



Fall 2019 C-Day

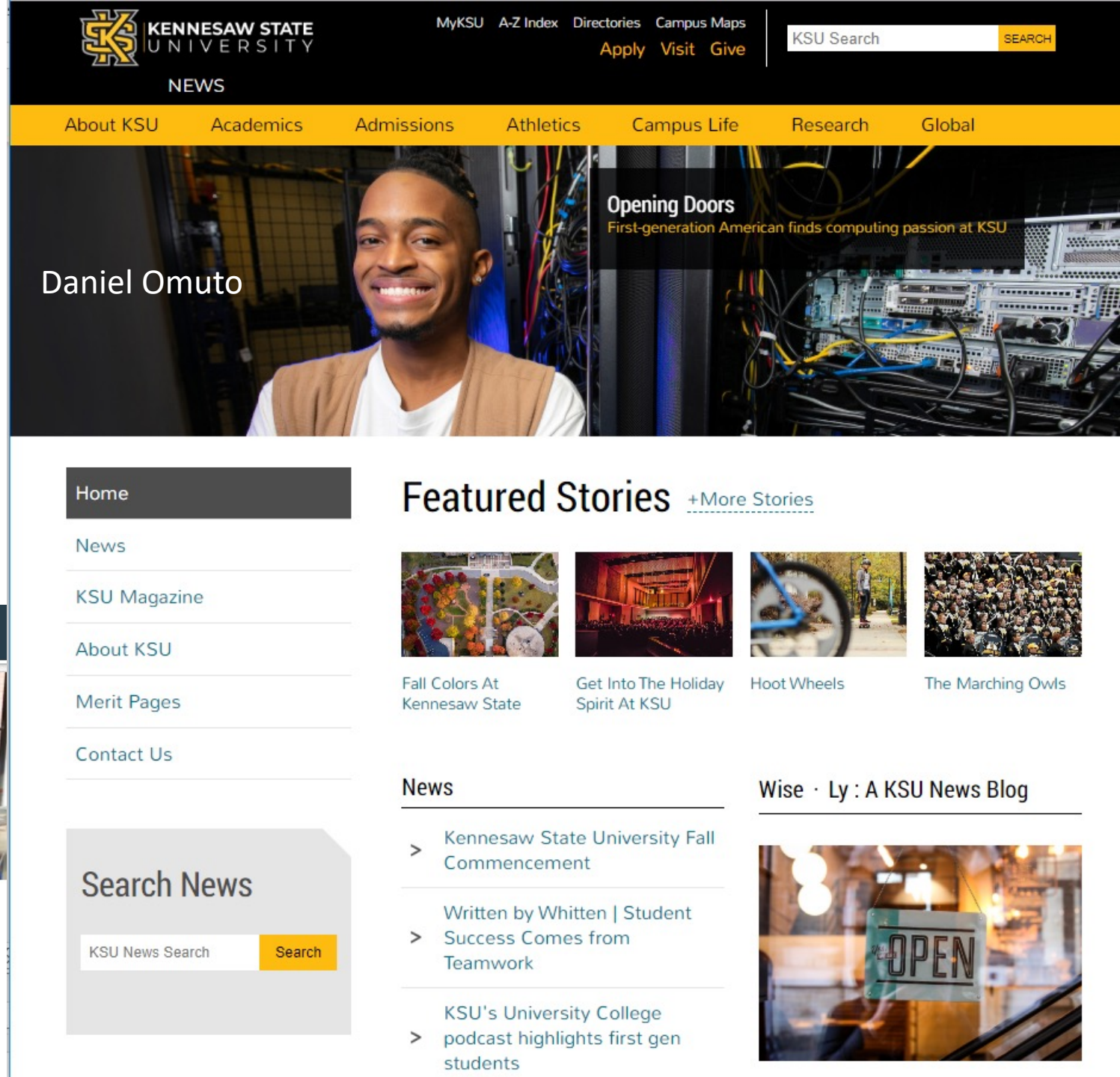
CCSE in the News

Winners, watch for an email from Travis Highfield who is writing a story about the C-Day.

LinkedIn



The LinkedIn profile for the College of Computing and Software Engineering at Kennesaw State University is displayed. The header includes the LinkedIn logo, a search bar, and navigation icons for Home, My Network, and Jobs. The main image shows a group of students in a computer lab, with one student in the foreground holding up a smartphone. The profile name is "College of Computing and Software Engineer..." and it is located in "Higher Education · Marietta, Georgia" with "126 followers". The bio states: "CCSE leverages computing, education, and research to empower people and improve lives in Georgia and around the world." A "Visit website" button is at the bottom.



The screenshot shows the Kennesaw State University website. At the top, there is a navigation bar with links for MyKSU, A-Z Index, Directories, Campus Maps, Apply, Visit, and Give. A search bar is on the right. Below this is a "NEWS" section with a yellow background and links for About KSU, Academics, Admissions, Athletics, Campus Life, Research, and Global. The main content area features a large image of Daniel Omuto, a young man smiling in a server room, with the text "Daniel Omuto" overlaid. To the right of the image is a headline "Opening Doors" with the subtext "First-generation American finds computing passion at KSU". Below the main image is a "Featured Stories" section with a "+More Stories" link. It contains four story thumbnails: "Fall Colors At Kennesaw State", "Get Into The Holiday Spirit At KSU", "Hoot Wheels", and "The Marching Owls". A "News" section follows, listing "Kennesaw State University Fall Commencement" and "Written by Whitten | Student Success Comes from Teamwork". At the bottom, there is a "Search News" section with a search bar and a "Search" button. A "Wise · Ly : A KSU News Blog" section is partially visible at the bottom right.



3rd Place in Computing Showcase

For winning third place at the College of Computing and Software Engineering Computing Showcase (C-Day) event in one of the following categories: Undergraduate Capstone; Graduate Capstone; Undergraduate Research; Graduate Research;

Best Undergraduate Capstone Project

UC

Best Graduate Capstone Project

GC

Best Undergraduate Research Project

UR

Best Graduate Research Project

GR

RECIPIENT ID

DATE



2nd Place in Computing Showcase

For winning second place at the College of Computing and Software Engineering Computing Showcase (C-Day) event in one of the following categories: Undergraduate Capstone; Graduate Capstone; Undergraduate Research; Graduate Research;

Best Undergraduate Capstone Project

UC

Best Undergraduate Research Project

UR

RECIPIENT ID

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2nd Place in Computing Showcase

For winning second place at the College of Computing and Software Engineering Computing Showcase (C-Day) event in one of the following categories: Undergraduate Capstone; Graduate Capstone; Undergraduate Research; Graduate Research;

Best Graduate Capstone Project

GC

Best Graduate Research Project

GR

RECIPIENT ID

DATE



1st Place in Computing Showcase

For winning first place at the College of Computing and Software Engineering Computing

† Showcase (C-Day) event in one of the following categories:

† Undergraduate Capstone; Graduate Capstone; Undergraduate Research; Graduate Research;

Best Graduate Capstone Project

GC

RECIPIENT ID

DATE



KENNESAW STATE
UNIVERSITY
COLLEGE OF COMPUTING
AND SOFTWARE
ENGINEERING



1st Place in Computing Showcase

For winning first place at the College of Computing and Software Engineering Computing Showcase (C-Day) event in one of the following categories:
† Undergraduate Capstone; Graduate Capstone; Undergraduate Research; Graduate Research;

Best Graduate Research Project

GR

RECIPIENT ID

DATE



1st Place in Computing Showcase

For winning first place at the College of Computing and Software Engineering Computing Showcase (C-Day) event in one of the following categories:
† Undergraduate Capstone; Graduate Capstone; Undergraduate Research; Graduate Research;

Best Undergraduate Capstone Project

UC

RECIPIENT ID

DATE



1st Place in Computing Showcase

For winning first place at the College of Computing and Software Engineering Computing Showcase (C-Day) event in one of the following categories:
† Undergraduate Capstone; Graduate Capstone; Undergraduate Research; Graduate Research;

Best Undergraduate Research Project

UR

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KENNESAW STATE
UNIVERSITY
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ENGINEERING



Computing Showcase NCR Award

UC-13 IT Capstone NCR/ Anti-Skimming solutions for NCR and USSS

Alex Philavong (BSIT) Oswaldo Armas (BSIT) Seth Carroll (BSIT), Lawson Garlin (BSIT), Sol Kim (BSIT)

Advisor: Dr. Ying Xie

RECIPIENT ID

DATE



Computing Showcase Alumni's Choice Award

For being chosen as the best or most relevant Undergraduate Capstone project by Alumni of the College of Computing and Software Engineering.

UC

RECIPIENT ID

DATE



KENNESAW STATE
UNIVERSITY
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AND SOFTWARE
ENGINEERING



Fall 2019

C-Day

December 5, 2019



Fall 2019 C-Day Program

Thursday, December 5, 2019

Location: Marietta Campus - Atrium (J) and Design 2 (I2) buildings

C-Day Home Page

Return to the C-Day home page.

Fall 2019 Winners

View the Fall 2019 C-Day winners.

Flash Session Presentation

Download the C-Day Flash Session Presentation.

TIME	EVENT
4:00 pm - 4:30 pm Atrium (J) building 1st & 3d floors	Student check-in: Atrium (J) building 1st floor lobby followed by set-up :Atrium (J) building 3d floor (presenters only)
4:30 pm - 5:00 pm Atrium (J) building 1st floor lobby	Check-in judges, industry partners, Networking. Students, bring your resume.
5:00 pm - 5:35 pm Design 2 (I2) Auditorium	Welcome from Dean Preston followed by Flash Session
5:35 pm - 6:20 pm Atrium (J) building 2nd and 3d floors	Judging of Student Projects Browsing
6:20 pm - 6:50 pm J-152 Atrium (J) building	Pizza and Networking. Students, bring your resume.

6:50pm - 7:00 pm Design 2 (I2) Auditorium	Recognition of Judges
7:00 pm - 7:30 pm Design 2 (I2) Auditorium	Presentation of Awards <ul style="list-style-type: none"> ◦ Best Undergraduate Project ◦ Best Graduate Project ◦ Best Undergraduate Research Project ◦ Best Graduate Research Project NCR Capstone Award Alumni's Choice Award

Fall 2019 Presentations

Judges

- Gary Cooper - Operations Manager - Technology Services - McKenney's
- Katina Cunningham - Chief Executive Officer - C3 Innovations LLC (GA) - Technology Consulting
- Andrew Greenberg - Executive Director - Georgia Game Developers Association
- Andrew Hamilton - CTO - Cybriant
- Wes Hogarth - Associate Director - IT Operations - Georgia Tech Research Institute
- Michael Isaza - Tool and Performance Engineer - Hi-Rez Studios
- Steve Jackson - Director, Software Development - Aderant
- Dan Lo - Professor - CS Department - CCSE KSU
- Roger N. Mahler - Public Sector/IoT Solutions - AT&T
- Sharon Perry - Limited Term Instructor - CS Department - CCSE KSU
- Reshma Patel - Application Development Manager - ADP
- Alex Pope - Sales Leader - Google Cloud
- Vladimir Rusanov - Development Manager - Stanley Black & Decker
- Jaspal Sagoo - Chief Technology Officer - CDC
- Jared Sanchez - Associate Producer, Creative - HiRez Studios
- Phil Schroder - Cloud Solution Architect - Fiserv
- Abdul Wahab - Software Developer - State Farm Enterprise Technology

Alumni's Choice Award

- Jake Baggs - Software Developer - State Farm
- William Forsyth - Lecturer of Information Technology - Kennesaw State University
- Sarah Hansberry - Software Developer - State Farm
- Brandon King - Head Teaching Assistant - CS 6460 - Georgia Institute of Technology

Rubrics and Acceptance Rate

Best Project in Each Category Rubric

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

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

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

- TECHNICAL: Technically sound with appropriate visual & audio fidelity(0-10)
- GAMEPLAY: Engaging & Fun, with an intuitive UI. Rules of play are clear. Includes a win/lose state(0-10)
- ORIGINALITY: Sound, Art, Design, or Code(0-10)
- Evidence of Rigor (0-10)
- 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) (29)

* Candidates for the best project award

+ Project will be featured during the Flash Session

- **UC_01 Monster Melee**
by [Sonya Rivers](#) (BSCGDD) Dani Butzen (BAACS) Amariae Hawkins (BSCGDD), Evan Williams (BSCGDD), Lukas Zubal-King (BSCGDD),
Advisor: Dr. Chao Mei
Title: Monster Melee is a fighting game in which the player's luck rather than skill determines the outcome of every match. Each round Players AND enemies are given random items which either boost or bust their attack and

defense abilities. It's the luck of the draw to see who comes out on top!

Merit: To research the addictive nature of reward systems in games.

- o **UC_02 Forgotten Will + ***

by [Christopher Plummer](#) (BSCGDD) [Luke Crowley](#) (BSCGDD)

Advisor: Prof. Rongkai Guo

Title: Forgotten Will is an action adventure title for PC that lets players explore and do battle in a charming poly aesthetic world full of quirky characters and methodical game-play.

Merit: Forgotten Will is a game polished enough to be sold on PC with more content added. Our Studio 1 and now Studio 2 work have allowed us to lay a great foundation for the game. With the game's lower graphics requirements, we'd like to push for releasing on the Nintendo Switch as well. Games like Zelda or Dark Souls have proven to be incredibly successful franchises and we have created a game in the same vein as both.

[More information](#)

- o **UC_03 Hacktical Advantage + ***

by Matthew Virga (BSCGDD) Sean O'dea (BSCGDD) Caleb Mauldin (BSCGDD), Collin Cumberland (BSCGDD),

Advisor: Dr. Rongkai Guo

Title: Hacktical Advantage is a video game featuring procedural generation, cooperative gameplay between two players over a network, VR, and all house made 3D modeled assets. This game features lots of gameplay, is playable on many different platforms, has a single player mode, and on its publishing, date will allow for lots of cross platform playability. Hack to your advantage and have fun!

Merit: The fact that this game is playable in VR, has procedural generation, is playable over the network, a single player mode, house made assets for everything except music, and more along with cross platform compatibility is exciting!

- o **UC_04 Re:Birth**

by Ronald Ison (BSCGDD) Matthew Keller (BSCGDD) Evan Williams (BSCGDD), Tyler Sutherland (BSCGDD),

Advisor: Dr. Rongkai Guo

Title: The game is an action game that takes place in a 3D environment. The player is a cybernetic test subject that was made in a lab. A sudden error caused by an unknown person breaks the player out of its containment capsule. The player doesn't know where or what he is. The game will take the player through interior environments of the facility as well as exterior landscapes. The game will have the player using combos to take down various enemies.

Merit: We explore what it takes to keep players engaged in an action game centered around continuous attacks on adversaries.

[More information](#)

- o **UC_05 Shards of the Demon**

by [Zachary Garrigan](#) (BSCGDD) Daniel Lawrence (BSCGDD) Eric Stover (BSCGDD), Roger Tyson (BSCGDD), [Michael Worrell](#) (BSCGDD),

Advisor: Dr. Rongkai Guo

Title: Shards of the Demon is a 3rd person action game where the player hunts down as many mini bosses as possible before the time expires. The more mini bosses the player kills the stronger the final boss will become. When the time expires the player will teleport into the demon's lair where the final showdown will take place.

Merit: We wanted to show off what we've learned throughout the course of our major.

- **UC_06 Arlight, the Tales of Auria ***
 by [Zared Redding](#) (BSCGDD) Davis Schuitema (BSCGDD) Sonya Rivers (BSCGDD),
 Advisor: Dr. Rongkai Guo
Title: A lighthearted, fantasy-adventure game set in the world of Auria. Join Iro, the main character, on his quest to become a proper mage. Lufore, the Mages College, located in Fludore, is looking to find the Archmage's next apprentice. Can Iro prove himself to be a top contender?
Merit: Understand the composition of multiple game systems in the game development pipeline, beginning from ideation, to art, to development, to full game. Create an enjoyable experience that players want to partake in.
- **UC_07 OSTICE: Secure Testing Environment ***
 by [Tae Soo Chun](#) (BSCS) [Jonathan Cardwell](#) (BSCS) [Jack Stringer](#) (BSCS), [Cameron Switzer](#) (BSCS), Tyler Hobbs (BSCS),
 Advisor: Dr. Donghyun Kim
Title: Secure coding environment, that allows users to take code based examinations without the opportunity for academic dishonesty.
Merit: Can become available to schools and testing institutions for use. Especially in cases with high numbers of online classes.
- **UC_08 Recreating Image Scaling Attacks + ***
 by Tara Vaghefi (BSCS) Michael Handlin (BSCS) Torie Umbdenstock (BSCS), Selena Guillen (BSCS), Glenn Cole (BSCS),
 Advisor: Dr. Donghyun Kim
Title: When a image is uploaded to a website, the source image is processed through a scalar and the image can change without the user knowing it. These websites use general scaling algorithms, however common scaling algorithms do not consider malicious inputs that may intentionally cause different visual results after scaling.
Merit: The proposed research demonstrates how to fool image recognition software into misinterpreting what a machine sees by manipulating image scaling algorithms to disguise an image.
- **UC_09 Telemedicine My Way ***
 by [Coogan Koerts](#) (BSCS) [Alex Towers](#) (BSCS) [Macy Parker](#) (BSCS), [Vishal Pechetty](#) (BSCS), Greg Giles (BSCS),
 Advisor: Dr. Ken Hoganson
Title: A Telemedicine web application that allows patients to connect with doctors over the internet. It allows users to register, connect with a doctor, send messages back and forth to doctors, upload & reference reports, schedule appointments & have video calls with their physicians. This application was built from the ground up using Angular v8, Dotnet Core 2.2, Entity Framework Core & a SQL Database. This application has also been hosted on a LAMP server at www.telemedicinemyway.com.
Merit: This project will help those who may not be able to afford to travel to a doctor's office or those who are homebound. Telemedicine My Way is benefiting society by giving people the healthcare that they deserve.
[More information](#)
- **UC_10 Lane Restoration Road Mask ***
 by [Michelle Campbell](#) (BSCS) [Ahmad Frazier](#) (BSCE) [Yihong Li](#) (MSCS),
 Advisor: Dr. Mohammed Aledhari
Title: The detection of lane marking is vital to the successful operation of an autonomous car. Without continuous maintenance, the road surface quality depreciates over time and use, making the lane markers difficult to discern.

This experiment endeavors to apply traditional lane detection and object tracking/detection algorithms to create a virtual space of the car's environment. The data from the virtual space is used to calculate and generate an appropriate lane line mask. Finally, the original image and the road mask are merged into one image to verify the accuracy of the road map. This experiment is implemented in the CARLA simulator using Python.

Merit: Autonomous Vehicles- lane detection, driving off-road (eventually)

o **UC_11 IoT Threat Discovery + ***

by Gregg Hammer (BSSWE) Paris Walters (BSSWE) Dewong Lucas (BSSWE), Bryan Monoue (BSSWE),
Advisor: Dr. Reza Parizi

Title: Most companies have no clue what Internet of Things assets (IoT) exist on their network and how they're communicating with the Internet. The common approach to IoT and asset discovery on most networks is commonly performed using one of a couple of methods: active discovery via NMAP or passive discovery via a SPAN port. While these are the most common and easiest ways to enumerate a network, they are also heavily error prone and unreliable in most implementations. Additionally, they pose additional problems in that for active discovery to work the device must be pingable, and for passive discovery to work a device must actively send IP packets. This often is not the case with IoT devices. IoT Threat Discovery is designed to gather asset information from multiple sources to ascertain the reliability of data flowing from those assets. The IoT Threat Discovery sensor uses multiple practices to read the flow of data and determine that reliability; such as DHCP leases, those leases correlated to DNS and the use of Netflow which will create a map of the monitored network showing the activity on that system.

Merit: The merit of the sensor will be reliable security that can defend from any potential threat. Threats on a system do not need to be direct attacks, they could be an accidental lapse in judgement of a user that followed a link from an email they shouldn't have. The IoT Threat Discovery sensor will identify the threats and provide an all-encompassing security system to stop and prevent all security threats.

o **UC_12 Idea Creator: Advanced Mind Mapping + ***

by [Samuel Mullinix](#) (BSSWE) [Justin Kelley](#) (BSSWE) [Clay Visscher](#) (BSSWE), [Adam Soph](#) (BSSWE), [Justin Spaid](#) (BSSWE), [Dave Hagemann](#) (BSSWE)
Advisor: Dr. Reza Parizi

Title: This project is a web based software interface that allows for the collaborative exchange of ideas in order to facilitate the creation of new and interesting products, a concept otherwise known as "Mind Mapping". With this application, users can work collaboratively to expand upon the ideas of others and extrapolate new and exciting solutions. Since Idea Creator supports this overarching idea creation process, formally known as Innovation Engineering, it will provide a much needed niche functionality to create areas of new opportunity. Additionally, with the help of a lexical cognitive synonyms database, users can receive machine generated related concepts that will assist with the mind mapping process. In summary, this application provides a unique collaborative web based interface for the process of "Mind Mapping" which allows for the molding and creation of new and exciting ideas.

Merit: This project provides significant business merit because it provides a unique collaborative solution for coming up with new ground breaking ideas. With this kind of platform, innovation engineers across teams and across the world are able to work together to determine the validity, feasibility, and significance of new and interesting projects. Finally, Idea Creator is a creativity tool that is the first spark and source for creating ideas that are innovative,

important, and never before conceived.

[More information](#): Code repository is private, please contact Sam Mullinix at smullini@students.kennesaw.edu for more information.

- o **UC_13 IT Capstone NCR/USSS ***

by [Alex Philavong](#) (BSIT) Oswaldo Armas (BSIT) Seth Carroll (BSIT), Lawson Garlin (BSIT), [Sol Kim](#) (BSIT),
Advisor: Dr. Ying Xie

[Title](#): Anti-Skimming solutions for NCR and USSS. Over the time of the semester, we created and tested 3 possible anti-skimming solutions.

[Merit](#):

- o **UC_14 Salesforce CRM Exploration**

by [Erik Heissner](#) (BSIT) [Anderson Kongoda](#) (BSIT) [Barry Wisdoman](#) (BSIT),
Advisor: Dr. Ying Xie

[Title](#): An exploration of uses for Salesforce CRM for the College of Continuing Professional Education to enhance the value of service.

[Merit](#): Business merits for the College of Continuing Professional Education.

[More information](#)

- o **UC_15 Mobile Health Security Risks +**

by Gwyn Haley (BSIT) [Marcus Parham](#) (BSIT) Yusuf Yurt (BSIT), Chrysanthus Nkengfack (BSIT), Gary Gainous (BSIT),
Advisor: Dr. Ming Yang

[Title](#): There has been numerous mobile health apps developed that can assess our health status, gather and process data, and integrate with EMR systems. Some apps are capable of analyzing images to accurately predict or monitor health conditions such as blood glucose level. This project will investigate (i) the typical apps that can identify health parameters, (ii) types of data they process, (iii) how errors, noises or attack data can alter their properties, (iv) how to safeguard the apps and sensors to prevent the privacy and security of individuals.

[Merit](#): One of the core pillars of Information Technology is privacy, and a study such as this one highlights the faults in protecting the privacy of end users when it comes to some of the most sensitive information about them.

[More information](#)

- o **UC_17 Data Analytics for CPE KSU ***

by [Faviola Guzman](#) (BSIT) Jose Calderilla (BSIT) Brandon Woodard (BSIT), Michael Ghaly (BSIT), Salar Attarha (BSIT), Terry Ro (BSIT)
Advisor: Dr. Ming Yang

[Title](#): The objective of this project is to find students' journeys, trends, geographic locations and student types that are currently enrolled in the Professional Certificates to be able to market future students. The team will present a Tableau interactive dashboard, develop a salesforce executive dashboard that will exceed the expectations of the stakeholders and create SAS Studio datasets, graph and modeling, and forecasting reports. The information will be compiled together and presented in a final presentation that will include the Tableau interactive dashboard, salesforce dashboard, SAS reports, and a final report. The scope of the project includes planning, discovery, design, development, and testing. The scope includes the completion of all documentation including user instructions for Tableau graphs and a formal presentation to the Project owners and the rest of the stakeholders. Completion of the project will occur when the software and reports have been approved and accepted by the Project owner executives.

[Merit](#): Analysis of student and course data identifies revenue and

demographic trends, leading to a better understanding of the student base and the ability to perform more informed decisions. The analysis shows that 70% of the student body in 2019 is made up of female students and 80% come from Kennesaw.

[More information](#)

- o **UC_18 OpenVPN SDN Management System +**
 by Cory Simmons (BSSWE) Quanny Hampton (BSSWE) Jessica Muh (BSSWE),
 Advisor: Dr. Reza Parizi
Title: The OpenVPN SDN Management System is a day-to-day virtual private network provider that will give its users a sense of internet security and privacy. By creating secure VPN tunnels, monitored by controlled endpoint firewall rules and maintaining a uni/bi-directional connectivity between different infrastructures, resources/packages may be requested and received on multiple different routers.
Merit:
- o **UC_19 KSU Research Portal + ***
 by [Ava Podrazhansky](#) (BSCS) [Cody Harrison](#) (BSCS) [Adnan Rashied](#) (BSCS),
 Advisor: Dr. Selena He
Title: The Kennesaw State University Research Portal was designed to assist undergraduate students in finding research opportunities. Both professors and students can create projects and use the web app to find others to join the project. Users can also search for projects and request to join projects of interest. The web app was developed using React-Redux, Node JS, and Firebase.
Merit: This project will increase the number of undergraduate students participating in research at Kennesaw State, thus increasing the prestige of the university.
- o **UC_20 College of Professional Education D**
 by Robert Cox (BASIT) Andy Nicolaus (BASIT) Brandon Hubner (BSIT), Christina Sylvestre (BSIT), Jomeiny De Leon (BSIT),
 Advisor: Dr. Ying Xie
Title: The objective of this project is to use data analytics to gather valuable demographic and marketing data from students such as geographic locations, student types, and etc. that will be used to make business and marketing decisions for the College of Professional Education in reaching potential students.
Merit: Provide data results of certificate courses in the College of Professional Education
- o **UC_21 Mobile Health - SpO2**
 by [Joseph Lackey](#) (BSIT) [Lara Oloruntoba](#) (BASIT) [Anthony Wimbush](#) (BASIT),
 Advisor: Dr. Ying Xie
Title: This project focuses on the accuracy, security, and availability of mobile apps that monitor SpO2 levels. Mobile phone apps are vetted and tested to gather data. These apps are then analyzed and compared against one another to determine a recommendation for a full prototype to monitor SpO2 levels.
Merit: This focuses more on personal use to measure SpO2 levels.
- o **UC_22 Server Room Monitor ***
 by [Jiaming Li](#) (BSCS) Jiahao Chen (BSCS) Shikun Lyu (BSCS), Daniel Omuto (BSCS), Patrick Nguyen (BSCS),
 Advisor: Dr. Ken Hoganson
Title: Server Room Monitor is a temperature, humidity and vibration detector implemented by a Raspberry Pi 3B+. It can send notification email and text message to administrators when the condition in server room is abnormal. It can also send graphed temperature and humidity data to the administrators

for analyzing and controlling the condition in server room. A web-based GUI was designed to display real time data and collect user information.

Merit: Our project was designed based on the need of server room administrator. Indeed, it can be implemented at any scenarios to achieve real time data monitoring and message notification. For example, it can be redesigned as a security system to detect fire, gas leaking or housebreaking. The low-cost feature guarantees its feasibility.

- o **UC_23 Cyber Forensic Discovery with A.I. + ***

by [Anthony Sarkis](#) (BSSWE) Evan Bennett (BSSWE) Gianni Orlando (BSSWE), Jelani White (BSSWE), Micheal Crawford (BSSWE),
Advisor: Dr. Reza Parizi

Title: An automated computer forensics tool that can gather event log data from a computer that has been infected with a virus or malware, all without leaving a trace in the filesystem, and uses that data to look for any indications of a compromise using an Artificial Intelligence.

Merit: This software can become very useful for determining if a computer that has been infected with a virus has any data on it that has been compromised. For instance, it will look for any computer files that may have been accessed by the virus, or it may determine if a keylogger has been installed on that PC. This can potentially save a lot of time for computer forensic investigations.

- o **UC_24 Computer Vision for Fall Detection ***

by [Ryan Taylor](#) (BSIT) Elise Maloney (BSIT) Dion Agbontaen (BSIT), [Marquez McClendon](#) (BSIT),
Advisor: Dr. Hossain Shahriar

Title: The goal of this project is to aid elderly patients in nursing homes by building a fall detection device. We are using a Raspberry Pi with a webcam to capture footage that is then sent to a server for processing two machine learning algorithms. The first algorithm is OpenPose, which takes an image as an input and outputs 25 X,Y coordinates of various body parts. These coordinates are then passed to our own XGBoost classifier that we trained to detect falls and non-falls. If a fall is detected, the Raspberry Pi sends an email and a text message to the nursing home staff.

Merit: This project has the potential to prevent the pain and suffering that elderly fall victims go through. We've also designed this device to be low-cost to be viable for nursing homes to purchase for all of their rooms. Each device would cost under \$75 and multiple devices could stream footage to a single server with a moderate GPU (Google Colab offers free high-end GPUs).

[More information](#)

- o **UC_25 C# to Java Cross-Compiler ***

by [Harriet Haisty](#) (BSCS) Bayleigh Correll (BSCS) [Adam Gonglach](#) (BSCS),
Advisor: Dr. Ken Hoganson

Title: This project is a web-based C# to Java cross-compiler. It takes in a user's source .cs or .txt file, runs it through a backend translator, and then produces the converted code in an embedded code editor with correct spacing and syntax highlighting. The front end of the application is written in JavaScript, CSS, and HTML, with elements of AJAX. The backend is written entirely in Java. The object of this project is to convert C# code into Java code that can run on any machine.

Merit: The intellectual merit of working on a project such as this lies in gaining an in-depth familiarity with three languages, and learning how to use tools and packages to reach beyond developing simple programs. This project has helped our team foster a deeper knowledge of the programming languages

involved, along with working with unfamiliar tools, such as servers and AJAX. Writing tools such as scanners, parsers, and compilers has given us a much closer understanding of how a programming language is structured.

[More information](#)

- o **UC_26 App Refactor and IoT Integrations +**

by Edgar Pineda (BSSWE) Tanner Jones (BSSWE) Johnny Santana (BSSWE), Myles Andre (BSSWE), Brandon Pineda (BSSWE),

Advisor: Dr. Reza Parizi

Title: We have been tasked to refactor and improve an existing architecture for an application and to implement new integrations such as WatchOS, Alexa Skills, and SMS abilities.

Merit: Through the architectural changes made to the system as well as the initial integrations of IoT devices we are setting up the ability for the owner of the software to be able to integrate future devices as they wish. This will be great for their business as they will be able to support users who own multiple IoT devices.

- o **UC_27 ELSYS Software Center + ***

by Bryan Firestone (BSIT) Sarah Brown (BSIT) Hunter Brumelow (BSIT), Justin Place (BSIT),

Advisor: Prof. Wes Hogarth

Title: An all-in-one solution providing automated unattended software installations, feature activation, and various other offerings to students and full-time researchers of the ELSYS laboratory at GTRI.

Merit: Reducing ELSYS IT Co-Op workload on easily automatable tasks while improving response time for commonly requested software and features.

- o **UC_28 Do Not Disturb +**

by Suzanna Carter (BSSWE) Cody Mullin (BSSWE) Joseph Nguyen (BSSWE), [Joshua Capers](#) (BSSWE), Kelly Click (BSSWE), Adam Simonicek (BSSWE)

Advisor: Dr. Reza Parizi

Title: The purpose of this system is to allow conferences to run more effortlessly and efficiently. The software will allow users to know when the conference is about to end and see whether the room is available or not. It will accomplish that goal by having a kiosk outside of the conference room as well as a notification in the meeting room close to the ending time.

Merit: The business merit is making people more productive by staying on schedule.

- o **UC_91 Glory in Death ***

by [Tyler Hocker](#) (BSCGDD) [Tim Hawkins](#) (BSCGDD) [Mary Ivester](#) (BSCGDD), [Devan Patel](#) (BSCGDD),

Advisor: Dr. Rongkai Gou

Title: Glory in Death is a stunning, heart-pounding arena fighter where players take control of one of our two valiant adventurers, Aura and Halfred, as they battle for their survival against hordes of vicious orcs and goblins. Players will be able to defend themselves with a combination of deadly weapon attacks and special powers unique to each character. As the player progresses they will be able to level up their characters and better equip them to take on stronger and stronger enemies.

Merit: This game will be fun enough that people will support us through paid advertisements and micro-transactions in order for us to further develop our game, and more game in the future.

[More information](#)

- o **UC_92 Blast Off! + ***

by Emily Strube (BSCGDD) Harrison Hopkins (BSCGDD) Terry Taylor (BSCGDD), Nick Feraco (BSCGDD), Carson Hopkins (BSMEI),

Advisor: Dr. Rongkai Guo

Title: Hate feeling grounded? Gravity got you down? Then try "Blast Off!" by KeySmash Studios! "Blast Off!" is a game about traveling further into space than anybody before you. Start as a humble rocket enthusiast and work your way up to the stars! Each flight grants you the money you will need to upgrade and buy rockets to get yourself further and further into the final frontier! Escape Earth and embrace the great unknown, with "Blast Off!"

Merit: Throughout this semester, our group has actually completed most of the processing and paperwork to be officially established as a business. KeySmash Studios will be an official business within the next two months, as founded by the five members of our team. The "Blast Off!" application will be an original IP of KeySmash Studios and will be originally marketed on the Google Play store for Android mobile devices. The application will have Google Ads, and In-App Purchases available to users, which will directly credit KeySmash Studios LLC.

[More information](#)

Academic courses graduate (e.g. capstones, games, innovative special topics projects, other course projects) (15)

*** Candidates for the best project award**
+ Project will be featured during the Flash Session

o **GC_01 Bank Deposit Subscription Report**

by Hui Xia (MSCS)

Advisor: Dr. Dan Lo

Title: In response to the demand of direct marketing strategy, the model in this project for bank direct marketing is to predict whether customers will subscribe the deposits with the bank by identifying potential customers. Based on the model analysis, bank can manage the marketing methods such as number of contacts, interval of contacts or selection of recipients. Additionally, bank can alleviate the risks of adverse effect of marketing from the groups who do not want to receive advertising by not contacting them. Hence, this model which can forecast the likelihood of deposit subscriptions can be profitable to the banks for improving their marketing campaign strategies.

Merit: This project will help marketing department in company to make direct and specific decision, to recognize the right target group so that the marketing efficiency will be enhanced, the marketing cost will be minimized and the response rate will be maximized.

o **GC_02 Fashion Item Detection**

by [Eun Hye Kim](#) (MSCS) [Seunghyeon Shin](#) (MSCS) [Yong Min Ju](#) (MSCS), [Luke Cranfill](#) (MSCS),

Advisor: Dr. Junggab Son

Title: Fashion Item Detection project is to detect fashion items in an image using image hierarchical segmentation, define types of fashion items and their features. We used a practical deep fully convolutional neural network architecture for semantic pixel-wise segmentation called SegNet. This architecture has an encoder and decoder. The encoder is identical to the convolutional layers in the VGG 16 network. The decoder is to map the low-

resolution input feature maps to full input resolution feature maps to classify in pixel-wise. The advantage of SegNet is that the decoder upsamples a lower resolution input feature map by performing non-linear upsampling using pooling indices by eliminating the need for learning upsamples. Then, the upsampled maps will be convolved with filters to produce dense feature maps. SegNet is also efficient in memory usage and computational time, and it has a smaller number of parameters than other architectures.

Merit: If we apply this project as application, it can be used in any kind of fashion field since it can detect the types of clothing and its attributes. The feature extraction of clothing plays an important role in any number of activities, but the activity that motivates the proposed research is one where a buyer procures merchandise for a fashion retailer. Extracting these features and conveying them to the application will support the buying activity. The objective of the research herein is to formulate a repeatable process for shifting all or part of the feature extraction task to the supporting application. By utilizing this application, retailers will save tremendous time by putting images to get their information via application.

- o **GC_03 privacy and trust in VANET**

by [Seunghyeon Shin](#) (MSCS)

Advisor: Dr. Junggab Son

Title: Vehicular Ad Hoc Network is a subclass of mobile network that provides enhanced driving experience through the provision of roadside assistance and safety information to participating nodes. There exists multiple types of malicious threats that target the privacy of nodes, manipulating messages and many more. In this research we propose an improved VANET scheme for enhanced privacy and trust management.

Merit: intellectual

- o **GC_05 Refinement Neural Network Smart Car + ***

by [Bhavana Pateriya](#) (MSCS) [Sowmya Kari](#) (MSCS) [Neha Rajendra Gosavi](#) (MSCS),

Advisor: Dr. Xiaohua Xu

Title: In recent years, smart cars have drawn much interest as a topic of research for both academia and industry. For a car to be a truly smart, it must make sense of the environment through which it is driving. The process of path planning and autonomous vehicle guidance depends on three things: localization, mapping, and tracking objects. We have focused on tracking of the objects. The proposed algorithm is developed using information from a camera. The images from the camera is used to detect and classify the object. The objects in the image are detected using Deep Neural Networks (DNN).The current DNN detectors of state-of-the-art can be divided into two categories: the two-stage approach, and the one-stage approach. In this work, we design a new object detection framework, called RefineDet, to inherit the merits of the two approaches (i.e., one-stage and two-stage approaches) and overcome their shortcomings. Advantage of applying neural networks in cars is that ,as the car gets older, the less it resembles the car that the original programming was designed for. This underlines the importance of a system that is able to learn and adapt.

Merit: 1)Efficient and accurate object detection will take us a step closer to safer driverless cars which could incorporate car sharing services like Zipcar which could transform cars from a thing people own to a service they call up on demand. 2)We present a single-shot refinement neural network-based detector, which consists of two interconnected modules, i.e., the ARM and the ODM. The ARM aims to filter out the negative anchors to reduce search space for the classifier and also coarsely adjust the locations and sizes of anchors to

provide better initialization for the subsequent regressor, while the ODM takes the refined anchors as the input from the former ARM to regress the accurate object locations and sizes and predict the corresponding multiclass labels. This new development will definitely help us in terms of safety. We can hope for better, more efficient ways of preventing accidents from happening. And obviously, for self driving cars, this will increase the safety features. 3) Object tracking has a variety of uses, some of which are surveillance and security, traffic monitoring, video communication, robot vision and animation and with the efficient algorithm presented by our work, we can achieve a high accuracy and efficiency for the same. 4) It can be used for Face detection and Face Recognition which can be applied for fraud detection 5) It can be used for Iris recognition which is one of the most accurate identity verification systems 6) Object detection is also used in industrial processes to identify products. 7) Robotics: Autonomous assistive robots must be provided with the ability to process visual data in real time so that they can react adequately for quickly adapting to changes in the environment. Reliable object detection and recognition is usually a necessary early step to achieve this goal.

- o **GC_06 Battling Bots with Random Forests + ***

by [Derek Willingham](#) (MSCS) [Christopher Sefcik](#) (MSCS) [Colton Thompson](#) (MSSWE), [Rehma Razzak](#) (MSCS),

Advisor: Dr. Xiaohua Xu

Title: Bots and fake profiles are the scourge of modern day social media. We investigate the benefits machine learning, more specifically Random Forests classifiers, can have for combating these dastardly robots.

Merit: This project is merited due to the money, time and resources lost to victims of phishing and spam social media bots. These victims lose money, personal identities, and time by having to deal with fake twitter accounts. Our project could help decrease the number of victims.

- o **GC_07 Text Semantics Representation + ***

by [Karl Kevin Tiba Fossoh](#) (MSCS)

Advisor: Dr. Dan Lo

Title: The capacity to convert text into images is possible through the usage of generative adversarial networks. The problem is the experimental nature of the procedure and the little research made to understand how text can be improved to generate better images. The goal of this research was to provide an in-depth analysis of the impact of coherence and summarization models applied to complex texts to improve the end result of GAN models.

Merit: GAN is fairly new models that dive into generating data out of scarce input data and noise. Few pieces of research have been made to prove their application in real-world scenarios such as automated illustration. Our goal is to prove that such application is possible, under the condition of accurate and semantically correct natural language processing.

- o **GC_08 MBUSA Internship**

by [Karl Kevin Tiba Fossoh](#) (MSCS)

Advisor: Prof. Dawn Tatum

Title: This internship took place during the fall semester and is to be completed before the end of December 2019. It took place within the IT Innovation Hub of MBUSA and had as the main focus to create new and disruptive technologies while following agile methodologies and reputed user-centered design techniques.

Merit:

- **GC_09 Table Order Management System + ***
by [Vincent Ogonor](#) (MSSWE) Abdulaziz Houbani (MSSWE) [Robert Hennings](#) (MSSWE), Merlyn Sequeira (MSSWE), [Pui Tam](#) (MSSWE),
Advisor: Dr. Reza Parizi
Title: This software is one of our current projects in development for a client. It is aimed at restaurants to allow them to manage, update and keep track of orders. Our software Solution for restaurants would allow you to place an order through a tablet (iPad mini). With this software, Pay-at-the-table gives customers a sense of security, knowing that they keep control of their credit card and its financial information. It reduces trips back and forth to the POS terminal, which in turn decreases the time it takes to close the sale. This lets tables wrap up their meal and get back to their day quicker and reduces friction due to split checks or servers multitasking while payments are being made. Our current software runs as a web app and we are switching over to develop a clover application for clover POS systems. The project needs to be integrated with more Clover api's to send created orders to the clover POS systems and printers.
Merit: Any restaurant can use this application. It integrates with Clover, which is widely used. It enables customers to place orders at their table without the need of wait staff
- **GC_10 Azure API for Data Analysis Power BI + ***
by [kavyasree Bezugam](#) (MSCS) Nikitha Gaddamidi (MSCS)
Advisor: Dr. Xiaohua Xu
Title: We create Azure APIs for feeding the data of the client into CosmoDB and Logic app to send the analyzed data with required fields to power BI for analyzing the data. The Power BI dashboard built for the client gives the detail reports to enhance his business and track his business. Example if we have a Education organization like Kennesaw state university we would built dashboard for analyzing Area of improvements.
Merit: Analyzing the data for the business is the key aspect to know the area of improvements A dashboard with reports would make life easy and have a track all the time.
- **GC_11 Wi-Fi Availability Monitoring**
by Ruth Barraza (MSIT) Matthew Reese (MSIT) Tammara Johnson (MSIT), Tonya Geiger (MSIT),
Advisor: Dr. Lei Li
Title: Wireless has become a critical IT service, however the ability of providers to monitor the service has not matured at the same rate. The emergence of low-cost wireless devices has created an opportunity for building a system that aggregates data from many distributed data collectors.
Merit: This low-cost solution can be used around KSU campuses to monitor and improve campus wireless user experience.
[More Information](#)
- **GC_12 The Conference Room of the Future + ***
by Sai Kasthala (MSIT) Shayan Shamskolahi (MSIT) Ashim Thapa (MSIT), Tommy Travis (MSIT), John Kane (MSIT),
Advisor: Dr. Lei Li
Title: Provide conference room of the future.... may include AI voice capability and automation that can control the technology and lighting/monitors in the room. May include a kiosk type reservation system that is associated with each conference room that can display if the room is in use, allow reservation of that room, and checking the availability. It may also include IoT type sensory to detect utilization of the room, and if it is under or over capacity, may notify the meeting organizer and make suggestions for alternatives (doing lookups of

other available conference rooms in the facility). Automated alerts could also notify participants and organizers that the meeting is coming to a close so that they can prepare for ending meeting in order for the next group to use the room. AI could also automate the startup or close down of the technology in the room based on a simple command "Start Meeting". Also, should integrate room reservations with Google calendar; and, identify conference room - meeting utilization and occupancy and trends. A web application will be built for the conference room that facilitates the meeting organizers to help choose the conference rooms based on number of attendees and provides details of the available conference room based on the requirements. A notification alert system that reminds about the end of the meeting. The web application will be using Angular for front-end, and Node JS, MongoDB and Python (Flask) for the backend. The database helps to store the required data related to the calendar events and conference rooms.

Merit: Successful completion of this project will allow Shaw Industries employees to more efficiently book meetings remotely in any of their many conference rooms of various sizes. A room will not only be selected based on availability but also based on number of attendees which would allow only conferences of appropriate sizes to be selected.

- o **GC_13 Phishing Awareness Training App ***

by [Travis Brown](#) (MSIT) [Sammy Box](#) (MSIT) [Nicholas Moore](#) (MSIT), [Quincy Nwagu](#) (MSIT), [Wesley Steverson](#) (MSIT),
Advisor: Dr. Lei Li

Title: The Phishing Awareness Training application, created for KSU UITs, is a web application designed to increase awareness around common phishing threat indicators. The application presents users with sample phishing emails, lessons, and assessment questions, with feedback, to test knowledge gained from the training.

Merit: This application is designed to improve end user knowledge of phishing for KSU. Because phishing has a major negative impact on cybersecurity for the university, it is important to provide users with extremely useful and accurate information to aid in understanding phishing emails. This application is aiming to accomplish increased end user awareness to help mitigate phishing attacks.

[More information](#)

- o **GC_14 Determining Human Emotions ***

by [Kevin Markley](#) (MSCS)
Advisor: Dr. Mohammed Aledhari

Title: Comparing run-time performances and accuracy of several AI classifiers, in similar implementations, in determining human emotions from facial images.

Merit: Without any novel implementations or improvements being done, the code itself should be intellectually valuable to any number of developers, students and even teachers. Once the code is hosted on a public website, and hopefully with a graphical interface, it will provide a simple to follow and understand visual step by step showcase of the process to use AI to find emotions. As well as, a way of comparing several different algorithms and determining which is more useful in certain situations. Hopefully, there will also be some useful and novel optimizations made to the algorithms.

[More information](#)

- o **GC_15 Detecting Pedestrians - Skin Tones + ***

by [Rehma Razzak](#) (MSCS) Jackson Randolph Randolph (MSCS)

Advisor: Dr. Mohammed Aledhari

Title: Because many applications of data science can in-inadvertently create bias, it is also possible that this bias can be present in pedestrian detection, especially on racial lines. We explore the different techniques (using supervised learning) that can be used to detect pedestrians in order to figure out which ones may be the least biased and we explore ways (using unsupervised learning) to automatically measure skin-tone in pedestrian data sets in order to benchmark potential algorithms. We concluded that a You Only Look Once Convolutional Neural Network should be the most robust method of pedestrian detection, and that it was likely a skin tone classifier could be created using deep feature extraction and a k-means classifier.

Merit: While research in pedestrian detection is nothing new, looking at the problem in the context of potential bias hasn't been looked at in an algorithmic context. Our project a more credible approach to looking at the problem of pedestrian detection in context of potential bias and a comprehensive comparison of various classical machine learning methods on account of which methods are more efficient, accurate, and less biased for pedestrian detection. This will enable people of all skin tones to feel safer, and For the automotive industry, the contribution will offer insight into how they can better design pedestrian detection systems for autonomous vehicles so the driver can also feel safer on the road

- o **GC_16 Robotic Process Automation + ***

by [Arunima Choudhary](#) (MSIT) [Danielle Bacud](#) (MSIT) [Demi Evangelatos](#) (MSIT), [Juston Bryant](#) (MSIT), [Steven Staebler](#) (MSIT),

Advisor: Dr. Lei Li

Title: The project sponsor, McKenney's Inc is looking to automate repetitive tasks. They have enlisted the capstone team to work on the UiPath platform to create 'robot' (Robotic Process Automation/RPA) that will automate these tasks. The project was divided into five phases: a. Training on the UiPath platform led by Arunima Choudhary. b. Work with McKenney's team to gather requirements for each 'robot'. c. Work with McKenney's Robotic Automation team to create an environment that capstone team can use to create and test robots outside of production. d. Capstone team worked to create the robots. e. Test and publish the robot in conjunction with the Robotic Automation team.

Merit: The project is pushing for automating business processes. The team directly worked with process owners to deliver long lasting results.

[More information](#)

Graduate Research (11)

* Candidates for the best project award

+ Project will be featured during the Flash Session

- o **GR_01 Utilizing CNN on EMG signals**

by Maxwell Lavin (MSCS)

Advisor: Dr. Chih-Cheng Hung

Title: Through the utilization of CNN, the processing and classification of EMG signals related to human hand motion is examined.

Merit: Helps further the advantages of using machine learning algorithms in a bio-mechanical/health care environment.

[More information](#)

- o **GR_02 Data Mining by Genetic Programming + ***

by [Mahsa Shokri Varniab](#) (MSCS)

Advisor: Dr. Chih-Cheng Hung

Title: This paper proposes an approach which uses optimized genetic programming (GP) with a new fitness function for multiclass dataset classification using 10-fold Cross Validation. In place of defining static thresholds as boundaries to differentiate between multiple classes, our work presents a method of classification where a GP system learns the relationships among experiential data and models them mathematically during the evolutionary process. We propose an optimized GP classifier based on a combination of pruning subtrees and a new fitness function. An orthogonal least squares algorithm is also applied in the training phase to create a robust GP classifier. Our approach has been assessed on 6 multiclass datasets and compared against three existing methods. We compared our approach in terms of speed with previous Genetic Programming algorithms as well. The analyzed results illustrate that the developed classifier produces a productive and rapid method for classification tasks that outperforms the previous methods for more challenging multiclass classification problems.

Merit: My developed technique could be used in developing predictive models for analyzing various business data and provide strong decision making power to the managements and stakeholders of companies.

- o **GR_03 Tiered Financial Fraud Detection ***

by [Charles Gardner](#) (MSCS)

Advisor: Dr. Dan Lo

Title: This study focuses on financial fraud detection via the creation of a three-tiered anomaly detection system. The system is constructed by tuning multiple random forest classifiers, each optimized utilizing a different fitness function. This process is done using a randomized grid search that optimizes the random forest parameters to match the fitness function. Once complete, the models are compared to form three-tiers of detected frauds with each tier containing a different level of precision. Separating detected frauds into different tiers allows for both high precision and high recall values. With this strategy, 96% of frauds are classified correctly while still maintaining a high precision of over 90% for 85% of detected frauds. Our studies show that the tiered random forest outperforms other algorithms such as SVM and logistic regression with precision at 85% and a recall of 72%. This model also outperforms a single F1 score optimized random forest with 2% high precision and 8% higher recall. The model is then expanded upon through the use of derived features which increase precision up 97% and recall to 99%. We are working on automating to processes of deriving these features as well as altering the random forest to give derived features preference in feature selection.

Merit: This project is a direct application of machine learning to improve financial security in FinTech. Through to creation of multiple tiers of fraud risks a financial institution can more easily address a possibly fraudulent transaction in the appropriate manner. The increases in precision and recall over a standard F1 score optimized model offers a potentially large mitigation of financial fraud.

- o **GR_04 DL Network Anomaly Detection + ***

by [Daniel Karasek](#) (MSCS) Jeehyeong Kim (Doctoral Researcher) Victor Kemmoe (MSCS), Seunghyeon Shin (MSCS),

Advisor: Dr. Junggab Son

Title: Network anomalies are correlated to activities that deviate from regular behavior patterns in a network, and they can be undetectable until their

actions define them as malicious and an attack has occurred. Current work in network anomaly detection includes network-based and host-based intrusion detection systems. However, these schemes suffer from high false detection rates due to the Bayesian base rate fallacy. To overcome such a drawback, this paper proposes a superior behavior-based anomaly detection system (SuperB) that uses time series as a parameter for reducing false detections. It trains a neural network with time series network traffic patterns collected from legitimate users, which is used to classify all other behaviors from the defined normal behaviors. As a result, SuperB can detect all of the traffic generated by unauthorized users. Our simulation results show that the proposed algorithm needs five end-to-end conversations to achieve over 90\% accuracy and 100\% recall rate. The performance increases significantly when we use 25 conversations, which results in 5.2\% false positive rate and 97.4\% accuracy. The execution times for 5 and 25 conversations are 11.92 and 41.49 millisecond, respectively.

Merit: This research is a general solution that can be used on any network for anomaly detection. Opposed to other research that uses standard data sets, this research was developed around live network data and has shown great results. The intent of this research is to develop a new approach for anomalous behavior detection while making the research practical for real-world use.

- o **GR_05 Designing Virtual Customers ***

by Sourav Debnath (MSSWE)

Advisor: Dr. Paola Spoletini

Title: Automated virtual agents are a great way to provide information without the need of human intervention. For this reason, they can be used in role-playing activities to simulate human conversations, particularly they can be used to train novice analysts on how to conduct requirements elicitation interviews for software engineering projects. In our research we show the design architecture of an online virtual agent, Virtual CustOmer (VICO) and how it can be developed using existing technologies. We will showcase an initial prototype of this system and show results from an exploratory study.

Merit: Even in its prototype phase this tool can reduce the number of mistakes students make in their requirements elicitation interviews. Effective requirements elicitation is decisive in the success of any business applications so by improving the interviewing skills of future analysts we can increase the number and the quality of successful projects.

[More information](#)

- o **GR_06 Development of Digital Currency**

by [Feiyang Qu](#) (MSCS)

Advisor: Dr. Selena He

Title: In this project, we will understand the development trend and future of digital currency through analysis of patent data related to digital currency. Specifically, we use natural language processing (NLP), such as 'Topic model' to classify text in raw patent data. The processing will help us to understand which patent topics related to digital currency are concerned at different time periods. Co-advisor: Dr. Meng Han

Merit: Our project will help people especially in finance emphasis understand the development trend of digital currency.

[More information](#)

- o **GR_07 Blockchain for fake news detection**

by Farid Khan (MSCS)

Advisor: Dr. Xiaohua Xu

Title: Fake news is the spread of misinformation through internet and social media. Multiple examples display the negative impact of fake news on our

economy, politics and society. It is an open problem with no standard solutions. Journalist and news agencies are in a desperate need for a solution that can provide identification and verification for news content. A solution is to design a blockchain that can provide proof of concept for news publishers. Three fundamental properties of blockchain are: hash function, consensus mechanism and smart contract. This makes the system tamper- proof, provides authentication. The news agency will sign up to blockchain platform. Smart contract are designed to establish the guidelines to create or edit a block. Smart Contract can revoke the agency if fake data is published. Each block consist of a cryptographic hash of the previous block and news content. Proof of Work (PoW) is used as a consensus algorithm, which keeps the system up to date and provides integrity.

Merit: This research project can be used by news agencies, press associations and journalist to validate or update a news content. Further it can be openly available for public to use.

- o **GR_08 Parallel FDG Clustering with Spark ***

by Daniel Brown (MSCS)

Advisor: Dr. Yong Shi

Title: We previously proposed and tested the Fast Density-Grid clustering algorithm. This project discusses the work and results of designing and testing a parallel implementation of this algorithm using Apache Spark.

Merit: The modern field of Big Data requires scalability of algorithms for them to be useful. We previously showed that our algorithm scales much better than traditional ones, but it was still serial. By successfully parallelizing the algorithm, we show that it is viable for actual data analytics work.

- o **GR_09 Smart Wine Cellar ***

by Hongkyu Lee (MSCS)

Advisor: Dr. Donghyun Kim

Title: A Software Framework for Smart Wine Celler, which is capable of learning a user's taste of wine. As user input the wine he/she bought, based on the chemical property of the wine such as acidity, sulfates, alcohol percentage, The wine cellar software learns and predicts which combination of the various chemical property will more fit to user's penchant. I used a wine-dataset that includes chemical data and rating (how good the wine is) of more than 4000 red wines. With this dataset, I used one of the reinforcement learning algorithm, well known as Deep Q Learning, for predicting user's taste.

Merit: The project showed the feasibility that reinforcement learning can be applied to IoT and Smart Home Appliances. Not only the wine cellar itself can be practically developed, but also other miscellaneous home appliances can adopt this algorithm. For example, if a refrigerator adopts this algorithm, it can learn the owner's personal taste such as if the owner is meat-lover or vegetarian, and may propose a list of ingredients that the person will like more.

- o **GR_10 OS meets Homomorphic Encryption ***

by Victor Youdom Kemmoe (MSCS)

Advisor: Dr. Junggab Son

Title: With devices more and more connected, it is easy for an attacker to target several individuals in one attack. Most of the time, the first line of defense between an attacker and our data is the Operating System running on our device. In this project, we aim to develop a new OS security solution by using Fully Homomorphic Encryption (FHE). With Fully Homomorphic encryption, data can be operated without being decrypted. Conventionally,

data stored on a computing system are encrypted only at rest (when they are stored in hard drives) and decrypted to be used (when they are transferred in the main memory). Therefore, if an attacker has a "listener" on your system, he will be able to grab the decrypted data. Whereas with FHE, he won't be.

Merit: To the best of our knowledge, our proposition is the first to try to integrate fully homomorphic encryption as a module of an Operating system. In terms of business, it means that even if attackers are able to penetrate a system, they will not be able to siphon useful information.

- o **GR_11 Adversarial ML for QoS Tampering + ***

by Jhilakshi Sharma (MSCS)

Advisor: Dr. Donghyun Kim

Title: This project focuses on exploiting Software-Defined Networks (SDNs) through Offensive Machine Learning, specifically by using Adversarial Examples. The project is currently focused on calculating the effectiveness of Adversarial Examples against SDNs using Convolutional Neural Networks for Quality-of-Service (QoS) classification of network packets. The aim is to test whether we can exploit the mechanism to obtain higher/lower QoS for packets than they deserve to get.

Merit: Software-Defined Networks are a novel method of networking, different from traditional networks. Till now the most novel implementation regarding the quality of service assigned to packets in Software Defined Networks involves the replacement of Deep Packet Inspection with ML algorithms. However, there are very few papers on ML algorithms being used offensively against SDNs, and this project hopes to fill that gap.

Undergraduate Research (4)

* Candidates for the best project award

+ Project will be featured during the Flash Session

- o **UR-01 Fake News Detection by Support Vect ***

by Jiahao Chen (BSCS) Shikun Lyu (BSCS)

Advisor: Dr. Dan Lo

Title: Fake news detection research emerges in a couple of years and is a relative new difficult research area. In this project, we attempt to attack this problem by using FakeNewsTracker, doc2vec, and Support Vector Machine. Our results indicate that Support Vector Machine is a suitable method to classify fake news from real ones with an acceptable accuracy. Future research directions will be addressed.

Merit: The project itself can make a reliable identification of real and fake news. This can help people not to be misled by some false information. It can also reduce the loss of time, energy and money caused by fake news. This may help newspapers and social media filter out fake news and thus improve their efficiency.

- o **UR-02 Machine Learning Network Intrusion + ***

by Jayden Johnson (HS Intern)

Advisor: Dr. Dan Lo

Title: This project studies and compares the accuracies of different machine learning algorithms in network intrusion detection. Machine learning algorithms implemented in this project include Regression Forests, Classification Forests, and Boosted Regression Forests. Performance evaluations on these algorithms via latest intrusion detection dataset are conducted and analyzed.

Merit: This project compares the accuracy of different machine learning algorithms in network intrusion detection based on the latest datasets open to the public, which is less studied in this subject. The results of this work may help network security engineers create highly efficient network intrusion detection systems and prevent data breach attacks effectively. It is important to detect and prevent these attacks because successful intruders can access and corrupt confidential or important information belonging to enterprises. This project potentially enhances network security and provides a simple and effective method for cyber defense.

o **UR-03 Geospatial Cyber Threat Hunting ***

by kristopher barnette (BSIT) Rabab Turabi (BSIT) Lain Alexander (BSIT),
Advisor: Dr. Ming Yang

Title: This research project will be using Splunk to create custom Dashboards to identify malicious traffic attempting to enter a network. The intrusion attempts will be analyzed to return Geospatial information "GEOINT". This information will then be used to see analyze attack methods used in specific locations.

Merit: Securing the enterprise network.

o **UR-04 Adversarial Attacks on Applied CNN + ***

by [Morris Wan](#) (HS intern)

Advisor: Dr. Selena He

Title: Convolutional Neural networks (CNNs) have become more and more prevalent in applications such as image recognition and autonomous driving. However, recent literature shows that a lot of these deep-learning algorithms are susceptible small perturbations to their input known as adversarial attacks. In this project, adversarial attack algorithms and defenses were implemented and evaluated using real traffic lights data and model.

Merit: There has been increased usage of Convolutional Neural Networks (CNNs) in many applications such as autonomous driving. My research shows how susceptible current models are to potential cyber-security attacks.

[More information](#)

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