Presentation / More information](#)

- o *** UC-08 Deep Learning and Drug Discovery**

by [Jennifer Nguyen](#) (BSCS), Advisor: Dr. Mohammed Aledhari

Description: The goal of this project is to identify machine learning and deep learning implementations that are beneficial for Drug Discovery in the healthcare and pharmaceutical fields.

Merit: Drug discovery doesn't have to be used for one specific disease. If a drug is discovered to be used for one disease, it is possible for it to be used for another illness. There are many current cases that do so. This will save money for many healthcare professionals and time.

[Presentation](#)

- o *** UC-09 Drone Detection with Sensor Fusion**

by [Nihad Kalathingal](#) (BSCS), [Ryan Terrell](#) (BSCS), Advisor: Dr. Mohammed Aledhari

Description: We present a combined approach using computer vision and radio frequencies to detect and confirm the presence of an Unmanned Aerial Vehicle to avoid false positives classifications in the real-time classification of Unmanned Aerial Vehicles. Current state of the art implementations for drone detection are reliant on a single sensor to detect drones and often produces false positives as the sensor fails. These false positive results arise from similarities between either bio-life creatures and drones or sub-optimal visual conditions challenging the classification of these drones due to the difficulty in distinguishing between background. When detecting through optimal or sub-optimal visual conditions (like occlusion), the radio frequencies emitted from the various states of the drone will stay consistent allowing for the combination of both visual and radio frequencies to be utilized for the classification of drones. Using this combined approach of computer vision and radio frequencies will also improve detection in cases of bad weather or visibility issues where the drone will be difficult to distinguish in fog, rain, and other weather conditions. We propose an artificial neural network-based detection system which uses a deep neural network to process the RF data and convolutional neural network to process the image data. The features from these networks are inputted into another deep neural network which outputs a single probability prediction of drone presence. This allows for a sensor fusion approach where the artificial neural network relies on both the image and the RF input in order to make a prediction.

Merit: Due to the increase in technological advances with commercial Unmanned Aerial Vehicle (UAV) the need to monitor and classify these drones is increasing. Drone technology is gradually becoming cheaper and easier to obtain, the danger of misuse and hostile use of drones are also on the rise. Sites like airports are at risk if these drones go undetected. Current systems usually use a single sensor (camera/radar) to detect these drones which are not always effective. We implemented a system which effectively uses RF and camera data to improve detection results.

[Presentation](#) / [More information](#)

- o **UC-10 Playing Games with Machine Learning**

by [Benjamin Hermes](#) (BSCS), [Josh Berezinski](#) (BSCS), Efren Portugal (BSCS), [Kurtis Webb](#) (BAACS), Jay Harris (BSCS), Advisor: Dr. Jose Garrido

Description: A machine learning AI which is capable of learning to play video games with no prior knowledge or human intervention.

Merit: Our project is an example of the usefulness and flexibility of Deep Reinforcement Learning. When given an environment with a simple scoring system and input data such as watch time on a video website, advertisement click through rates, ticket sales and times for movie showings, the screen and score in Mario Kart, and many other complex scenarios, the algorithm can be trained to learn and complete repetitive complex tasks using this data.

[Presentation](#) / [More information](#)

- o **UC-11 Telemedicine Application**

by [Rohan Desai](#) (BSCS), [Ronak Desai](#) (BSCS), [Tyler Odom](#) (BSCS), Leo Hayes (BSCS), [Juan Huaca](#) (BSCS), Advisor: Dr. Ken Hoganson

Description: Telemedicine is a way for patients and doctors to communicate over the web. The application's main features include (but are not limited to): The ability for patients to schedule appointments according to a doctor's availability. One on one text chat between patients and doctors. One on one video chat between patients and doctors. Patients and doctors can upload files for doctors to view. This is our project website (Create a new account or for viewing/testing purpose of our test account, please use email:

test123@gmail.com password: test123):- <https://telemedicine-application.web.app/> This is a GitHub link to our project which would provide basic information on the features, components used, etc:- <https://github.com/Lhayes32/Telemedicine-Application>

Merit: Allowing patients to communicate online with their doctors will not only save the cost for doctors who don't need to have their facilities open at all times when it comes to meetings that could be accomplished by online tools especially when possible in these uncertain times. A future goal for the website would also save the cost for health care providers as having a platform that can connect insurance companies, doctors, patients and pharmacies in one place could be cost beneficial to all.

[Presentation / Project Website / More information](#)

- o **UC-13 Automatic Scheduling-Selection**

by [Ashton Moore](#) (BSIT), [Taylor Gordon](#) (BSIT), [Debbie Leiva](#) (BSIT), [Shakir Gilkes](#) (BSIT), [JJ Jones](#) (BSIT), Advisor(s): Dr. Ming Yang, Dr. Shirley Tian

Description: Web Development: Automatic Scheduling and Selection in Capstone Project Project to help students and instructors easily apply for and be assigned capstone projects.

Merit: Web Development Experience. Database / Web Application Experience.

[Presentation / More information](#)

- o **UC-14 Bioinformatics Software Packaging**

by [Matthew Cabral](#) (BSIT), Alex King (BSIT), Sean Pace (BSIT), Wesley Berrien (BSIT), Advisor: Dr. Ming Yang

Description: The field of bioinformatics permeates almost every aspect of our lives. From the effort to cure cancer to creating disease resistant plants that we eat every day, we see the effects throughout our daily lives. Applmage is a packaging solution designed for use in Linux environments. It consolidates all source, binaries, and dependencies for a given application. It then wraps them into a singular package, and produces a self-contained application that is distribution agnostic. This allows both terminal and graphical user interface (GUI) applications to function without any additional installations or configurations on almost any Linux distribution.

Merit: Applmage packaging of bioinformatics software enables researchers the ability to download, run, and share applications in a distribution agnostic format. In light of current events, this enables the sharing of information and processes when and where it is needed.

[Presentation / More information](#)

- o *** UC-15 CCSE Client Relationship Model**

by [Kennedy Makina](#) (BASIT), Andrew Cochran (BASIT), Ian Davis (BSIT), [Christina Bellino](#) (BASIT), [Jeff Tillerson](#) (BASIT), Advisor: Prof. Dawn Tatum

Description: CCSE has a need for a repository to manage client contacts in industry. The dean would like a repository for faculty and staff to be able to better equip users to engage with industry and keep track of all the relationship touch points that take place within the college.

Merit: CCSE will be able to identify new opportunities; improve relationships with existing clients, find new clients and win back former clients. The numerous strategic advantages like adding a personal touch to existing relationships, maintaining a repository on each client's profile will enhance customer service. The system will be able to facilitate the collection, organization and management of client's information for the benefit of the college and this can be extended to the university as a whole.

[Presentation / More information](#)

- o **UC-16 CCSE CRM database project**

by [Sean Carroll](#) (BSIT), [Matthew Luu](#) (BSIT), [Adrian Bonaparte](#) (BSIT), [Carl Lewis](#) (BSIT), [Khalil Lambert](#) (BSIT), Advisor: Dr. Ming Yang

Description: Kennesaw State University has the need for a repository to allow faculty and staff to manage and track client contacts in industry. Our Capstone group developed a solution to this problem with our CRM project, titled: Owlforce.

Merit: The purpose of our CRM Capstone project is to create a software solution that will help KSU track, record, and manage business contacts and donations. While also providing a product with the ability to easily integrate into another physical database server like mysql, postgresql, or sql server for business scaling.

[Presentation / More information](#)

- o **UC-17 CCSE Project Management System**

by [Mike Kilinc](#) (BSIT), [Jason Hazenfield](#) (BSIT), [Hannah Faissal](#) (BSIT), [Avery Brown](#) (BSIT), [Shravan Raul](#) (BSIT), Advisor: Dr. Ming Yang, Prof. Dawn Tatum

Description: Kennesaw State University's College of Computing and Software Engineering (CCSE) has requested an application that will allow KSU staff to track, manage, and review their projects and contracts for hire. The application allows administrative users to create and delete projects and users. Non-administrative users are able to view existing projects and submit new projects for approval.

Merit: A Project Management System can help speed up operations and accurately maintain a record of ongoing projects. It is important to be able to tell what projects are ongoing, eating up the budget, etc. We hope that our system will bring value to the school, and that it is built in a clear and concise way so additional features can easily be added in the future.

[Presentation / More information](#)

- o **UC-19 Student Engagement-Capturing Info**

by [Tyler Addison](#) (BSIT), [Jacob Yoder](#) (BSIT), [Norsi Onyekaba](#) (BSIT), [Tyler Commodore](#) (BSIT), Michael DiSalle (BSIT), [Vaishali Saseenthar](#) (BSIT)

Advisors: Dr. Ming Yang, Prof. Dawn Tatum, Ms. Adriana (Project Manager)

Description: Student Engagement- Capturing Information to increase student turnout. Develop solutions to engage student traffic for KSU events, talks and student organizations. These solutions should be tested and verified through data collection processes. Propose a final recommendation to the project advisor with a documented report.

Merit: None. This project was designed to gather data from current students to devise a plan to solve student engagement issues.

[Presentation / More information](#)

- o *** UC-20 The Clarity Project**

by [Jacob Barnett](#) (BSIT), [Henry Colomb](#) (BASIT), [Amari McGee](#) (BSIT), [Christian Moore](#) (BSIT), [Jack Wengert](#) (BSIT), Advisor: Dr. Ying Xie

Description: The Clarity Project aims to isolate vocals within any audio track. This is done by pairing Keras LSTM deep learning neural networks, and a custom collection of training data. This has created a model that can support

a wide range of vocal inputs and filter out various background noises.

Merit: Using machine learning to denoise vocal audio has shown a noticeable difference compared to traditional filters that have attempted the same goal. The way that machine learning distorts vocals is debatably more clear than traditional filters have shown in the past. This leans towards the prospect of machine learning for vocal isolation being a worthwhile avenue of research for better yields.

[Presentation / More information](#)

- o **UC-21 CCSE Project Management System**

by [Justin Barnett](#) (BSSWE), [Jordan Allen](#) (BSSWE), [Alicia Wille](#) (BSSWE), [Henry Homiller](#) (BSSWE), [Tanner Johnson](#) (BSSWE), [Stephen Hoffer](#) (BSSWE)

Advisor: Dr. Reza Parizi

Description: CCSE had a need for a repository to manage all their projects (capstone, contract for hire and research). The dean requested a repository for faculty and staff to better equip them to manage contract for hire, capstone and research projects within the college. This project delivers a cloud-based solution where faculty and staff have access to project information any time and anywhere. There is an easy-to-use interface that allows for viewing and updating projects as well as a dashboard with aggregated data for reports that helps with future planning.

Merit: Benefit to KSU directly as this project will help with managing and facilitating all future capstone, research and contract projects.

[Presentation / More information](#)

- o *** UC-22 CribMaster Solution Generator**

by [David Martin](#) (BSSWE), [Ryan Oliver](#) (BSSWE), [Redouane Medjek](#) (BSSWE), [Wesley Dale](#) (BSSWE), Devin Annunzio (BSSWE), Raj Patel (BSSWE)

Advisor: Dr. Reza Parizi

Description: The CribMaster Solution Generator is a software system that generates a set of custom configured industrial vending machines to store and distribute items based upon the client's needs. The system works by taking in a list of items from a client in the form of an excel spreadsheet or XML document, validating that the items have all required information (height, width, weight, etc), and then choosing machines and internal configurations to best fit the client's needs. The output of the system is a set of lists of configured machine options, ranked based on the purpose of the list, such as best ROI or smallest space consumption. This allows the CribMaster sales team member to look at multiple options and decide what is best for a particular client.

Merit: The business merit of our project is that it will save CribMaster thousands of hours of man-time, and thus hundreds of thousands of dollars. It will also expedite the process from CribMaster's client's side, as they will not have to wait hours or days for the sales staff to determine the industrial vending machine configurations by hand.

[Presentation](#)

- o *** UC-23 Enlightenment**

by [Jim Sizemore](#) (BSCGDD), [Logan Thompson](#) (BSCGDD), Matt Dwyer (BSCGDD), [Chase Peery](#) (BSCGDD), Advisor: Dr. Joy Li

Description: Enlightenment is an educational video game developed for the PC using Unreal Engine 4. The game is designed for students ages 10-12 and teaches about light and its properties, such as reflection, refraction, transparency, and opaqueness. Enlightenment was developed in conjunction

with a local 4th-grade classroom, which provided user testing, feedback, and gameplay ideas.

Merit: This project was designed to be published and used alongside teachers demonstrating light concepts to their students. The game can run on most computers with ease, which makes this a good tool to use in the classroom alongside normal education tools. Video games are very useful in engaging young students, and educational games are incredibly useful in providing learning content while stimulating their critical thinking and puzzle-solving skills.

[Presentation / More information](#)

- o *** UC-24 Estimating Rasch Model Parameters**

by Amy Hadzic (BSSWE), [Thaide Huichapa](#) (BSSEW), Stephan Joseph (BSSEW), Advisor: Dr. Reza Parizi

Description: The purpose of the project was to estimate the difficulty parameters found in the Rasch model utilizing linear regression implemented using machine learning. Our software allows users to accurately and efficiently find the difficulty parameter of each item in a fraction of the time it would take to derive the parameters utilizing traditional computational methods, all with an accuracy of over 98%.

Merit: The project presents a benefit to potential research opportunities which may rely or utilize parameter estimation. Similarly, from a business perspective, research carried out utilizing the project may be performed faster thereby minimizing wait times and reducing possible expenditures.

[Presentation / More information](#)

- o *** UC-25 GGUM model ML parameter estimation**

by Steven Garcia (BSSWE), James Lee (BSSWE), Aaron Badgett (BSSWE), Advisor: Dr. Reza Parizi

Description: Estimating parameters for a Generalized Graded Unfolding Model using a machine learning approach. The GGUM model requires four parameters to be estimated so that a model can be produced.

Merit: GGUM models currently use Algorithmic approaches to parameter estimation, which requires close to nine hours to calculate. Our machine learning approach offers a quicker approach to parameter estimation.

[Presentation / More information](#)

- o *** UC-26 Idea Creator with Survey Tool**

by [Bailey Cash](#) (BSSWE), Anthony Lee (BSSWE), Ayo Awodu (BSSWE), Evan Yott (BSSWE), Andres Riveros (BSSWE), Jonathan Depina (BSSWE) Advisor: Dr. Reza Parizi

Description: This project is a continuation of the Idea Creator platform (idea-creator.com). Phase I included a project creation tool with the ability to define, constrain, ideate, and add research to a project, with a central focus on a word mapping tool. This phase is already live and was completed by a previous Capstone group. Phase II elaborates on Phase I by adding: - Fine tuning of Phase I elements - A concept builder tool to elaborate on established ideas - The ability to upload prototypes on the idea (in .pdf, .ppt, and other common file types) - The ability to create surveys on these prototypes, deploy them to test the ideas. - The ability to view survey results in a visual way through the aggregation of data.

Merit: The purpose of the project is to create new ideas and receive thought-provoking stimulus while doing so through answering questions, receiving word suggestions, and the ability to conduct surveys. This product is highly applicable.

[Presentation](#)

- o *** UC-27 ParkinsonsVR**

by [Cody Ducleroir](#) (BSCGDD), Advisor: Dr. Joy Li

Description: A VR tool to better teach medical students empathy for patients with Parkinson's disease and other neurological diseases like it by simulating daily life of those patients.

Merit: The intellectual merit is the further understanding of Parkinson's disease as well as furthering VR development in the medical field. This project will be a stepping stone into more complex VR simulations being used for teaching applications and medical research.

[Presentation / More information](#)

- o **UC-28 Passive location detection with BLE**

by [Andrew Dameron](#) (BSSWE), [Nick Belvin](#) (BSSWE), [Marco Magana](#) (BSSWE), [Brianna Gilchrist](#) (BSSWE), [Omar Elzeftawy](#) (BSSWE), Sylvan Mayfield (BSSWE)

Advisor: Dr Reza Parizi Project Mentor: Steve Appling

Description: In the commercial HVAC controls business, it is valuable to know how many people are in each room. This can help to provide adequate fresh air ventilation and impact temperature control strategies. Our new line of HVAC room controllers have Bluetooth Low Energy (BLE) radio receivers. Since most smart phones and smart watches support BLE, we believe that it is possible to estimate the number of people in a room from a combination of the unique BLE UUID and the signal strength information available through standard BLE programming APIs. In order to accurately estimate people counts, it will probably be necessary to have receivers in each room, know the size of the rooms, allow them to communicate with each other, and utilize historical data. We would like the students to develop and test an algorithm to estimate the number of people in a room using BLE receivers without installing any custom software on personal BLE

Merit: This project is for a company called "Automated Logic" and they plan on using our findings as a starting point for their systems.

[Presentation / More information](#)

- o **UC-29 WeaveVPN: OpenVPN Without Headaches**

by [Christian Strahl](#) (BSSWE), [Alan Castle](#) (BSSWE), [Keandre Graham](#) (BSSWE), [Brianna Howard](#) (BSSWE), [Hayes Roach](#) (BSSWE), Advisor: Dr. Reza Parizi

Description: Virtual Private Networks (VPN) are an important tool in networking infrastructure and OpenVPN is the most prolific and robust open source framework for VPN connectivity. In theory, OpenVPN allows the set up of a Software Defined Network (SDN), connecting many different VPNs together. However in practice this is difficult to accomplish. WeaveVPN is a web based service for dynamically setting up and configuring an SDN, quickly, easily, and securely.

Merit: This tool has immense value for consulting companies that frequently will need to make VPN connections to clients. It also has potential for companies with large infrastructure in which VPNs form a basis for inter-connectivity. Finally it also has potential as a DevOps tool for managing connections between various developers and servers.

[Presentation / More information](#)

Academic courses graduate (e.g. capstones, games, innovative special topics projects, other course projects) (12)

* Candidates for the best project award

o **GC-01 Campus Cop**

- o by [Charishma Macherla](#) (MSCS), [Shwetha Adoni Prasad](#) (MSCS), [Neeraj Sharma](#) (MSCS), Advisor: Dr Xiaohua Xu

Description: The drone provides live streaming of scenes on college campus (best suited for secured government institution for monitoring threat) The AWS face ReKognition is used to analyse live streaming of videos. It helps in recognizing unauthorized person, describing a potential suspect, suspicious activities. Alexa is integrated with the lambda function and lambda function calculates and reads the result of face recognition.

Merit: It will prevent robbery/assaults on students. If developed fully, it will be helpful for cops to track places where they cant go.

[Presentation / More information](#)

o * **GC-02 Backdoor Attacks**

- o by [Bhavana Pateriya](#) (MSCS), Sowmya Kari (MSCS), Priyanka Velu (MSCS), Advisor: Dr. Xiaohua Xu

Description: Because of so many layers, Deep Neural networks (DNN) become like a black box which is difficult for us to understand and hence DNNs are vulnerable to hacks and deception. We know how a DNN will behave on a set of trained data but what about untested data? We have no idea about that. By identifying patterns that these systems use to function, attackers can modify inputs to DNNs in such a way that the DNN finds a match that we would not recognize. Such a manipulation is termed as "Trojans". These trojans are hidden patterns that have been trained into DNN model that produce unexpected behavior which can't be detected unless there is a trigger in input. We present a methodology capable of detecting false data crafted to insert backdoors and repairing the model.

Merit: The presented approach considers the previous works done regarding such types of attack on NN and proposes a way to tackle the attacks. It's useless to use a model that doesn't make sense. It's also dangerous to deploy in the real world if the risks are high. Also, we can create adversarial inputs to any known network today. Many algorithms have been specifically developed for this purpose alone. Below are few examples of attacks on DNN and the threats they present. 1)Unauthorized person can make a one hundred dollars check and cash it for ten thousand dollars. Unauthorized person can rob a bank and A.I could report that it's 99% sure the robber is someone authorized. 2)Its also applicable in sentimental analysis. By simply replacing certain words with their synonyms, a model could say that a negative sentiment is a positive one or vice versa. It's a disaster for autistic person if he makes decisions on how to act based on opposite information. 3)Attackers could target autonomous vehicles by using stickers or paint to create an adversarial stop sign that the vehicle would interpret as a 'yield' or other sign.

[Presentation](#)

o **GC-03 Sentiment Analysis on Amazon Review**

- o by [Neha Gosavi](#) (MSCS), Sanju Timsina (MSCS), Sumedha Inamdar (MSCS), Lakshmi Sri Sowmya Javvadi (MSCS), Advisor: Dr. Xiaohua Xu

Description: Project Name: Amazon product Reviews and Discovering Sentiment using Byte LSTM on AWS. Description: In this project, In this identifying the review of the Amazon Product user and process them and classify them. Using this Byte code LSTM model, It can classify the reviews as positive or negative. They are also very data efficient. When using only a

handful of labeled examples, our approach matches the performance of strong baselines trained on full dataset. We also demonstrate the sentiment unit has a direct influence on the generative process of the model. We are training out Amazon review data on AWS model so that data can be trained in the faster manner. It's absolutely necessary for any organization to have an automated process which can spot such reviews and improve their products. Using this tool 86% accuracy has been achieved.

Merit: This project will enable the industries to get the general idea of the product by analyzing the entire review set without having to go through each and every one of the reviews. It could also be applied in other domains such as document analysis, industries/ business. By using the AWS we can improve the accuracy of predictions of sentiments.

[Presentation / More information](#)

- o *** GC-04 Smart- Pay: No Cashier Pay System**

by Farid Khan (MSCS), Chris (MSCS) Advisor: Dr. Mohammed Aledhari

Description: The advances in machine learning has opened a new spectrum of applications. In retail stores we find cashier systems that are either labor intensive or time- consuming. We propose Smart- Pay as a novel cashier less payment system. Smart - Pay uses machine vision, smart devices and mobile system to automatically charge the user at point of sale. Such systems can bring high productivity and efficiency for the user. We expect that through further testing and higher accuracy results, such systems can gain broad deployments and application in areas related to retail, marketing and entertainment industry.

Merit: The proposed solution has industry application. It is the use of advances in machine vision and smart devices to design cashier less payments at retail store. the user can simply walk in the store, pick the required items and exit the store. the user will be billed automatically through the configured back-end. Smart- Pay uses machine vision system to verify the user face and classify the user's items. We expect such system to gain broad application with the spread of smart technology and high convenience to the client.

[Presentation / More information](#)

- o *** GC-05 Smart Traffic Light**

by Tony Niebank (MSAS), Andrew Henshaw (PhD. Data Science), Advisor: Dr. Mohammad Aledhari

Description: Create a traffic light control model based on Machine Learning algorithms. This project is based on simulated street traffic using SUMO, <http://sumo.sourceforge.net/>. We create simulated inputs based on traffic activity and determine the light conditions needed to optimize traffic flow.

Merit: Most adaptive traffic signals operate a part of a large network of sensors and signals, the sensors collecting traffic data across a large area of feeder roads and main traffic arteries. This data is then used to calculate optimal signal timing sequences to maximize traffic flow through the area. This method, while cheaper than building new roads, still requires a large infrastructure of sensors, networks and databases to operate. Conventional and area based adaptive systems require periodic traffic studies, recalibration, and ever-growing memory and hardware demands, initial capitalization for a large area can be prohibitive. One of the more ambitious systems under development by the National Transportation Safety Board (NTSB), will combine fixed ATMS systems with GPS and autonomous driving technology in vehicles to manages traffic throughput.

[Presentation](#)

- o *** GC-06 CCSE Project Management System**

by [Geetika Bajaj](#) (MSIT), [Nikita Talole](#) (MSIT), Elizabeth

Gladstone (MSIT), [Casiana Mba Maye](#) (MSIT), Advisor: Prof. Dawn Tatum
Description: This capstone project requires us to create a repository which will manage the past, ongoing and future projects for the CCSE department. The objective of this project is to build a user interface that will let users add new projects to the database, search projects in the database based on search criteria, update project details when necessary and delete the projects from the database. These operations are going to be role-based and will be restricted based on the account login. Having a repository for faculty and staff will help them better equipped to manage the contract for hire, capstone, and research projects within the department. The application will also have the ability to print reports i.e. export the project details into an excel.

Merit: This is going to be a one-stop application that will help faculty and students to look at all the external projects (both past and ongoing) in the CCSE department. This will help faculty have easy access to the database repository of all the projects and contracts. The application will help students look at what kind of projects and researches have been done in CCSE. Main functionalities of our application: - The interactive project forms in the application are easy to use. - Secure login will prevent unauthorized personnel to access the project information. - Ability to export the project details into an excel file to create reports. - Search filters to filter the project data based on any criteria In the future, the application can be updated based on any new functionality requirements.

[Presentation](#) / [Website](#) / [More information](#)

- o * **GC-07 CCSE Student Engagement Research**

by [Nkonge Ngwesse](#) (MSIT), [Marcquette hughes](#) (MSIT), Advisor: Dr. Ying Xie

Description: This project focus is on how the CCSE department of KSU can improve the attendance and engagement of students to events, clubs, meetings organized by the department. Over the past few years, the department has faced challenges getting students to attend or get involved in events such as the Hack-A-Thon as well as attend speaking events and project presentations from company representatives. The lack of attendance from students puts a poor image of KSU to these companies which doesn't encourage them to attend. The previous solutions the department had tried were providing food and drinks, posting on their social media pages such as Facebook. So our Capstone project this semester is to provide other alternative solutions, test it to see if it works and present it to the department.

Furthermore, the objective of these project include: Determine the best way to increase attendance at events. Prototype solutions and test them during the spring semester Make final recommendations by end of the spring semester Documentation should include transition information necessary to allow another capstone team to continue the project in fall 2020, if necessary
Merit: The proposed research demonstrates how the following description quantitative research methods could be used to improve student involvement and participation in various events organized by the CCSE department. Based on some of the preliminary results the department could use to results to better reorganized the various events organized and focus on a target student population as well to get positive responses, there encouraging the department and sponsoring companies to continue hosting events for students.

[Presentation](#) / [More information](#)

- o * **GC-08 MyCollab Project management Solutio**

by [Ambika \(Amica\) Lohani Sharma](#) (MSIT), [Adeleke Asekun](#) (MSIT), [Nathaniel](#)

[Okogie](#) (MSIT), [Wajid Ali](#) (MSIT), Advisor: Dr. Lei Li

Description: The College of Computing and Software Engineering has a need for a repository to manage all our projects. The requirement is to have a repository in place for faculty and staff to be able to use to better equip us to manage our contract for hire, capstone and research projects within our college. Objectives are to build the structure and user interface that will allow users to input data. The first phase needs to allow administration users the ability to input data and print reports. For this purpose, the project team will implement an open source project management solution called "MyCollab". This solution will be used by end-users to manage projects and documents. The scope of the project will include planning, implementation, and testing. The scope will also include the completion of all documentation including end-user instructions. Completion of the project will occur when the software has been approved and accepted by the project owner.

Merit: The project demonstrates how projects can be managed more efficiently using the use of MYCollab. The finding from this project can be useful for IT professionals, project managers and researchers to understand better ways of managing projects that includes the management of programs users and database system.

[Presentation / More information](#)

- o **GC-09 Social Media for Cybersecurity**

by [Sierra Wilson](#) (MSIT), [Victor Tekobo](#) (MSIT), [Gachena Denu](#) (MSIT), [Michael Woodie](#) (MSIT), [Paris Brown](#) (MSIT), Advisor: Dr. Lei Li

Description: The purpose is to analyze the connection between Social Media and Cybersecurity. Our goal is to pull Twitter data labeled/tagged as "Breaking News", find any/all tweets that are relevant to Cybersecurity, then analyze the data; percentage of tweets that are Cybersecurity, how these tweets are spread (retweeted), other tags associated with the tweets, peak times when tweets are created/retweeted, and any additional information that could be determined to help provide insight on how Cybersecurity alerts function within Social Media. Once we pull the data, we will use python to analyze and complete most of the work. We will create a website to publish our findings, along with our project plan, milestones, etc. The data and analysis that will be published will be statistics of the data, tags used with the tweets, but no actual tweeted user data.

Merit: Business Merit: The goal is to identify key words that relate to cybersecurity tweets and how this information is dispersed within social media. For the analysis part we used Python and data visualization will be done using Python/Power BI. This work will be used to help enhance this push of cybersecurity information leveraging social media.

[Presentation / More information](#)

- o **GC-10 Technology Outreach Project Status**

by Ananda Kunwar (MSIT), Amani Qutaish, Hope Ewing, Michael Rea Advisor: Prof. Veronica Trammell

Description: A website that allows members of the Technical Outreach Department to input data in a single location to easily view and update project statuses.

Merit: This research tackles the outstanding problem of reporting for The Technology Outreach department. As they spend a fair amount of time producing status reports, it is worth considering ways to make it faster to write them. Better yet, automate as much reporting as possible. This research will be the first to create a standard status report template, and use the data input to populate the project progress.

[Presentation / More information](#)

- o *** GC-11 Technology Training ITIL Assessment**

by [Swati Kulkarni](#) (MSIT), [Alex Brown](#) (MSIT), [Cathy Jackson](#) (MSIT), Eugene Thorncroft (MSIT), Advisor: Dr. Lei Li

Description: The Technology Training team offers a variety of service for faculty, staff, and students. Background: The technology training team offers training through face-to-face, online, and one-on-one support. Surveys are provided for face-to-face workshops, but not other services. The survey has been updated for logistics, but not content. The surveys are viewed, but no formal process is in place to map the data. Problem statement: The team is always looking for ways to improve the all services to be more efficient while continuing to support the needs of the campus. However, due to time and resource constraints, the team has little bandwidth available to assess and make improvements. Objectives: 1. Improve training processes. 2. Reach more participants, especially students 3. Develop feedback which allow for continuous improvements (reduce staleness)

Merit: The Technology Outreach (TO) department is an integral team of University Information Technology Services (UITS) at Kennesaw State University. Providing support, innovation, and empowerment within the university's dynamic environment is the mission of this department. The primary objective of our Capstone project is to help the TO department improve and broaden their businesses processes and service areas by implementing the principles of CSI approach of the ITIL framework. The process involves holistically evaluate current methods, identifying areas of improvement, and executing the recommended changes. Thus, this project helps to strengthen the department's mission and vision in a long run in an incremental phase. The changes made will enhance productivity, quality, competence, and standards while empowering all users (employees, students, and faculty) within the organization to feel more capable and confident. The department will also save costs as well as improve overall efficiency. Our team's ITIL acumen combined with our detail-oriented work ethic will allow the Technology Outreach department to provide value to KSU in a revolutionary way and allow the organization to soar to new heights in years to come.

[Presentation / More information](#)

- o **GC-13 Git Contribution Measurement ToolMS**

by [Israel Chen](#) (MSSWE), Sathya Chekuri (MSSWE), Paul Thim (MSSWE), [Jasmine Moore](#) (MSSWE), Lashon Hudson (MSSWE), Yoseph Hailemariam (MSSWE), Tarius Bray (MSSWE)

Advisor: Dr. Reza Parizi

Description: The project solves a novel problem in academia. In software engineering education, many curricula often require collaborative-group projects to provide students hands-on experience. However, instructors evaluating the team's performance often have to rely on their subjective judgment of the product, documentation, and team member testimonials. This creates a black-box nature in terms of how accurate a member's contribution is evaluated for the team project. As software development moves towards automated DevOps (with less and less documentation), it is critical, now more than ever, to engineer a novel solution for this problem. This project's vision is to utilize decentralized collaborative software development systems and platforms such as Git and create a tool that can continuously provide detailed visualization of each team member's contributions (i.e. performance) and also provide an objective score of the contribution based on

an evaluation metric.

Merit: The project solves a novel problem in academia.

Presentation

Graduate Research (9)

* Candidates for the best project award

- o **GR-01 credit card approval analysis**

- o by [Hui Xia](#) (MSCS) Advisor: Dr. Selena He

Description: Nowadays, there has been an increasing number of people applying and using credit card. Along with this, there has been concerns on credit card default. Credit cards can be a convenient means for payment, a useful tool for learning financial responsibility, a resource in case of emergencies, a way to establishing good credit history and to gain greater access to credit in the future. Excessive credit card debt and late payments can damage user's credit ratings and make it more difficult for them to obtain credit down the road. Inexperience with credit and a lack of personal financial knowledge are likely to place some users at greater financial risk for having large, and perhaps unmanageable debts burdens. Therefore the factors that have significant effect on the approval of one's application for a credit card should be taken into consideration to avoid delinquencies over time. The main purpose of this project is to build a logistic regression model and use it to obtain a classification rule which is used to predict whether a credit card application can be approved.

Merit: Help client to improve and take care of their credit ratings, gaining personal financial knowledge; avoid worker delinquencies like fail to approve some application or mistakenly approve some credit card application; provide guidance to the advertisement department to lock down the target group, thus reduce cost and increase benefit

Presentation / More information

- o *** GR-02 Group Key Exchange without TTP**

- o by Youdom Kemmoe Victor (MSCS), Yongseok Kwo Kwon, Seunghyeon Shin (MSCS), Rasheed Hussain, Sunghyun Cho, Advisor: Dr. Junggab Son

Description: This project aims at devising a security protocol that will allow a set of IoTs to establish a common cryptographic group key that they can use to encrypt/ decrypt messages exchanged. Nowadays, IoTs (smartwatches, connected weighing scale, connected fridges, etc.) handle more of our private data, such as our sleep pattern. And they interact with each other by exchanging messages. Current approaches based on the client-server model are flawed. Companies handling those servers (Trusted third parties, TTP) may go out of business, which can render our IoTs obsolete, or they can sell data transacting through those servers without owners' consent. Hence, the need for a protocol that does not rely on TTP.

Merit: - The proposed scheme allows an asynchronous group key exchange without the need for a TTP. This means all members do not need to be online during the key exchange process. Well known protocols such as TLS do not provide this property. - The proposed scheme ensures post compromised security against passive attackers. It is possible for a group to re-establish a secured group key even if a member of the group was compromised (hacked). This property is currently supported by a few protocols such as signal and asynchronous ratcheting tree. However, all of them requires the use of a TTP - The proposed scheme supports the addition and removal of members to a

group with strong security guaranteed. This means every time a new IoT is added to the group, it will not be able to decipher messages exchanged prior to its integration. When a member is removed from a group, it will not be able to decipher messages exchanged after its removal

[Presentation](#)

- o **GR-03 Improving Solar Panel Efficiency**

by [Sumedha Inamdar](#) (MSCS), Advisor(s): Dr. Sandeep Das, Dr. Sumit Chakravarty, Dr. Yong Shi.

Description: Improving Solar Panel Efficiency by predicting the Maximum Power Point Tracking. With the global warming and environmental pollution increasing, it is of high importance that we adapt to clean and sustainable energy. Solar energy is the first that strikes our mind because of its clean nature and abundance. Harvesting solar energy has some challenges associated with it such as improving the efficiency of photovoltaic (PV) module and making sure that the solar array operates at maximum power point (MPP). Maximum power point tracking (MPPT) techniques play a major role in efficiency improvement of the PV system. There have been various tracking techniques/ algorithms built to make the PV array work efficiently that is, to extract maximum power out of PV array by identifying and tracking MPP on its power-voltage (P-V) curve. Therefore, it is of high importance to use a good and effective algorithm to find the MPP with high degree of certainty and with minimum amount of time. The existing algorithms track the entire P-V curve to identify the MPP. Most of the algorithms have three particle trackers that trace the P-V curve until they converge at global maximum which happens to be the global MPP of the P-V curve. As the particles traverse the entire P-V curve until they all converge, to detect the MPP, it is a time-consuming task. The project proposes a method to optimize the existing algorithm by trying to predict the zone where the MPP could lie. After predicting the zone, the existing algorithm can be applied to the zone / region where MPP could exist. This can drastically reduce the time needed to find the MPP at which the solar PV array operates. Also, the MPP dynamically keeps varying depending upon changes in the environmental irradiance, temperature and partial shaded condition (PSC). Thus, predicting of the zone must be dynamic in nature, which adds more challenge. The algorithm is double layered grouping, by first predicting the region in which the MPP lies using random forest and then considering the training data that belongs to that region alone to predict the more accurate region.

Merit: With the better prediction of MPP(Maximum Power Point) at which photovoltaic panel works better output can be obtained by solar system which will improve efficiency.

[Presentation / More information](#)

- o **GR-04 Intrusion Detection in IoT Network**

by [Madhuri Gurunathrao Desai](#) (MSCS), Advisor: Dr. Yong Shi

Description: I am concentrating on Intrusion Detection in the Internet of Things. IoT devices, which are always connected to the internet, are more susceptible to botnet attacks. To prevent such attacks, machine learning models can be built to classify normal network traffic from the once caused by botnets. Also, dimensionality reduction can be used to reduce the time taken to train data. During my tenure, I plan to research on how we can detect the intrusion traffic caused in the Internet of things (IoT) network by botnets. I am planning to use two different DR algorithms – PCA and F-Score, and two different classification methods – Decision Tree and Random Forest. With this,

I plan to measure which classification algorithm works best for the chosen dataset and which DR methods yield better accuracy while reducing the processing time. Added to this I plan to use clustering algorithms like K-Means clustering to see how unsupervised learning behaves for such dataset and whether that could be a way to identify intrusions.

Merit: Internet of Things (IoT) technology has been utilized in many areas including health monitoring, energy management, transportation, home automation or manufacturing. However, IoT devices are prone to various physical, network and application layer attacks which may lead to business interruptions, privacy violations or even physical injuries. The implications of these attacks are not limited to the users of these systems; they create significant problems for all other information systems as the compromised devices enormously increase the damage capacity of botnets. So, it is very important in current to have an effective Machine Learning model that can be utilized to detect any intrusions. Moreover, these ML models need to be explainable so that admins can take action. Here the proposed research demonstrates that classification algorithms and low-dimensional features can effectively distinguish normal IoT device traffic from different attack traffic. This project envisions the generic explainable model which can be deployed to all IoT networks with whose help attacks can be detected and prevented.

[Presentation / More information](#)

- o *** GR-05 OutlierDetection using RandomForest**

by Divya Pramasani Mohandoss (MSCS), Advisor: Dr. Yong Shi

Description: In this project we designed a model to detect the Outliers . As technology changes constantly, it is becoming difficult to track the behavior and pattern of Data. To come up with the solution we used machine learning, it becomes feasible to automate this process and to save some of the intensive amounts of labor that is put into detecting Outlier manually.

Merit: In this project we proposed a robust framework to process large volume of data, the functionality of framework can be extended to extract real time data from different desperate sources. The extracted data is then used to build strong analytical model. To improve the analytical accuracy of fraud prediction, we have implemented three different analytical techniques.

[Presentation / More information](#)

- o **GR-06 Smart Contract for Learning**

by Farid Khan (MSCS), Advisor: Dr. Xiaohua Xu

Description: There is a growing demand for education content on the internet. Further the industry requires technical and specific IT skillset to handle the growing use of technology. We propose a smart contract mechanism to provide transaction of digital education content (DEC). The system provides authentication, security and anonymity. It doesn't require a third party to authenticate the transaction or the e-content. These models can be used to train employees or public learning through decentralized network.

Merit: This technology can have broad application. As we enter in the information age, technical skills are coming in demand. the public wants access to such learning platforms, as recent surveys highlights. Smart Contract is a contending solution as it offers high flexibility to the host (education content provider) and high- security and convenience for the client.

[Presentation](#)

- o *** GR-07 Analysis of Mental Illness with VR**

by [Christopher Baxter](#) (MSSWE), Advisor: Dr Joy Li

Description: Virtual Reality, while a hot trend in the entertainment industry, is also becoming a large area of study in the field of mental health. DaveG is a

serious game based in a VR environment designed to provide mental health professionals with a visual tool to help augment their current practices of diagnosing mental illness. Through the use of mood induction, DaveG allows a professional to observe a subject's reactions to mental stimuli, as well as physical activities, in order to assess their mental state.

Merit: While other projects have proven that Virtual Reality can be used to assist in the treatment of mental illness and can induce emotional responses, our program is the first to show that it can be used to assist in the diagnosis of mental illness. No other study has explored this aspect. Ours is also the first to report how a person might react after undergoing emotional mood induction. Also, no other program has explored the concept of psychomotor retardation, the impairment of reaction time brought about by depression, in a VR environment before.

[Presentation / More information](#)

- o *** GR-08 Comprehensive Profile Modeling**

by Honglai Peng (MSCS), Advisor(s): Dr. Selena He, Dr Meng Han

Description: In this project, we will create a new model which can accomplish the tasks of face detection, gender classification, age classification, emotion classification and more simultaneously in a single integrated module.

Merit:

[Presentation / More information](#)

- o **GR-12n Text Based Rating Prediction**

by [Bhawana Sharma](#) (MISIT), [Samantha Russo](#) (MSIT), Advisor: Dr. Ying Xie

Description: This project aims to predict user rating based on ordinal scale for Amazon products review text. For our prediction we are using a novel loss function called Ordinal Hyperplane Loss (OHPL) solution proposed by Dr. Bob Vanderheyden and Dr. Ying Xie. The proposed solution enables deep learning techniques to be applied to the ordinal classification problem on both structured and unstructured data.

Merit: Being able to predict user rating based on text review accurately can offer insight for user preference / interest. This prediction model can be used to determine rating from different sources on unrated review data. Predicted data can be used by businesses to improve product offerings and improve customer satisfaction.

[Presentation / More information](#)

Undergraduate Research (6)

* Candidates for the best project award

- o *** UR-01 AI Melanoma Detection**

o by [Ava Podrazhansky](#) (BSCS), [Rebekah Roepke](#) (BSCS), Jennifer Nguyen (BSCS), Advisor: Dr. Dan Lo

Description: This project examines methods of data cleaning and different machine learning models to predict early cases of melanoma.

Merit: With the rise in premiums and deductibles for health insurance, the availability of affordable medical care is nearly out of reach. Because of diminishing coverage, more people opt to visit medical doctors on only an extreme need basis. In dermal abnormalities, like Melanoma, there is neglect in treatment due to the high medical costs for consultations and the lack of

public knowledge of symptoms. In this study, we propose a software approach to mitigate this problem, which utilizes artificial intelligence with high-level image processing to diagnose and categorize common forms of Melanoma

[Presentation](#)

- o *** UR-02 Automatic Fake News Detection**

by Jordan Hasty (BSCS), Advisor: Dr. Dan Lo

Description: This project implements a fake news detection model to identify deliberate disinformation in news articles. The model utilizes machine learning and natural language processing techniques to analyze news articles and related social media posts to determine the probability that a given news article contains fake news.

Merit: The project implements a model to detect fake news, which can be used to suppress the propagation of deliberate disinformation in social media.

[Presentation](#)

- o **UR-03 Mental Illness Detection Chatbot**

by [Ava Podrazhansky](#) (BSCS), [Hao Zhang](#) (BSCS), Advisor: Dr. Meng Han, Dr. Selena He

Description: This is a mobile application with a chatbot that detects a user's mental illness and also aims to improve users' moods over time. The application tracks the user's mood changes over time and gives the user with a summary on a profile screen.

Merit: Treatment for mental illness is in high demand. For some it is necessary, but it is inaccessible. With the developments in artificial intelligence, chatbots have become advanced and reliable. Presently, chatbots can complete semantic analysis of the text that the user inputs, to provide a more tailored response, which promotes chatbots more popular as a powerful tool. One of the most popular applications of chatbot is digital counselling. There are several mobile applications (Woebot, Wysa, Pacifica) offering chatbots acting as therapists. These are text-based chatbots that use a variety of free responses and selectable, predetermined responses from the user. They use data from a user's daily check-ins and a variety of mental illness surveys. By relying on surveys and simple check-ins with predetermined responses, these applications provide a less personal experience to the user. Additionally, by only using text data, they miss key information from the user, like emotional queues, that would normally be noticed by a human. Hence, to overcome these weaknesses, we propose a method to develop a model with greater accuracy to predict a user's mental illness using more mobile application features. We will incorporate emotion detection and speech pattern analytics using audio recordings and video.

[Presentation](#)

- o *** UR-04 Vehicle License Plate Recognition**

by Zekai Fei (BSCS), Advisors: Dr. Selena He and Dr. Meng Han

Description: The project includes a set of programs that can automatically detect vehicle license plates and recognize the characters from the plates. The project works for most images and is working on detecting license plates from videos.

Merit: Machine Learning, image processing

[Presentation / More information](#)

- o *** UR-12n App Ordinal Classification**

by [Kayla Dougal](#) (BSIT), [Jean Rodriguez](#) (BSIT), [Jovanny Duran Salgado](#) (BASIT), [David Hinojos](#) (BSIT), Advisor: Dr. Ying Xie

Description: Our project's objective is to take a complex dataset such as an image dataset and apply OHPL as the decision layer to categorize the images into the different levels. The dataset chosen was for Diabetic Retinopathy and

the classifications ranged from normal to proliferative.

Merit: The success of our project will have great impact in the medical community and can be scaled to other industries that rely on ordinal data to make predictions. In the case of our project, we leveraged labeled data to train the model which learns patterns and shapes from each individual image. The model then takes labeled data that has not been classified and assigns a classification. Leveraging Deep Learning, doctors will be able to understand the progress of a patient who has diabetes and determine if they will lose their ability to see due to diabetes.

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- o *** UR-18n Edge Computation for SDR-SDN**

by Samuel Helwig (BASIT), Brandon Gocool (BASIT), Olutayo Taiwo (BASIT), Daniel Pierce (BASIT), Brad Barnett (BASIT), Advisor(s): Dr. Sumit Chakravarty and Dr. Ying Xie

Description: Current implementations of Internet systems are very hard to be upgraded. The ossification of existing standards restricts the development of more advanced communication systems. New research initiatives, such as virtualization, software-defined radios, and software-defined networks, allow more flexibility for advanced computations like Edge Computation. We propose that the convergence of these overlying and complementary technologies. In recent years, independent research initiatives have proposed software-based architectures and devices to make networks more flexible.

Network virtualization allows a single real machine to run several virtual machines. Software-defined radios (SDRs) implement most of the communication functions in software, except analog-to-digital and digital-to-analog conversion. Software-defined networks (SDNs) permit routers and switches to run simple programs, which can alter forwarding rules, modify a packet or drop it. SDR -SDN is used in tandem to perform edge computing.

Merit: This project prepares us for the shift from traditional networks into software defined networks that is currently taking place. It can be used to test different network configurations within our SDR-SDN platform. Simulations can be done in software requiring very few resources, then based on those results, a decision can be made on whether or not to spend more resources on actual implementation.

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