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

C-Day Winners

Fall 2021

Graduate Capstone

- **1-st Place GC-123 - Service Delivery Enhancements using Live Chats and Virtual Agents** (Graduate Capstone) by Patrick R. Wadkins, Peter Twene, Rachel Williamson, Tamar McDowell, Naomi DeGraft,
  Department: Information Technology
  Supervisor: Dr. Zhigang Li
  Presentation | Poster | More Information
- **2-nd Place GC-132 - Microsoft Azure Sentinel to ConnectWise Integration** (Graduate Capstone) by Christine Neal, Miseker Birega, Ryan James, Charul Patel, L. Renee Davis Townsend, Matthew Parker,
  Department: Software Engineering and Game Design and Development
  Supervisor: Dr. Reza Parizi
  Topics: Enterprise Systems
  Presentation | Poster
- **3-d Place GC-113 - NLP Sentiment Analysis on Amazon Reviews** (Graduate Capstone) by Sushma Aladhalli Shivakumar, Swetha Pailla, Sireesha Hasti
  Department: Computer Science
  Supervisor: Dr. Mahmut Karakaya
  Presentation | Poster | More Information

Graduate Research

- **1-st Place GR-078 - AI for Social Good: Assisting the Elderly/Visually Impaired in Reading Prescription Labels** (Graduate Research) by Stacie P. Allen, Jessica Barnes, Lauren Pope, Chenelle Hill
  Department: Information Technology
  Supervisor: Dr. Ying Xie
  Topics: Artificial Intelligence
  Presentation | Poster
- **2-nd Place GR-136 - Students Certification Management (SCM): Hyperledger Fabric-Based Digital Repository** (Graduate Research) by Md Jobair Hossain Faruk
  Department: Software Engineering and Game Design and Development
  Supervisor: Dr. Hossain Shahriar Dr. Maria Valero

Topics: Software Engineering

Presentation | Poster | More Information

- **3-d Place GR-127 - IoT Clusters Platform for Data Collection, Analysis, and Visualization** (Graduate Research) by Soin Abdoul Kassif Baba M Traore
  Department: Information Technology
  Supervisor: Dr. Maria Valero
  Topics: IoT/Cloud/Networking
  Presentation | Poster | More Information

Undergraduate Capstone

- **1-st Place UC-085 - Universe Language CRM App** (Undergraduate Capstone) by Kara Stanley, Khalid Diab, Gabriel A. Rodriguez Serrano, Sammantha King, Carolina Martinez, Taren Bridges
  Department: Software Engineering and Game Design and Development
  Supervisor: Dr. Reza Parizi - capstone professor Carlos Solis - project sponsor
  Presentation | Poster
- **2-nd Place UC-072 - Authenticating Middleware Implementing DNS-Based Identity** (Undergraduate Capstone) by Brooklyn Crowe, Jade Godwin, Marilyn Marcos, Aaron Moore, Ricardo Rojo, Noah Starr,
  Department: Software Engineering and Game Design and Development
  Supervisor: Dr. Reza Parizi
  Topics: Software Engineering
  Presentation | Poster
- **3-d Place UC-082 - Remote Presence Robot in the Classroom** (Undergraduate Capstone) by Noah Trinite, Anna Furrow, Christopher Lyons, Joshua Odeyemi, George Tatge, James Perdue, Dylan Sloan
  Department: Computer Science
  Supervisor: Dr. Ken Hoganson - Capstone Instructor
  Presentation | Poster

Undergraduate Research

- **1-st Place UR-120 - Analyzing Adversarial Attacks in Machine Learning Models** (Undergraduate Research) by Niti Mirkhelkar
  Department: Computer Science
  Supervisor: Dr. Dan Lo
  Topics: Artificial Intelligence
  Presentation | Poster | More Information
- **2-nd Place UR-086 - Food Desert: Hungry For Answers** (Undergraduate Research) by Lawren Cumberbatch
  Department: Data Science and Analytics
  Supervisor: Prof. Susan Mathews Hardy

Topics: Data/Data Analytics

[Presentation](#) | [Poster](#)

- **3-d Place UR-102 - Auto Grader for Unstructured Open-ended Questions using Natural Language Processing and Recommender Systems** (Undergraduate Research) by [Anna Furrow](#)
  Department: Computer Science
  Supervisor: Dr. Mohammed Aledhari
  Topics: Artificial Intelligence

  [Presentation](#) | [Poster](#)

Contact Info

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Kennesaw, GA 30144

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Marietta, GA 30060

Campus Maps

Phone
470-KSU-INFO
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kennesaw.edu/info

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College of Computing and Software Engineering / Computing Showcase /
Fall 2021 C-Day Program

Fall 2021 C-Day Program

Thursday, December 2, 2021

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

C-Day Home Page

Return to the C-Day home page.

Fall 2021 Winners

View the Fall 2021 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) building3d 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 the Interim Dean Yenduri 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 • Best UndergraduateProject • Best Graduate Project • Best Undergraduate Research Project • Best Graduate Research Project

Fall 2021 Presentations

Judges —

- Fatma Abdelkefi - Sr, Manager, Science - Infor
- Bob Cole - Managing Director - Accenture
- Andrew Greenberg - Executive Director - Georgia Game Developers Association
- Leonard Greski - Architecture Practice Lead - LeadingAgile LLC
- Joshua Gaze - Data Analyst - Global Payments
- Andrew Hamilton - CTO - Cybriant
- Andrew Jergel - Epidemiologist Assistant - Georgia Department of Public Health
- Tatiana Loskutova - Science Solutions Management Director - Infor
- Jessica Reyes - Data Scientist - Equifax
- Dorren Schmitt, Ph.D. - Sr. Director Technology Engineering - Weather Group Television
- Frank Ziller - SVP and CIO - Frontline Managed Services

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) (14)   —

* Project will be featured during the Flash Session

- **UC-072 - Authenticating Middleware Implementing DNS-Based Identity** (Undergraduate Capstone) by Brooklyn Crowe, Jade Godwin, Marilyn Marcos, Aaron Moore, Ricardo Rojo, Noah Starr,
  Abstract: Emails have been around for a long time with very little improvements made. Without security in mind, you assume that only people you have given your email to can contact you. So why not trust the strange person on the internet that claims you wont money from a deceased family member far, far away? By adding authentication protocols and deciding who you will allow to send email, our added layer of protect can help keep your privacy safe.
  Department: Software Engineering and Game Design and Development
  Supervisor: Dr. Reza Parizi
  Topics: Software Engineering
  Presentation | Poster
- **UC-079 - Linked in Alumni Data | IT4983 Section W01 | Group 2** (Undergraduate Capstone) 5 by Timothy Maroosis, Devin Javier, Niyoosha Peymani, Celina Harris, Rumsha Karim
  Abstract: Project members are given data sets regarding alumni data from LinkedIn and a list of required deliverables. The members of the team are to design a database into their chosen database system, import the data into the database, and run various queries to generate charts and other data visualizations regarding different data analyzation cases.
  Department: Information Technology
  Supervisor: Dr. Ying Xie

Topics: Data/Data Analytics

Presentation | Poster | More Information

- **UC-080 - IT Deployment AoA** (Undergraduate Capstone) by Trexell T. Bailey, Elijah Deputy, Sabiha Iqbal, James Diaz, Evan Dillon, Kathryn S. Highers
Abstract: Description: This project is an Analysis of Alternatives (AoA) for workspace deployment solutions in small scale IT deployment environments. Motivation: This research will be primarily used to compare and measure the capabilities of various IT deployment solutions and provide a recommendation on the best solution for small scale IT deployment environments using RHEL, Windows, or MacOS. Materials: Google Docs, Google Sheets, Kennesaw State University Undergraduate Research Lab, RHEL 7, RHEL 8, Windows 10, Windows Server 2019, Ubuntu. Methods: Our methods include requirements elicitation through weekly meetings with our client. This presents us with the opportunity early on to get feedback and improve upon our Requirements Document until the client is satisfied. Using the Requirements, we have used the Requirement/Question/Answer (R/Q/A) method to create our metrics. This method allowed us to create quantifiable and traceable metrics along with client feedback. Preliminary Results: With only research completed so far, our top three scoring solutions in terms of flexibility of Operating System Compatibility, usability in creating/managing custom environments, and multiple security aspects are Foreman, Ansible, and Salt.
Department: Software Engineering and Game Design and Development
Supervisor: Dr. Reza Parizi (Course Instructor) Allison Boyle (Supervisor) Dr. Dawn Tatum (Co-Supervisor) Matthew Pinkston (Project Owner, Sponsor)
Topics: IoT/Cloud/Networking

Presentation | Poster

- **UC-082 - Remote Presence Robot in the Classroom** (Undergraduate Capstone) by Noah Trinite, Anna Furrow, Christopher Lyons, Joshua Odeyemi, George Tatge, James Perdue, Dylan Sloan
Abstract: COVID-19 has impacted everyone. Both students and professors have talked about the disconnect felt between themselves and their classes due to everything moving online. The purpose of this project is to give the students an opportunity to feel like they have a little more connection between themselves and the classroom while also providing the professor a chance for a physical audience so they're not staring at a screen of initials. Students will be able to connect to the robot from another computer and control the robot via keyboard commands, the user will be able to see and hear from the bot's perspective via the webcam on the bot. The bot will have a monitor that will display the webcam video from the user's end. The bot will also have a speaker that will be used to relay the user's audio. The user will be able to select an area of interest and the bot will track the movement of that area of interest. The idea is to have a classroom full of these bots so that students can connect to them and control the bots.
Department: Computer Science
Supervisor: Dr. Ken Hoganson - Capstone Instructor
Topics: Other (explain in the comments section)

Presentation | Poster

- **UC-085 - Universe Language CRM App** (Undergraduate Capstone) by Kara Stanley, Khalid Diab, Gabriel A. Rodriguez Serrano, Sammantha King, Carolina Martinez, Taren Bridges
Abstract: We created a mobile app and desktop app that are used together in order for Universe Language Solutions to be able to easily manage requests to book the services they offer. The desktop app is used by the administrative team to view what clients have requested and what staff can work. The mobile

app will be used by clients and staff. Clients can see what services are offered and request the service they need, as well as see the status of current requests and what services have been requested in the past. Services include interpretation, translating, and closed captioning. The staff, including interpreters, translators, technicians, technical assistants, distribution assistants, and captioners, will be able to view and accept, decline, or reply maybe to upcoming jobs to work at. This allows Universe Language Solutions to have one place to perform all transactions, which streamlines their current process that only utilizes email and phone calls to request services and staff events.
Department: Software Engineering and Game Design and Development
Supervisor: Dr. Reza Parizi - capstone professor Carlos Solis - project sponsor
Topics: Other (explain in the comments section)
[Presentation](#) | [Poster](#)

- **UC-087 - Hibernate Funds: Back Office Portals for Fundraisers** (Undergraduate Capstone) by Phillip Blackwell, Kasey L. Merritt, Patrick A. Krouba, Daniel Duran, Diana Calixto, Logan Miller
Abstract: For this project, we are working with the Hibernate Funds organization to build a new web application that can be used by organizations, such as schools, who are trying to raise funds. We will be creating an online, back office portal that will allow these organizations to better track the data associated with their fundraiser. To that end, each user role in the system will have their own dashboards where they will be able to track statistics relevant to their own position. The dashboards will display important information, in both a tabular and graphical format. These dashboards will help organizations who are fundraising by automatically keeping track of their sales and displaying relevant statistics and information to all involved parties. The system will contain the following roles: Hibernate Admins, Hibernate Sales Representatives, Participant Leaders, and Participants. The Hibernate Admins will have the greatest functionality in the system and will have insight into all other system roles. They will be able to add, delete, and edit all organizations and users. A Hibernate Sales Representative will have a role one step down in the system from the Hibernate Admins. These users will work with multiple different organizations composed of the participants and the participant leaders. A Hibernate Sales Representative will be able to see data aggregated over all of the different organizations they are working with and only those organizations. They will be able to add, delete, and edit all organizations and users they work with within the system. The Admin and Sales Representatives user roles will each have their own portal. Each user should see dashboards that display total sales statistics for different organizations. The Hibernate Sales Representative will be limited to their specific organizations while the Hibernate Admins will have access to all organizations in the system. The dashboards will display relevant data through different charts and tables. In addition, both roles will be able to set organizations as Active or Ended in the system. Each organization in the system will be composed of that organizations Participants and a Participant Leader. These are the users that are actively involved in raising funds for their organization. Their specific portal will bring them to dashboards that provide them with insight into all the sales they've made so far and show them how far away they are from their target goal. Fundraising sales data will be associated with each participant through the use of a unique URL when the product is being purchased. The participants will then be able to see all of

their sales transactions in their portal (i.e., they can see on their dashboard each transaction when a supporter purchases their product). Charts and tables will then be generated to display things like how much money has been raised and how far they are from their goal. While each individual participant can only see their own data, the participant leader can see data across the participants in their organization. Hibernate Funds has asked us to start this project from scratch rather than build on to an existing application. Since we are starting from scratch, this project will be the first version of the application.
Department: Software Engineering and Game Design and Development
Supervisor: Capstone instructor: Dr. Reza Parizi Project sponsor: Cody Flemming
Topics: Software Engineering
Presentation | Poster

- ***UC-089 - 3D Information Extraction from Physics Exercise Videos** (Undergraduate Capstone) 3 by Benjamin M. Miller, Khoa Ho, Mickael D. Yongo
  Abstract: This project stems from a collaborative effort with a group studying exercise science led by Dr. John Johnson & Dr. Michael Hales. The group studied 3D information that was scanned from athletes exercising in an environment with multiple cameras to gather information. The motivation of this project is to provide a mobile solution that will be able to extract 3D information from athletes on the field without the use of the previous setup. The goal of the project is to extract similar information with the use of a device as portable as a cellphone. Our group has used multiple different packages available on GitHub that use deep learning techniques to produce estimates of 3D poses using 2D key points. We have successfully produced predicted 3D poses using both trained datasets and custom footage provided by the exercise science group. The most successful package we have used has been VideoPose3D. Our group is working to provide coordinates for key points so that the exercise science group can calculate valuable information.
  Department: Information Technology
  Supervisor: Sponsors: Dr. Ying Xie and Dr. Linh Le
  Topics: Artificial Intelligence
  Presentation | Poster | More Information

- ***UC-092 - Wireless Information and Power Transfer using Beam Forming** (Undergraduate Capstone) by Shikirah B. Johnson, Orion Williams , Aaron Bennett , Braden Tucker
  Abstract: In our paper we consider a full duplex relaying system powered by an energy constrained relay node. The Relay is powered by radio frequency signals, provided by an access point, and is utilizing time switching architecture to perform wireless information and power transfer. In our research we focus on beam forming from Relay to destination. We consider the delay tolerant transmission method and the realistic throughput of data and power. In the process of sending information to the destination the relay is using Amplify-and-forward to increase the signal. In the process we consider the effects of an eavesdropper between the relay and destination, we utilize jamming signals to ensure that the eavesdropper does not receive the same information as the other nodes in the destination area. We focus on the optimal time it will take to complete the transmission of information and power from source, which is the access point, to destination.
  Department: Information Technology
  Supervisor: Dr. Ying Xie - Instructor Dr. Sumit Chakravarty - Project Sponsor

Topics: Artificial Intelligence
Presentation | Poster

- **UC-110 - Habermas V0.1** (Undergraduate Capstone) by Anthony Grant, Chloe E. Raymond, Sean M. Shields, Mark T. McVay
  Project Sponsors: Jonathan Boardman, Dr. Ying Xie
  Department: Information Technology
  Supervisor: KSU supervisor/Sponsor: Dr. Ying Xie Sponsor: Jonathan Boardman
  Topics: Data/Data Analytics

- **UC-112 - Telemedicine Web Application - CS4850/03 - Group 5A** (Undergraduate Capstone) by Cade T. Lanktree, Michael L. Wessels, Yash Shidhaye, Kevin J. Crews, Estephany Bonilla, Jodi-Ann Patterson, Will Paris
  Abstract: The motivation for this project was to create a telemedicine web portal for a local physician. Telemedicine web applications have become indispensable during the COVID-19 Pandemic in order to minimize the transmission risk of SARS-CoV-2 between patients and healthcare workers. This portal will be able to: store messages/chat, reports, requests for appointments, store video recordings, and host video recordings in a HIPPA compliant manner. This project was assigned to students in Section 03 of the Senior Project Course at Kennesaw State University. The project submissions are split into three sprints throughout the Fall 2021 Semester. The preliminary results as of this abstract being submitted are as follows. The authors have created a singular React JS web application that serves as the front-end of their web portal. The distinct pages of this application are Home, Reports, Recordings, Messages/Chat, and Video Chat. Amazon Web Service (AWS) resources were utilized to store reports, recordings, and important user data in a cryptographically-secure manner. New users can create an account, edit user attributes, and reset their password through AWS'"Admin UI."Each Admin UI group for this web portal, Patients, Nurses, Doctors, and Administrators, are given specific privileges to restrict or allow access to application resources. For example, all Patient accounts should only access their unique video recordings or reports. The primary user attributes, such as Name, Birthdate, and Address are stored in Admin UI. The lab data for each unique patient is also stored in Admin UI, and now the authors need to store more detailed lab reports in a PDF format. These PDF reports will be stored in AWS' S3 Object Storage, and each user will have a unique"Bucket"for their reports. The same backend is used for the video recordings page where read and write functionality is completed. The video recordings page needs to extend this functionality to each user instead of the singular bucket it is currently using. The Messages page allows all new user accounts to be automatically added to the chat database. The Messages page uses the Chatengine.io library to connect individual users to a new chat session. The remaining Messages page changes are minimal and include simple UI features and dependency requirements. The Video Chat page utilizes the Heroku Platform to connect Patients and Doctors. This page will soon allow the recording of live video chats which will be manually uploaded to the video recordings page. The remaining global changes before this telemedicine web application is submitted include a unified styling schema, dynamic page access for unique user pools in Amazon Cognito, and synchronized button handling. Once these changes are made, this React JS Application may be launched from a unique URL or an Administrator account using AWS Admin UI. The authors have attached the first two Sprint PowerPoints which were used in each submission thus far.

Department: Computer Science
Supervisor: Dr. Ken Hoganson
Topics: Software Engineering
Presentation | Poster

- ***UC-116 - Security Solution for a Small Business** (Undergraduate Capstone)
by Jessica Casasola, Craig Englert, Phuc Nguyen, Charles Pegram, James Vesper
Abstract: For our project, we constructed our own e-commerce website using an open source template to use within our server as a simulation for a small business. Working through the server assigned through us, we installed our e-commerce site and built a security program around it. Our security includes an Avast anti-virus, Snort IDS/IPS, and a Pfsense firewall. We also changed some settings within the server to only allow for some changes to be made as well as changed user and root passwords.
Department: Information Technology
Supervisor: Supervisor: Dr. Ying Xie Sponsor: Dr. Lei Li
Topics: Security
Presentation | Poster

- ***UC-134 - Georgia School Grades Map** (Undergraduate Capstone) by William T. Duren, Joe Richardson, Amanda Doige, Tylor Anderson, Gamada Fayiso
Abstract: This project serves to create a functional, hosted website that conveys a visual representation of various data points regarding public schools within Georgia. The site contains a map display that portrays every public elementary, middle and high school within the state, as filtered by the selection of the user. Once the user selects a school, various information regarding location, grades, graduation rates etc is provided about the school.
Department: Information Technology
Supervisor: Dr. Jack Zheng
Topics: Data/Data Analytics
Presentation | Poster | More Information

- ***UC-138 - 3D Extraction from Physics Exercise Videos** (Undergraduate Capstone) by Zachary Matthews, Lhakpa N. Sherpa, Francisco J. Alvarez, Sam Guan, Philip McFarland, Cole Bruton
Abstract: This project is used to track the movement and pinpoint key points on the people that are in the videos.
Department: Information Technology
Supervisor: Dr. Ying Xie & Dr. Linh Le
Topics: Data/Data Analytics
Presentation | Poster | More Information

- ***UC-141 - Georgia Schools** (Undergraduate Capstone) by Maxwell Trivers, Bailey Knezevich, Samson Oso, Mo Khan
Abstract: Description: This project allows a user to search and sort through the Georgia school system and see the schools visually and sorted onto a map. Motivation: This project's goal is to allow a user to sort through the school system as efficiently and effectively as possible. Materials and Methods: We used JavaScript, jQuery, Mustache.JS, Google Maps API, Azure Hosting, HTML, and CSS. Preliminary Results: At this point we can search through the schools and have personalized markers pop up on our map depending on the grade levels and rating of the school. We also have headers pop up on each marker with the school's name, information, and a link to its website. Site URL: https://baileyknez.github.io/CapstoneKSU2021/
Department: Information Technology
Supervisor: Dr. Jack Zheng

Topics: Data/Data Analytics
[Presentation](#) | [Poster](#) | [More Information](#) | [More Information](#)

Academic courses graduate (e.g. capstones, games, innovative special topics projects, other course projects) (7)

* Project will be featured during the Flash Session

- ***GC-074 - Statistical and Machine Learning Approaches to Investigate Adverse Effects of COVID-19 Vaccinations** (Graduate Capstone) by [Aleema Dyer](#), [Azadeh Khorsandi](#), [Carter Mauro](#), [Francelene Carmichael](#), [Lillian McCrary](#) , [Martin Martinelli](#)
  Abstract: Abstract—The novel coronavirus disease (COVID-19) has been ongoing since December 2019 and continues as a highly contagious virus. COVID-19 is mutating in more viral, lethal variants and while COVID-19 vaccines have been available to the generalU.S. public for a majority of 2021 there exists a struggle to encourage vaccinations. In this study, authors utilize multiple machine learning methods in order to find which model has the highest accuracy in predicting if a reported event in VAERSwill recover or not. This is done through supervised machine learning software, WEKA, and several training models that can process given dataset in a single rational table form. EachWEKA's ML techniques are compared against a random dataset training split and then weighed based on several performance indicators. In addition, we leverage the overall VAERS dataset for statistical analysis of the most common symptoms present in adverse reactions leading to death and other demographic factors as reported. Index Terms—COVID-19, Vaccination, Adverse Reactions,Symptoms, Machine Learning, Statistical Analysis, WEKA
  Department: Information Technology
  Supervisor: Dr. Seyedamin Pouriyeh
  Topics: Artificial Intelligence
  [Presentation](#) | [Poster](#) | [More Information](#)
- **GC-105 - VISUAL EVALUATION OF PREDICTION OF GLAUCOMA USING MACHINE LEARNING** (Graduate Capstone) by Praneeth Kumar Reddy Dendi, Anirudh Kollipara, [Maneesha Kumari Penmetsa](#)
  Abstract: Glaucoma is a pathological condition of optic nerve damage and is the second leading cause of vision loss. It is known as the silent thief of sight. The project aimed to develop machine learning models that have strong prediction power and interpretability for the diagnosis of glaucoma. We used retinal images dataset and performed support vector machine algorithm and C5.0, random forest (RF), support vector machine (SVM), k-nearest neighbor (KNN) algorithms and We repeatedly composed a learning model using the training dataset and evaluated it by using the validation dataset and gained 94.4% accuracy.
  Department: Computer Science
  Supervisor: Dr. Mahmut Karakaya
  Topics: Artificial Intelligence
  [Presentation](#) | [Poster](#)
- ***GC-106 - Emotion Recognition Using Wireless Signals** (Graduate Capstone) by [Jui Mhatre](#)

Abstract: Emotion Recognition plays an important role in understanding human behavior. It finds its utility in various domains such as healthcare, automobile industries, understanding social interactions, fraud detection, and many more. Analyzing a person's emotions in a controlled environment with various devices has been challenging since it adds to human anxiety, which manipulates the readings. This presents a need to devise ways to recognize and study emotions in a wireless manner. There have been previous works done to predict emotions by obtaining photos of subjects whose facial features were analyzed to identify emotions. Though this is an easier way of obtaining results, the data obtained could be wrong since such features could be faked by people. Physiological signals play an important role here. But obtaining physiological signals like Electrocardiography (ECG), Electroencephalography (EEG), Heart Rate Variability (HRV), Blood Volume Pulse (BVP), Galvanic Skin Response (GSR), Electrodermal analysis (EDA), etc. require dedicated equipment, handling skills, and its knowledge. Moreover, human emotions are contaminated when devices are planted on the body since it produces discomfort for them and thus produces incorrect signals. Both physical and physiological methodologies have their advantages and disadvantages. Taking best from both worlds, this paper proposes a technique for emotion recognition that combines both approaches where both physical and physiological signals are used. We use Remote Photoplethysmography (rPPG) to identify the HRV and HR signals which are analyzed and classified for emotion recognition. We use KNN-classifier for training emotion recognition. To obtain diversity in emotions, we have combined SWELL and WESAD datasets. The proposed classifier with SMOTETomek sampling gives improved results for the imbalanced and overlapping datasets. We have done comparative study for Logistic regression (accuracy = 50.34%), Support Vector Machine (SVM) classifier with OVR strategy (accuracy = 85.36%), K-nearest-neighbour (KNN) with k =500 (accuracy = 93.27%) and Naive Bayesian classifier (accuracy = 35.46%). We observe that the KNN classifier gives better results than other proposed models as well as state of art classifiers.
Department: Computer Science
Supervisor: Dr. Mohammed Aledhari
Topics: Data/Data Analytics
Presentation | Poster | More Information

- **GC-113 - NLP Sentiment Analysis on Amazon Reviews** (Graduate Capstone) by Sushma Aladhalli Shivakumar, Swetha Pailla, Sireesha Hasti

  Abstract: A lot of times, companies want to understand the public opinion on their products and figure out what's responsible for the growth and backfall. For better understanding, they perform sentiment analysis on their product reviews. Sentiment analysis has been on the rise because of the availability of new analysis techniques in deep learning, and there is an incomprehensibly large amount of data being generated everywhere. Every product review, every tweet, every reddit post, etc., contains subjective information which we would like to be able to process and understand. It helps the organization to recognize the primary issues with their products and to extract the instructive information from a large amount of data is crucial. In this project, we propose a deep neural network architecture using NLP techniques to evaluate the performance of proposed models in terms of accuracy, precision, sensitivity, specificity, f1-score, confusion matrix and classification report.

  Department: Computer Science
  Supervisor: Dr. Mahmut Karakaya

  Presentation | Poster | More Information

- ***GC-123 - Service Delivery Enhancements using Live Chats and Virtual Agents** (Graduate Capstone) by Patrick R. Wadkins, Peter Twene, Rachel Williamson, Tamar McDowell, Naomi DeGraft,
  Abstract: The Kennesaw State University, University Information Technology Services department needs to evaluate the use of the ServiceNow Virtual Agent and Live Chat Support for use at the KSU UITS Service Desk to enhance service delivery. The UITS Service Desk is currently staffed by six full-time employees and ten part-time student assistants (who work less than 20 hours per week). Areas of concern include the high volume of service and incident tickets, the small number of staff, and the available service hours (eighty-three hours per week). The objective of this project is to: 1. Evaluate both ServiceNow's Live Chat and AI-based Virtual Agents as potential options for enhancing and optimizing service delivery. 2. Compare ServiceNow's Virtual Agent to their Virtual Agent Lite and determine which is a better fit for KSU. 3. Determine efficiencies gained/lost by employing these added support options 4. Determine the optimal number of clients per live chat agent. 5. Recommend an appropriate number of live chat agents based on this new methodology and historical trends. 6. Recommend appropriate configuration and deployment methodologies 7. Determine which metrics can/should be captured and for what purpose 8. Make recommendations for how our knowledgebase can/should be used or enhanced to work best with both the Live Chat and Virtual Agent. 9. Develop and document the workflows for live chat and virtual agents, including escalation paths 10. Document how to best train the artificial intelligence components of the virtual agent, and how much and what kind of data is necessary to professionally train the system to meet the needs of the institution 11. Make recommendations for how the Live Chat and Virtual Agent might integrate with existing KSU technologies
  Department: Information Technology
  Supervisor: Dr. Zhigang Li
  Presentation | Poster | More Information
- **GC-125 - COVID-19 PREDICTION USING SYMTPOMS** (Graduate Capstone) by Yagna Gurjala, Chalamayya Batchu, Shruthi Pethe
  Abstract: The recent COVID-19 outbreak, which was triggered by the new coronavirus SARS-Cov2, is a pressing global concern. In the absence of effective therapies, the primary containment method is to restrict the spread of infection by isolating sick people; nevertheless, isolating unaffected people is extremely undesirable. It would be useful to determine which symptoms presented by suspected infection patients are the best predictors of a positive diagnosis to assist in making smart decisions on treatment and isolation needs. It is possible to create prediction models that include numerous characteristics to assess the likelihood of infection. We intend to use a machine-learning approach that will be trained on records from tested individuals(some of whom have been confirmed to have COVID-19). Using the attributes from the dataset, our model will reliably assess COVID-19 test results. When testing resources are limited, this approach can be used to prioritize testing for COVID-19, among other factors.
  Department: Computer Science
  Supervisor: Dr. Mahmut Karakaya
  Topics: Artificial Intelligence
  Presentation | Poster
- ***GC-132 - Microsoft Azure Sentinel to ConnectWise Integration** (Graduate Capstone) by Christine Neal, Miseker Birega, Ryan James, Charul Patel, L.

Renee Davis Townsend, Matthew Parker,
Abstract: This project provides our client, Cybriant, with an integration tool between ConnectWise Manage and Microsoft Azure Sentinel. Cybriant, a leading Managed Security Services Provider, utilizes Microsoft Azure Sentinel to detect and analyze security incidents. In order to manage these incidents, Cybriant needed to manually transfer data collected into ConnectWise Manage, the platform Cybriant utilizes to manage incident tickets internally. Manually entering this data for each detected incident was inefficient and error-prone. Using Logic Apps, our team created an integration solution to aid Cybriant with this time consuming process. Once incidents are detected or handled in Sentinel, our integration solution automatically triggers through the creation of a ticket in ConnectWise. This ticket contains a description, the severity, and other pertinent information related to the incident. Additionally, once the ticket is closed in ConnectWise, our integration tool communicates with Sentinel to close this ticket. In order to keep their system secure, Key Vaults are used to ensure that no sensitive data is hardcoded. Key Vaults also provide a central location for the security keys to be updated. Our integration solution permits security, precision, and efficiency for our client.
Department: Software Engineering and Game Design and Development
Supervisor: Dr. Reza Parizi
Topics: Enterprise Systems
[Presentation](#) | [Poster](#)

Graduate Research (14)

* Project will be featured during the Flash Session

- **GR-077 - A Robust Federated Machine Learning Framework for Security Analytics in Solar Farms** (Graduate Research) by Jiaming Li
  Abstract: Smart grids face more cyber threats than before with the integration of photovoltaic (PV) systems. Data-driven based machine learning (ML) methods have been verified to be effective in detecting attacks in power electronics devices. However, standard ML solution requires centralized data collection then processing that is becoming infeasible in more and more applications due to efficiency issues and increasing data privacy concerns. In this letter, we propose a novel decentralized ML framework for detecting false data injection (FDI) attacks on solar PV DC/DC and DC/AC converters. The proposed paradigm incorporates the emerging technology named federated learning (FL) that enables collaboratively training across devices without sharing raw data. To the best of our knowledge, this work is the first application of FL for power electronics in the literature. Extensive experimental results demonstrate that our approach can provide efficient FDI attack detection for PV systems and aligned with the trend of critical data privacy regulations.
  Department: Computer Science
  Supervisor: Dr. Liang Zhao
  Topics: Artificial Intelligence
  [Presentation](#) | [Poster](#)
- ***GR-078 - AI for Social Good: Assisting the Elderly/Visually Impaired in Reading Prescription Labels** (Graduate Research) by Stacie P. Allen, Jessica Barnes, Lauren Pope, Chenelle Hill
  Abstract: According to the Centers for Disease Control (CDC), roughly 12 million people in the United States above the age of 40 are visually impaired. In adults

18 years and older, visual impairment is one of the top 10 disabilities, and can have an enormous effect on one's independence and quality of life. Assistive technology through artificial intelligence can support the visually impaired in everyday life functions. Our application is specifically designed for reading text such as small print on prescription labels. After the user takes a picture of the text with the app, the text is extracted from the image, converted to speech, and played to the user in audio format. Overall, this app is a benefit to society through increasing the quality of life for the visually impaired.
Department: Information Technology
Supervisor: Dr. Ying Xie
Topics: Artificial Intelligence
Presentation | Poster

- **GR-083 - Analysis of Malware Detection Techniques** (Graduate Research) by Joel Stansbury, Robert White, Keifer Bazan
  Abstract: Today's digital world is pervaded with malware. In response to this reality, there are copious studies being conducted around the world on how best to improve the detection of malware, as malware becomes more sophisticated with every passing year. In the following report, we will discuss some current studies of interest on malware detection techniques and propose some of our own suppositions on how these suggested techniques can be improved upon.
  Department: Computer Science
  Supervisor: Dr. Dan Lo
  Topics: Security
  Presentation | Poster

- ***GR-095 - Using Machine Learning to Detect Alzheimer's Disease** (Graduate Research) by Rhema Razzak, Yang Fu
  Abstract: More than 6 million Americans are currently living with Alzheimer's Disease. Alzheimer's Disease causes problems with memory, thinking and behavior, and while treatments exist to help manage the condition, there is no known cure. Alzheimer's Disease often requires lab / imaging tests for proper diagnosis, but even with current diagnostic tools, accuracy from these tests can vary. These tests also may not be able to differentiate between normal brain function and mild to moderate Alzheimer's Disease. As such, Machine Learning has proven to be a valuable tool in improving Alzheimer's Disease detection and classification. For our project, We utilize Machine Learning to accurately classify different stages of Alzheimer's Disease. We use two datasets: (1) a 34.7 MB dataset from Kaggle which contains 4 MRI images: Mild Demented, Moderate Demented, normal, and Very Mild Demented. (2) The OASIS(Open Access Series of Imaging Studies (OASIS) dataset. (2) was used for testing and validation. We tested a total of four Machine Learning techniques and convolutional neural network (CNN) on both datasets. On dataset (1) our CNN achieved a high accuracy of 96% and a validation loss of 10%. On dataset (2) our Machine Learning methods were tested 6 times at different test sizes: 30%, 20%, and 10%. Our XGBoost classifier outperformed all other machine learning classifiers, scoring an accuracy of 84%. These results indicate that Machine Learning can differentiate between normal patients and those with mild to moderate Alzheimer's Disease.
  Department: Data Science and Analytics
  Supervisor: Dr. Ramazan Aygun
  Topics: Data/Data Analytics
  Presentation | Poster

- **GR-100 - Non-Invasive Monitoring of Human Hygiene using Vibration Sensor and Classifiers** (Graduate Research) Shashank Trivedi, by Shashank Trivedi, Md Jobair Hossain Faruk

  Abstract: Personal hygiene is how people take care of their bodies. Maintaining hygiene practice reduces the spread of illness and the risk of medical conditions. With the current pandemic situation, practices like washing hands and taking regular showers have taken major importance among people, especially for senior populations that live alone at home. Having an understanding of the human hygiene habits of our seniors is fundamental to monitoring health conditions.This research work presents the concept and idea of a noninvasive monitoring system for human hygiene using only vibration sensors. The approach is based on a geophone, a digitizer, and a cost-efficient computer board (raspberry pi). We capture the vibration of the water flow while people perform activities in the bathroom (open faucet, flush toilets) and kitchen (open kitchen sink). Results show that our approach can distinguish from these different activities with an accuracy higher than 90%. With this approach, we hope to start a new tendency of monitoring people activities without using cameras or other privacy-invasive methods.

  Department: Information Technology

  Supervisor: Dr. Maria Valero

  Topics: IoT/Cloud/Networking

  Presentation | Poster | More Information

- **GR-101 - Non-Invasive Glucose Monitoring System using Raspberry Pi Four** (Graduate Research) by Priyanka Pola

  Abstract: Diabetes is a metabolic disease that causes high blood sugar. It is the most predominating condition in population between 45 and 64. In this population, periodic glucose monitoring is crucial to keep blood glucose levels under control and take appropriate medication. The traditional method for monitoring blood glucose involves the use of a glucometer that requires a blood sample obtained from the person's finger after being pricked. One cannot deny the fact that this method causes discomfort and stress at the sight of puncture. In this research, We propose a Non-Invasive Glucose Monitoring System, which is easy to use, inexpensive and most importantly, does not require any blood samples. Patients will have a simple and effective way to keep Diabetes in control without discomfort. The use of optical sensors has gained much attention in recent years. Taking those sensors and leveraging the capabilities of small cameras, we create a prototype that is connected to a Raspberry Pi. The prototype captures images of the fingertip when a laser beam is directed to human tissue. Blood glucose concentration can be estimated by studying the absorption, reflection properties, and analyzing how the light is transmitted along the finger. An artificial neural network model is proposed to be built and trained by the image dataset obtained to predict blood glucose level. The design includes a smartphone app which will be able to send an alert a physician if needed. This idea will help the diabetes community and make a blueprint for future research.

  Department: Information Technology

  Supervisor: Dr. Maria Valero De Clemente

  Topics: IoT/Cloud/Networking

  Presentation | Poster

- **GR-104 - Diabetic Retinopathy Detection using Deep Neural Networks without Pre-Processing techniques** (Graduate Research) by Suman Bharti, Swetha Pailla

  Abstract: Diabetic retinopathy (DR) is an eye condition that can lead to vision loss and blindness in people who have diabetes. The manual screening of

color fundus images to detect DR at early stages is expensive and time consuming. This process requires a trained clinician to examine and evaluate the diseased images, but this analysis is monotonous and error prone. Hence, various computer vision hands-on engineering techniques and machine learning models are applied to predict the occurrences of the DR and its stages automatically, but these methods are computationally expensive due to pre-processing techniques. Therefore, this study focuses on analysis of five different DR stages using Deep Neural Networks (DNN) without pre- or post-processing of retinal images to overcome the above limitations. We proposed a model called Capsule Neural Network (CapsNet) which adopts the concept of capsules to address the weakness in existing algorithms. Capsule neural network helps to perform the functions of a CNN with improved architecture and with for more robust classification. We used Kaggle (EyePACS) Dataset in this paper to train and test our model. There are five DR stages: 0 - No DR, 1 – Mild, 2 – Moderate, 3 – Severe, 4 - Proliferative DR. We trained and tested our model on an enormous dataset (6726) train images and (1682) test images to automatically detect the DR stages. In this research patient's fundus eye images are used as input parameters without applying any pre-processing techniques on eye images and the model (CapsNet) is trained for 150 epochs with batch size of 64 and tested on test dataset to predict the current stage of DR. The proposed model on challenging dataset (EyePACS) indicates that it outperforms state-of-the-art methods with average accuracy score of 0.76 without pre-processing techniques. Performance metrics: Average accuracy of 0.76, Recall of 0.73, Precision of 0.53, and F1 score of 0.61 are obtained and plotted ROC curves to support the suitable performance of the model.
Department: Computer Science
Supervisor: Dr. Mohammed Aledhari
Topics: Artificial Intelligence
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- **GR-114 - Decentralized Network Architecture on Git Platform** (Graduate Research) by Jonathan D. Lashgari, Kiran mai M. Narnavaram, Rohit Gowru
  <u>Abstract:</u> Git is a powerful distributed version control system used by developers all over the world. It is common practice to have developers synchronize with a central server to ensure all end-users have the most recent files and can access earlier versions of files. Central network architectures have the main problem of single-point failure. By creating a true distributed Git platform, end-users will participate in a decentralized network architecture and remove the issue of single-point failure. This project will compare the effects of different decentralized network architectures on the Git platform, implement a select number of the architectures, and propose one of the architectures to use on the Git platform based on their effects.
  Department: Computer Science
  Supervisor: Dr. Dan Lo
  Topics: Software Engineering
  [Presentation](#) | [Poster](#)

- ***GR-117 - Transfer learning with synthetic data improves the performance of fashion apparel pattern classification and neckline detection** (Graduate Research) by Tong Chen, Luke Cranfill, John Morris
  <u>Abstract:</u> The large size of the training dataset is often required to obtain a robust deep learning model. In the project, we aim to offer a solution to obtain a robust deep learning model with only a small amount of data. We proposed a machine learning scheme that utilizes transfer learning with synthetic data

to improve the deep learning model's performance in the fashion apparel classification domain with a small dataset. Our scheme successfully improves the accuracy of the deep learning model and reduces the overall training time/ computational power to reach such high performance.
Department: Computer Science
Supervisor: Dr. Junggab Son
Topics: Artificial Intelligence
Presentation | Poster

- **GR-118 - Sentiment Analysis on Hotel Review** (Graduate Research) by Navya Pallapothu, Aravinda Pandanaboyana, Dilip Kumar
Abstract: In this project, we are going to implement Sentiment Analysis (also known as opinion mining or emotion AI) is the use of natural language processing, text analysis, computational linguistics, and biometrics to systematically identify, extract, quantify, and study affective states and subjective information. Sentiment analysis is widely applied to voice of the customer materials such as reviews and survey responses, online and social media, and healthcare materials for applications that range from marketing to customer service to clinical medicine. As part of this project, we used the dataset of around 550K records and selected the 10% records out from that randomly as sample dataset and devided that sample into 8:2 ratio, in training and test dataset respectively.
Department: Computer Science
Supervisor: Dr. Mahmut Karakaya
Topics: Data/Data Analytics
Presentation | Poster

- **GR-121 - Binary Image Processing for Computation of Connected Components, Image Holes and Euler Number Using Graph Theory** (Graduate Research) by Sravya Sabbu, Prasuna Reddy Salepela, Yamini Hanisha Talluri, Sruthi Vaidyula
Abstract: Binary images are images whose pixels have only two possible intensity values. This is also used in human recognition for machines to learn their language and behaviour. This image processing is helpful for the easy disjunction of an item from its surroundings. This report is based on analysing of binary image process that consists of a set of image analysis operations that are used to produce or process binary images, usually images of 0's and 1's. These are mostly used to shape outline of an image. The pixel used in this binary image can be converted into required density and disparity.
Department: Computer Science
Supervisor: Dr. Dan Lo
Topics: Artificial Intelligence
Presentation | Poster

- **GR-127 - IoT Clusters Platform for Data Collection, Analysis, and Visualization** (Graduate Research) by Soin Abdoul Kassif Baba M Traore
Abstract: The Internet of Things (IoT) popularity leads more scientists and students to research this field. IoTs have an efficient way of monitoring complex infrastructure systems and the environment around them. Thus, they intervene in several areas such as health care, engineering, or monitoring the effects of climate change. IoT's primary function is to collect data and share them with a distant server through the internet or a private network. Research on IoTs is firstly about creating efficient light devices composed of sensors that follow rigorous security protocols to guarantee the integrity of the data from the collection to its final destination. Secondly, the challenge is to store the data on a secure platform accessible by competent people for analysis and visualization. The next generations of IoT devices will have to pass through

multiple tests to satisfy collection, transmission, and storing challenges. Our research implementation provides a physical system allowing users to set and configure sensors on Raspberry Pis or Arduinos for data collection, a secure data transfer using APIs, and a cloud base storing space for visualization and analysis. The objective is to make research on IoT devices easier by providing a ready-to-use platform that allows research teams to focus on developing and testing new devices. Also, it offers real-time visualization of collected data via a web bases application and an adequate database for future analysis. Our platform aims to help students conduct IoT research projects or provide a complete database to those interested in data science on various sensors or IoT devices.
Department: Information Technology
Supervisor: Dr. Maria Valero
Topics: IoT/Cloud/Networking
Presentation | Poster | More Information

- **GR-129 - Using Machine Learning Techniques for Early Alzheimer's Disease Detection** (Graduate Research) by Sudarshan Badireddi, Shalaka Kulal, Gayatri Sravanthi Kuntla, Travis Meeks
Abstract: Alzheimer's disease (AD) is a form of dementia that causes a serious problem with the memory, cognition, and motor skills of patients. There are various approaches and tools for AD diagnosis that are invasive, expensive, and bring discomfort to the patients. Those approaches are usually utilized when the patients are experiencing serious symptoms in an advanced state. AD early detection is a key factor to intervention to occur effectively or slow down/halt AD progress with appropriate medication. In recent years, machine learning (ML) techniques have received lots of attention for early disease detection and AD is one of them. In this project, we aim to use DimentiaBank dataset and explore different machine learning techniques for early AD detection.
Department: Information Technology
Supervisor: Dr. Syed Amin Pouriyeh
Topics: Data/Data Analytics
Presentation | Poster

- ***GR-130 - Prediction of Heart Disease with Machine Learning Techniques** (Graduate Research) by Marcella Araujo, Lauren Pope, Stephen Still, Cynthia Yannone
Abstract: Heart disease consistently ranks as one of the leading causes of deaths globally. This project utilizes a newly merged heart disease dataset with 918 unique instances and 12 attributes, comprised of five globally recognized datasets from UCI Machine Learning Repository. Various machine learning techniques such as OneR, Decision Tree J48, K-Nearest Neighbors, Support Vector Machines, Logistic Regression, and ensemble methods are applied on Waikato Environment for Knowledge Analysis (Weka) open-source ML tool and python sickit-learn with 10-fold cross validation to the dataset to evaluate the likelihood of a patient having heart disease. Overall, python sickit-learn and Weka results were similar, and ensemble methods have better accuracy than simple classifiers. The Weka results were slightly higher in all methods.
Department: Information Technology
Supervisor: Dr. Seyedamin Pouriyeh
Topics: Data/Data Analytics
Presentation | Poster

- **GR-131 - Privacy Preserved Federated Learning Approach for Diabetic Retinopathy Detection** (Graduate Research) by Mohammad Nasajpour

  Abstract: According to recent statistics, the number of people with diabetes is predicted to rise more than 552 million by 2030. Diabetic Retinopathy (DR) is one of the complications of diabetes caused by high blood sugar. This disease could be critical to people with diabetes, worsening their eye condition to vision loss or blindness. Since DR does not show symptoms at the first stages, early diagnosis has a huge clinical, social, and even economical importance in dealing with DR. In fact, not only early detection could prevent vision loss, but it could also be cost-effective compared to a situation where the patient is dealing with blindness. As we discussed, early detection of DR plays a key role in patients' treatments. However, proper equipment may not be available in developing countries. There are smartphone-based devices, e.g., iExaminer, D-Eye, etc., available that have been designed to detect damaged eye blood vessels due to the DR by taking low-cost images. Moreover, there is a high demand for analyzing such images to enable faster diagnosis. Researchers have deployed several types of deep learning techniques to address this critical image classification task. Although these models demonstrated efficient results with high accuracy, they may not be applicable in real life due to the strict privacy regulations on using the collected data. These regulations, such as the Health Insurance Portability and Accountability Act of 1996 (HIPAA), restrict the usage of confidential data in a centralized manner where the data should be transferred to the model for training. This shows the weakness of centralized deep learning models when dealing with confidential data. To address this problem, Federated Learning has been proposed to enable decentralized training of data. In this research, we aim to develop a privacy-preserving model using Federated Learning (FL). With regard to the scope of this research, real-time adoption of deep learning models is not applicable for smartphone-based devices where users can take their eye images to find whether their eyes are at considerable risk or not. In the proposed approach, we aim to simulate this process by assuming that our four available datasets perform as our four institutions by providing the data for DR detection. In this case, the images staying on the end-user device will be trained locally, and their aggregated weights will be transferred to the main global model. This enables healthcare institutions or patients to detect their DR condition without sharing their images along with confidential data. The proposed model allows us to securely work with different types of data without knowing the details of the samples. As shown in the figure below, FL will enable us to only aggregate model parameters and weights in a decentralized matter.
  Department: Information Technology
  Supervisor: Dr. Mahmut Karakaya Dr. Seyedamin Pouriyeh
  Topics: Data/Data Analytics
  Presentation | Poster

- ***GR-136 - Students Certification Management (SCM): Hyperledger Fabric-Based Digital Repository** (Graduate Research) by Md Jobair Hossain Faruk

  Abstract: The higher education sector has been heavily impacted financially by the economic downturn caused by the pandemic that has resulted a decline in student enrollments. Finding cost-effective novel technology for storing and sharing student's credentials among academic institutions and potential employers is a demand. Within the current conventional approach, ensuring authentication of a candidate's credentials is costly and time-consuming which gives burdens to thousands of prospective students and potential employees. As a result, candidates fail to secure opportunities for

either delay or non-submission of credentials all over the world. Blockchain technology has the potential for students' control over their credentials; degrees and transcripts for instance that will allow seamless streamlining of the sharing of educational records during changing and transferring schools, higher education, or even employment processes when need to show credentials. To implement the novel idea, we conduct a preliminary survey, study the existing applications, and investigate the feasibility of a Blockchain-based system to exploit the potential. Based on our findings, we propose a Students Certification Management System (SCM) by adopting Emerging Hyperledger Fabric that will offer a universal, tamper-evident, immutable, and secure educational certificate storing and sharing network. Our primary aim is to construct the proposed system into an educational certificate repository network using consortium blockchain for different entities including, (i) educational institutes to manage the network (ii) students and authorized third parties to access verifiable digital certificates and transcripts. Initially, we introduce an advanced architectural framework of the proposed system that has the potential in improving data flow between academic institutions, students, and potential employers. For ensuring transparency, each attempt in storing, sharing, and accessing credentials by the authenticated users within the proposed network shall be stored in the ledger which is secure and non-corruptible. Our future direction is to implement the architectural framework into an educational certification repository network within a private blockchain network.
Department: Software Engineering and Game Design and Development
Supervisor: Dr. Hossain Shahriar Dr. Maria Valero
Topics: Software Engineering

[Presentation](#) | [Poster](#) | [More Information](#)

Undergraduate Research (4)

* Project will be featured during the Flash Session

- ***UR-086 - Food Desert: Hungry For Answers** (Undergraduate Research) by [Lawren Cumberbatch](#)
Abstract: In 2010, the United States Department of Agriculture (USDA) reported that 23.5 million people in the United States live in food deserts. A"food desert"is defined as a neighborhood that lacks healthy food sources. This can be measured by distance to a store, number of stores in an area, individual-level resources (family income, vehicle availability), and neighborhood-level resources (availability of public transportation). Past research provides evidence that food deserts are especially likely to occur in minority-heavy communities. As a multiracial pre-med student aiming to join the world of healthcare innovation, the researcher is passionate about factors that affect the quality of life for commonly disenfranchised communities. However, can food deserts be predicted by factors other than race? The Food Access Research Atlas provided by the USDA provides census tract information for the state of Georgia. The data includes 1,965 census tracts with roughly 4000 people in each tract. The following relationships were investigated. Are more densely populated areas more likely to be food deserts? Are low-income census tracts more likely to be associated with food

deserts? Are median incomes the same for census tracts that are classified as food deserts and not? The methods used to investigate these relationships included both nonparametric and parametric hypothesis tests with corresponding post hoc comparisons. Stratified histograms and correlation plots will be used to display these findings. The researcher's preliminary research has yielded results indicating that Black Georgians are disproportionately affected by food deserts as compared to the nation, that nearly 500,000 senior citizens in GA are living in food deserts, and that communities with larger populations can be associated with lower poverty rates. Insights into these relationships and others may foster new ideas to solve the problem.
Department: Data Science and Analytics
Supervisor: Prof. Susan Mathews Hardy
Topics: Data/Data Analytics
[Presentation](#) | [Poster](#)

- **UR-102 - Auto Grader for Unstructured Open-ended Questions using Natural Language Processing and Recommender Systems** (Undergraduate Research) by [Anna Furrow](#)
  Abstract: Auto-graders are systems that score a response in comparison to a given key such that it reduces variance and human error in the grading process. Open-ended questions allow students to convey their knowledge of a subject in a unique way, but these questions are time consuming for a professor to grade. An auto-grader allows a professor to ask open-ended questions without having to make such a large time commitment to grading and would provide more consistency when grading. This can be done through the combination of Natural Language Processing techniques and Recommender systems. Student responses and an answer key are transformed to word vectors and then compared and scored accordingly through the Recommender System. This study aims to determine how the methods of short answer and long essay grading can be combined, quality and accuracy of a student's writing are considered in the grading process. An auto-grader that can score a student's writing like a professor would can make students experience better in terms of learning. Through this system, there is a dramatic decrease in the time it takes to score a student response, going from possible hours to mere minutes. The recommender system is also able to give a score similar, if not the same, as human graded responses. Through fine tuning and more training, the auto-grading system can be further explored for grading student responses.
  Department: Computer Science
  Supervisor: Dr. Mohammed Aledhari
  Topics: Artificial Intelligence
  [Presentation](#) | [Poster](#)

- **UR-120 - Analyzing Adversarial Attacks in Machine Learning Models** (Undergraduate Research) by [Niti Mirkhelkar](#)
  Abstract: Studies have been done on adversarial attacks in machine learning models, but not much research has looked at the possible adversarial attacks in Lidar data. Lidar, also known as Light Detection and Ranging, is used in autonomous cars because of its ability to map a car's surroundings (Cao et al. 2019). This Lidar data is used in machine learning models to classify the objects surrounding of a vehicle, and adversarial attacks are a threat to their security as they aim to confuse and attack these machine learning models (Bosech, 2021; Garfinkel, 2017; Kapelke, 2019; Lin & Biggio, 2021; Rosenberg et al., 2021). Since these attacks are getting stronger and more effective over time, a model using Lidar data is secured against adversarial attacks by adversarial training,

increasing road safety in the future. The preliminary results show that the model is built and returned the correct accuracy without the presence of adversarial images, but when adversarial images were introduced using Fast Gradient Sign Method, the model misclassified images. Adversarial training, a way machine learning models can be more robust (Ren et al., 2020; Using Adversarial, 2021) by being given images that are slightly"wrong"(Garfinkel, 2017; Ren et al., 2020; Short et al., n.d.; Using Adversarial, 2021), will be completed in this study to improve the accuracy.
Department: Computer Science
Supervisor: Dr. Dan Lo
Topics: Artificial Intelligence
Presentation | Poster | More Information

- **UR-124 - BreastNet; Ensemble Deep Learning** (Undergraduate Research)
by Cora L. Meador, Ryan Deem

Abstract: In the United states, 13% of women are diagnosed with breast cancer in their lifetime, and it is the second leading cause of death by cancer in women. Early detection and screening can result in an increase of life expectancy by 10 years on average. Unfortunately, breast cancer can be challenging to detect, since it can appear anywhere in the breast. Cancer that is detected in its early stages can give patients more options and save thousands of dollars in medical costs. Some of the most recent developments in computer science and machine learning are in the biomedical field, especially individualized healthcare. There is also an increase in the demand for telehealth options, reducing healthcare costs. With the help of computational technology, medical practitioners will be able to process data more quickly, which will allow more patients to have access to reliable treatment. Besides, systematic processes for interpreting various data types (such as clinical features, genetic information, and medical images) can identify trends that a human eye would not detect. This project aims to design and implement an artificial intelligence-based model called BreastNet to classify breast cancer into high and low-risk categories based on a combination of MRI images and clinical data. BreastNet uses a convolutional neural network (CNN), a type of machine learning methodology that imitates how the human brain learns information. Neurons fire in a connected pathway, reinforcing the relationship between a stimulus and the correct outcome. In this case, the CNN identifies characteristic features within the MRI that correspond to different life expectancy outcomes, which are notated in the clinical data. The clinical data serves as a loss function, which allows the network to identify how well the current model performs on images. We will evaluate the model by dividing the dataset into three partitions: training, validation, and testing, and then uses the evaluation metrics of Accuracy, Loss, F1 Score, Precision, Recall, Specificity, and Sensitivity. This model builds upon our previous project by implementing multiple ensemble models that use MRI images, clinical data, and genetic biomarkers.
Department: Computer Science
Supervisor: Dr. Mohammed Aledhari
Topics: Artificial Intelligence
Presentation | Poster