WELCOME
to
The 2021
Capstone Award
Ceremony

Rutgers
Electrical and Computer Engineering
Department
May 5, 2021

Dr. Narayan Mandayam

Department Chair, ECE, Rutgers

Dean Thomas Farris

School of Engineering, Rutgers

Congrats to all our seniors for a job well DONE!!!

Judges Panel

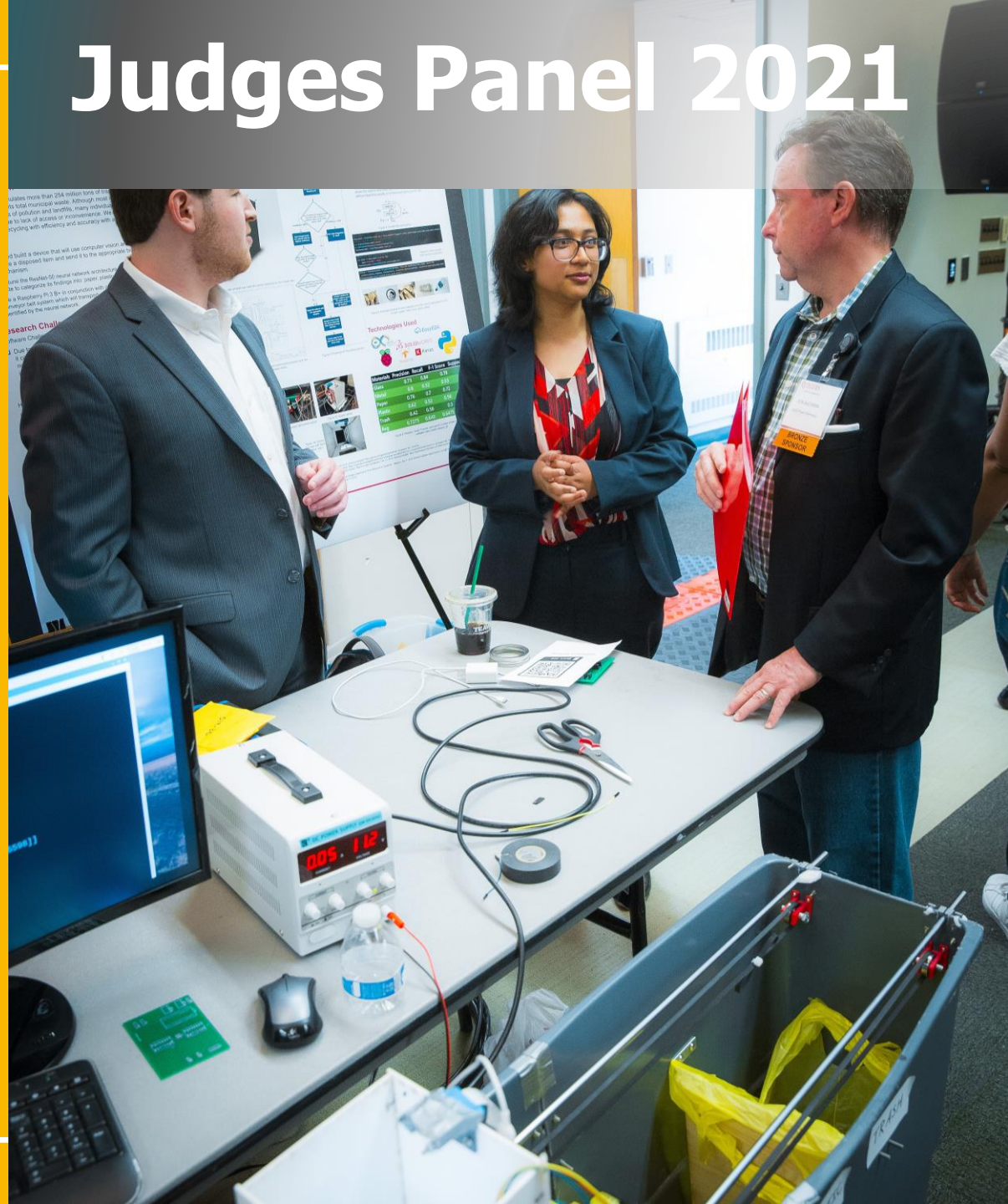
Thank You 2021 Panel of Judges

Judges Panel 2021

- Donald Levy, AT&T
- Richard Huber, AT&T
- Kamal Abburi, Microsoft
- Govindaraj Muthukrishnan, Morgan Stanley (17)
- Harry Li, MIT Lincoln Laboratory (18)
- Jonathan Ksiezopolski, KAMTech Solutions (16)
- **Anand Bhagwat, JP Morgan (91/94)**
- Marc Campos, JP Morgan
- Mareesh Kumar Issar, Hughes Network Systems (20)
- Parneet Kaur, Sea Machines Robotics (17)
- Tim Petersen, L3Harris (20)
- Matthew Torcivia, Naval Nuclear Laboratory

Judges Panel 2021

- Umama Ahmed, L3Harris (19)
- Kshitij Minhas, SRI International (16)
- Shahab Jalalvand, Interactions LLC
- Nazmul Islam, Qualcomm (14)
- Hubertus Franke, IBM
- Sarah Hallac, Blackrock
- Akanksha Pathak, Verizon (18)
- Luke Miller, SpaceX (18)
- Revan Sopher, Headway (16)
- Sakshi Sardar, Capital Path Institute (19)
- **Rajiv Jain, CDW (94)**
- Cat Le, Duke University (16)



Judges Panel 2021

- Mhammed Alhayek, Bloomberg (18)
- **Stephen Wilkus,** Spectrum Financial Partners
- Mike Dolan, L3Harris (99)
- **Don Bachman**, Siemens (86,08)
- Daniel Arkins, Blackrock
- **Ed Cordero**, Protiviti
- Neharika Bhandari, NBCUniversal (B18)
- ParsaHosseini, Tesla (18)
- Pengfei Sun, F5 Networks (19)
- Deepti Upmaka, Bank of America (19)
- Syed Naqvi, Consolidated Edison (17)
- Varun Bhandari, Bank of America (19)
- Niharika Mishra, Capital one (19)

Judges Panel 2021

- Akash Patel, Nordic Semiconductor ASA (15)
- Roshni Shah, American Express (20)
- Niral Shah, Apple Inc (17)
- Karen Raihofer, Summit Recycling Advisory Committee
- Diksha Prakash, Schrödinger Inc. (20)
- Parth Parikh, Amazon (17)
- Akash Nayak, Fidelity Investments (20, 21)
- Mark Koenig, Bridgewater-Raritan School District
- Jagadeesh Dantuluri, Keysight Technologies

THANK YOU
to our support team:

- Arletta Hoscilowicz
- Pamela Heinold
- John Scafidi
- Kevin Wine
- Christopher Reid
- Demetrios Lambropoulos

THANK YOU
to all out advisers and mentors from Rutgers and the industry!

- Shahab Jalalvand, Interactions LLC
- Hubertus Franke, IBM
- Daniel Arkins, Blackrock
- Dr. Scott Glenn
- Cameron Greene, L3Harris
- Andrew Levine, Commure
- Dean Telson, L3Harris
- Dillion Houghton, L3Harris
- Dr. Kevin Lu (Stevens)
- ECE faculty

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TOP 10…

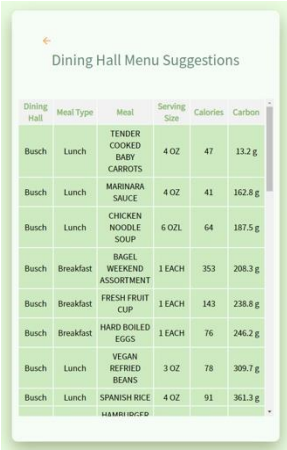
10th PLACE

($25 per student)

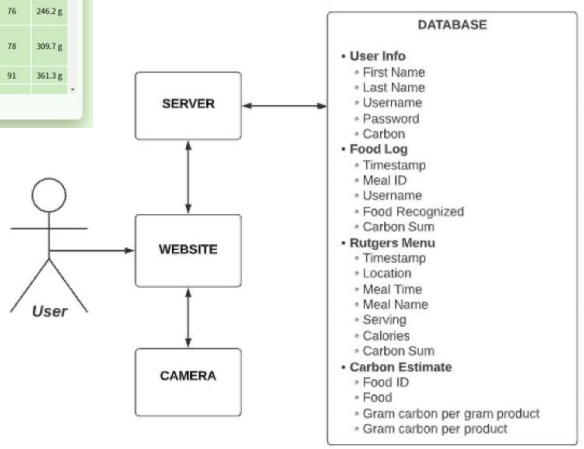
Presented by:

John Scafidi

Rutgers University


Dining Hall Menu Suggestions

Dining Hall	Meal Type	Meal	Serving Size	Calories	Carbon
Busch	Lunch	TENDER COOKED BABY CARROTS	4 OZ	47	13.2 g
Busch	Lunch	MARINARA SAUCE	4 OZ	41	162.8 g
Busch	Lunch	CHICKEN NOODLE SOUP	6 OZL	64	187.5 g
Busch	Breakfast	BAGEL WEEKEND ASSORTMENT	1 EACH	353	208.3 g
Busch	Breakfast	FRESH FRUIT CUP	1 EACH	143	238.8 g
Busch	Breakfast	HARD BOILED EGGS	1 EACH	76	246.2 g
Busch	Lunch	VEGAN REFRIED BEANS	3 OZ	78	309.7 g
Busch	Lunch	SPANISH RICE	4 OZ	91	361.3 g



10th

PLACE

Team number: **S21-20**

Title: **CO_2NSUME**

Members: Samantha Moy, Shreya Patel, Atmika Ponnusamy, and Nandita Shenoy

Adviser: Dr. Jorge Ortiz

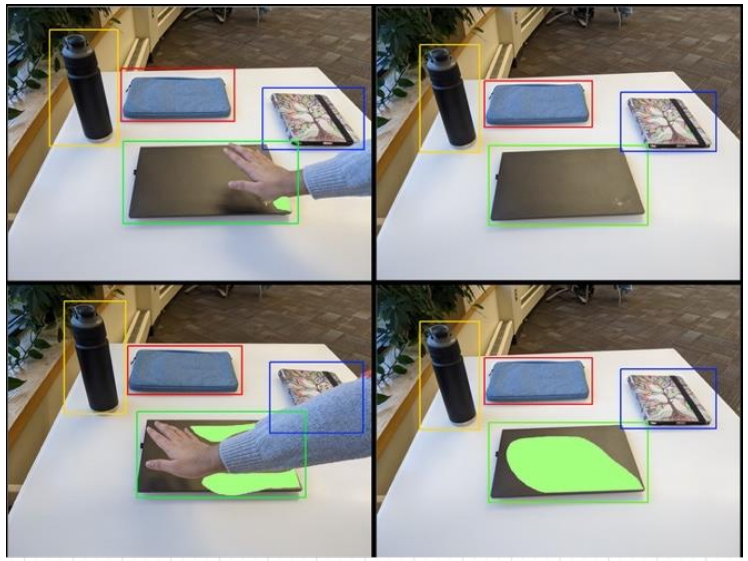
Abstract: CO_2nsume utilizes machine learning algorithms to identify foods via smartphone images and calculate the CO_2 emissions associated with producing and transporting the foods. It also integrates university dining hall menus in order to suggest more sustainable (and typically healthier) meals to students. Ultimately, CO_2nsume aims to raise student awareness of the environmental impacts of their eating habits, and consequently, encourage a healthier, more sustainable lifestyle.

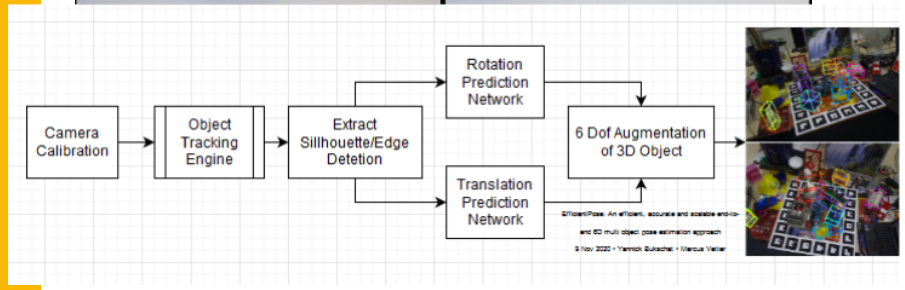
9th PLACE

($25 per student)

Presented by:

Pamela Heinold
Rutgers University





Team number: **S21-21**

Title: **Tracking Cleaning Progress with Computer Vision**

Members: Andrew Ko, Edler Olanday, Parth Patel, Piotr Zakrevski

Adviser: Dr. Yuqian Zhang

Abstract: The onset of the COVID era quickly garnered attention to the hazardous nature of microbes spreading through common surfaces. With a possible lifetime of 72 hours, COVID-19 is capable of quickly sickening any whoa approach or touch that surface.

By tracing the movement of a cleaning object (i.e., hand or glove) across a surface and the objects on that surface, a heatmap is created that shows well a surface has been cleaned. This heatmap can then be displayed to maintenance staff to keep track of how well they are cleaning a surface. Furthermore, this information can also be shared with individuals who will use that area to verify how long ago and how well a surface has been cleaned. As both the cleaner and the user know how well a surface has been sanitized, both can be assured that neither are susceptible to infectious pathogens.

9th

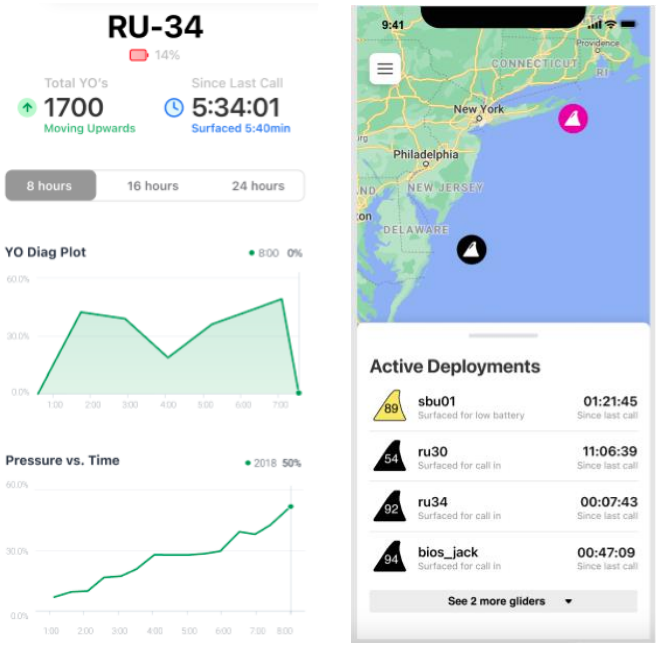
PLACE

8th PLACE

($25 per student)

Presented by:

Prof. Hana Godrich
Rutgers University



Team number: **S21-02**

Title: **Real-time Analytics of Hurricane Gliders**

Members: Radhe Bangad, Matthew Chan, Brian DelRocini, Kinjal Patel, Jasmine Philip

Adviser: Dr. Scott Glenn

Abstract: With close coordination and direction from the Rutgers University Center for Ocean Observing Leadership (RUCOOL), this project will consist of creating intuitive web and mobile applications to integrate various datasets from the gliders and automate data analysis and communication with the gliders. These applications will be tested with active glider pilots at various research facilities. We aim to aid glider pilots in making better informed and quicker piloting decisions, alleviate their pressure and increase accuracy via automation, and ultimately improve hurricane predictions for general public safety.

8th

PLACE

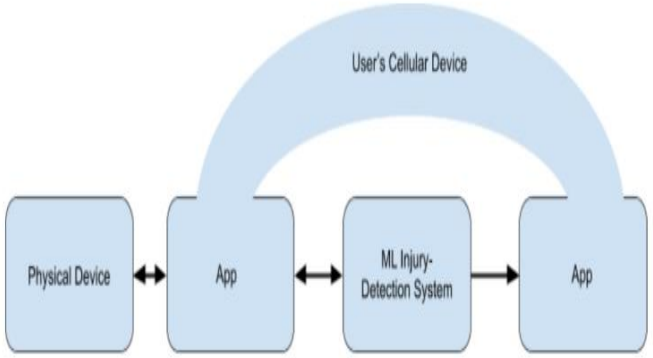
7 TH PLACE

($25 per student)

Presented by:

Kevin Wine

Rutgers University



Team number: **S21-38**

Title: **F-SCAN DS: Foot Splinter, Cut, and Nick Detection System for the Purpose of Preventing Amputations in Diabetics**

Members: Amber Haynes and Maria Rios

Adviser: Dr. Jorge Ortiz

Abstract: With a substantial portion of the US population suffering from diabetes, we feel that it is important for there to be a tool that will help patients identify any cuts that could turn life- threatening. Since diabetics have a weakened immune system and neuropathy, they are prone to cuts on their feet and often are unable to detect them. Our goal is to create an imaging system that will help diabetics identify these cuts/injuries and relay that information to a healthcare professional. This system will be split up into 3 major components. The first component is the physical F-SCAN DS scanning device. The device will contain a hardware mechanism that sends information to the Machine Learning (ML) System and the app. The ML System, which is the second component, works to identify any cuts or injuries in the image. The ML System then calls the app. The app, the third component, receives information from the ML System regarding the type of injury and the location.

7th

PLACE

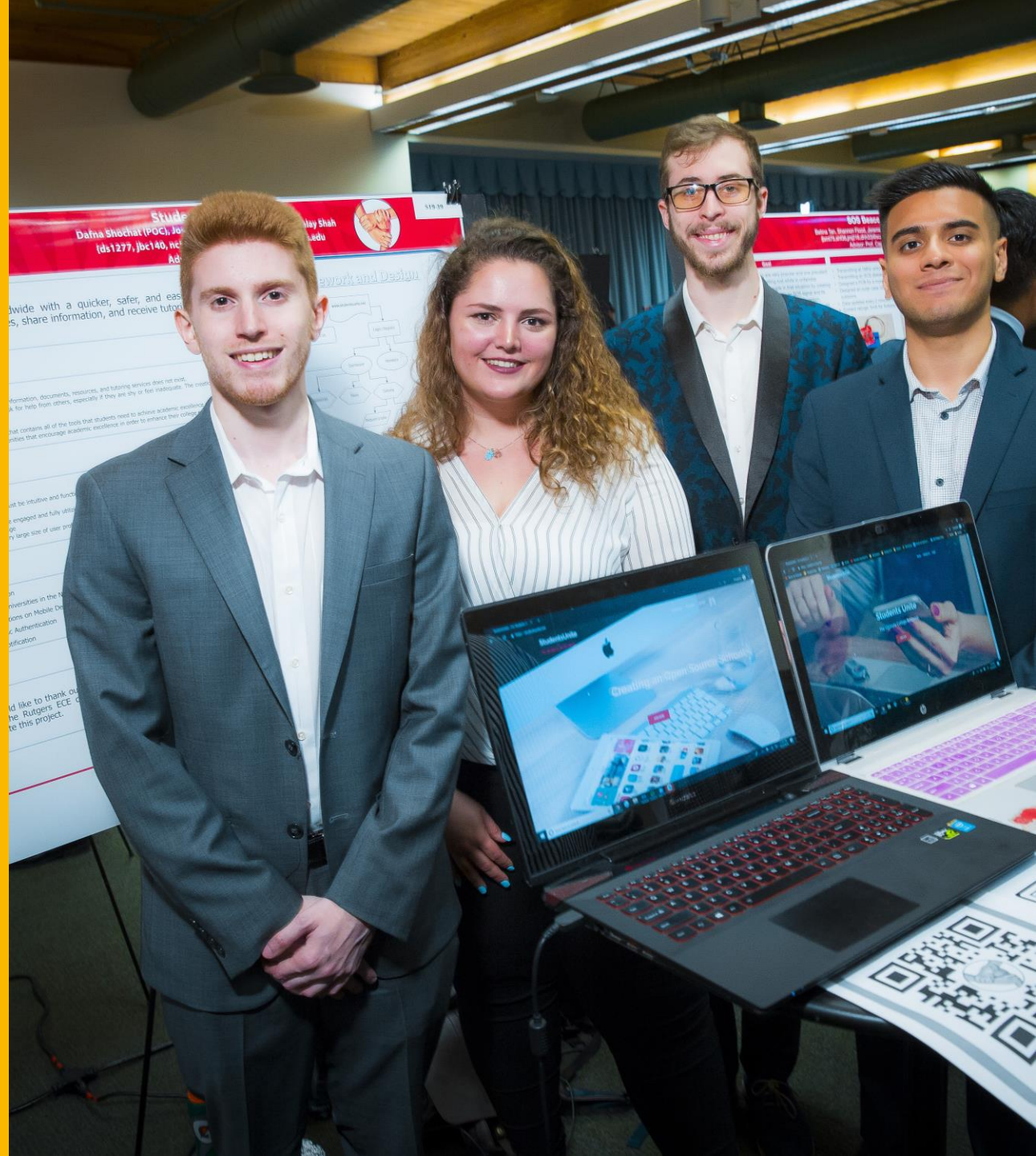
6 TH PLACE

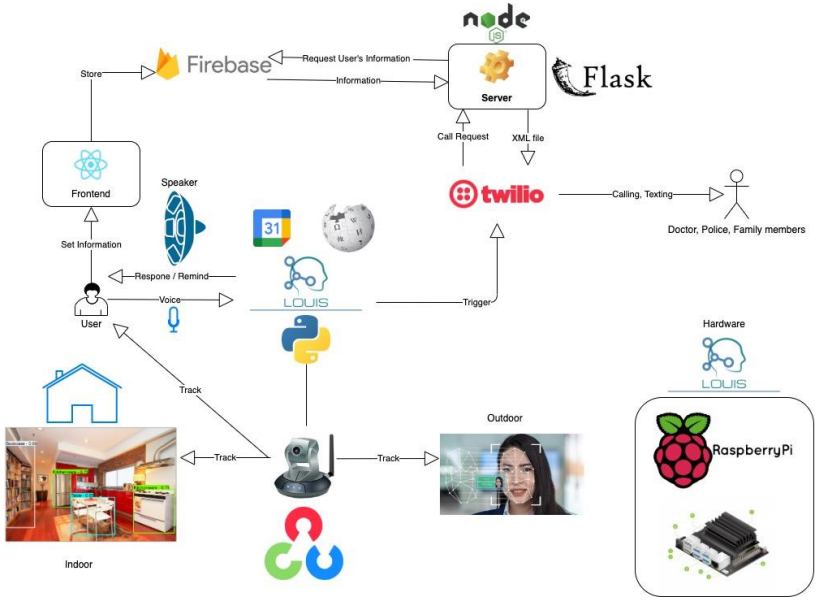
($25 per student)

Presented by:

Arletta Hoscilowicz

Rutgers University





Team number: **S21-11**

Title: **Project LOUIS**

Members: Sahil Patel, Darshan Singh, Luan Tran, Tan Ngo, and Khanh Nguyen

Adviser: Dr. Kristin Dana

Abstract: Project LOUIS is an in-home network designed for the use of Alzheimer's and dementia patients. Project LOUIS offers action-based reminders to the patients based on their daily tasks and current actions detected by the system. The network consists of multiple devices strategically located around the house of the user in order to be able to collect and serve data and reminders to the patient based on their needs and requests. The modules include a central home module, with a speaker and microphone input to communicate with the user, as well and the other modules. The other type of module is a camera module, consisting of a camera, which sends and receives data to and from the home module for further processing. The modules will also be tasked with the computations necessary for our implemented technologies, including computer vision with object detection, as well as speech recognition and machine learning. With these technologies, Project Louis will be able to actively search for the patient in certain areas in the house and be able to offer reminders based on their location, as well as recognize objects in the room.

6th

PLACE

5 TH PLACE

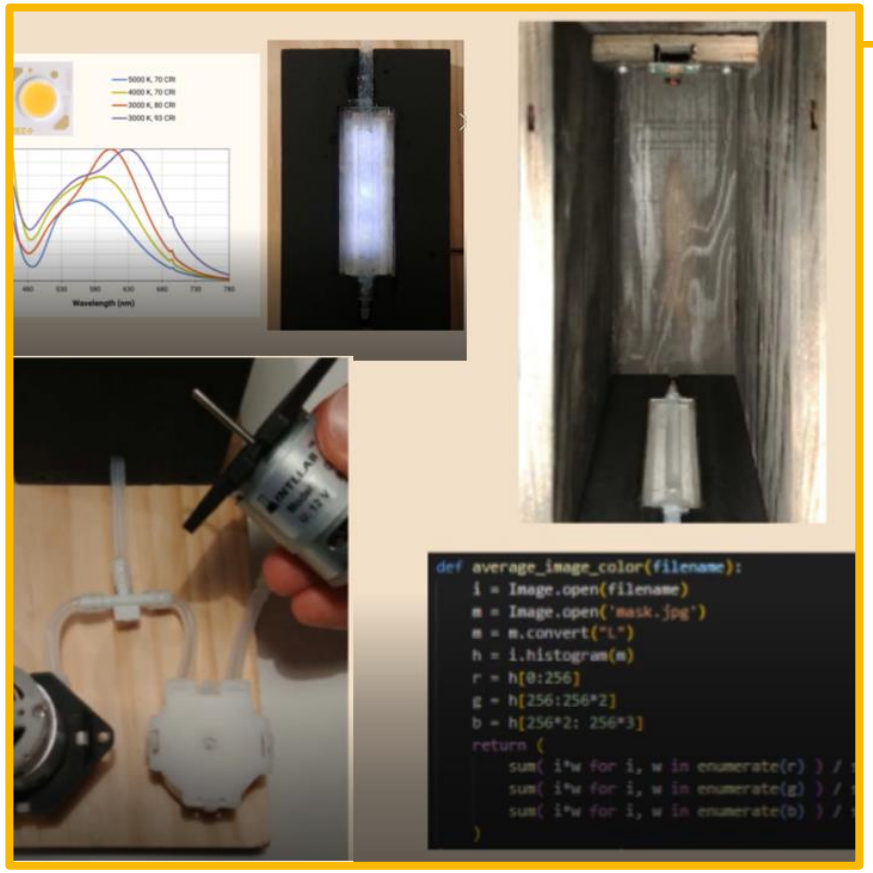
($25 per student)

Presented by:

Prof. Wade Trappe

ECE Undergraduate Program Director

Rutgers University



Team number: **S21-45**

Title: **RU-Therapy**

Members: Khizer Humayun, Akash Govindaraju, Sianna Arruda, Rebekah Bediako, Hedaya Walter, and Katherine Moreira

Adviser: Dr. Hana Godrich

Abstract: The project goal is to create a web-based/mobile application which will allow Rutgers students to virtually attend counseling when needed. Due to covid-19, especially, in-person counseling has become difficult to attend. Also, in normal conditions, at times it is difficult for students to meet in-person with their counselors because the appointment times never line up with their class schedule. Therefore, having a software application will allow students to attend counseling anytime and from anywhere. The need of counseling is essential for one going through anxiety and stress because it could lead to affecting their decision making. A student dealing with one of these disorders can experience negative effects on their attention, interpretation, concentration, memory, social interaction, and physical health.

5th

PLACE

4 TH PLACE

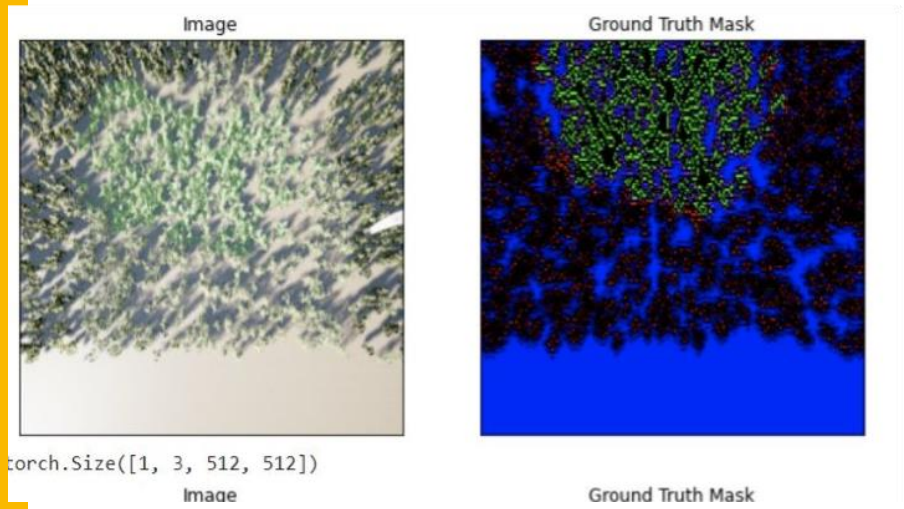
($25 per student)

Presented by:

Prof. Narayan Mandayam

ECE Department Chair

Rutgers University



Team number: **S21-13**

Title: **Eagle-View: Realtime Onboard Monitoring in Agriculture for Weed Clusters**

Members: Andrew Dass, Andrew Vincent, Virajbhai Patel, Harsh Desai, Jeffrey Samson

Advisers: Dr. Dario Pompili and Khizar Anjum

Abstract: By using a computer vision model that returns real-time results of weed cluster locations from the aerial images taken by a drone, we coordinate a team of drones to monitor crop fields and identify weed clusters while properly allocating each drone's limited resources such as battery life. By implementing a type of convolutional neural network model, the Feature Pyramid Network (FPN), drones process images and specifically find weed clusters in real-time. Since a drone's in-built CPU cannot process a complex computer vision model such as an FPN, a GPU is mounted on board the drones to run and process images through the model to return real-time results. Drones have limited resources; therefore the necessity of real-time results will be important in efficiently allocating these resources when monitoring large acres of farmland.

4th

PLACE

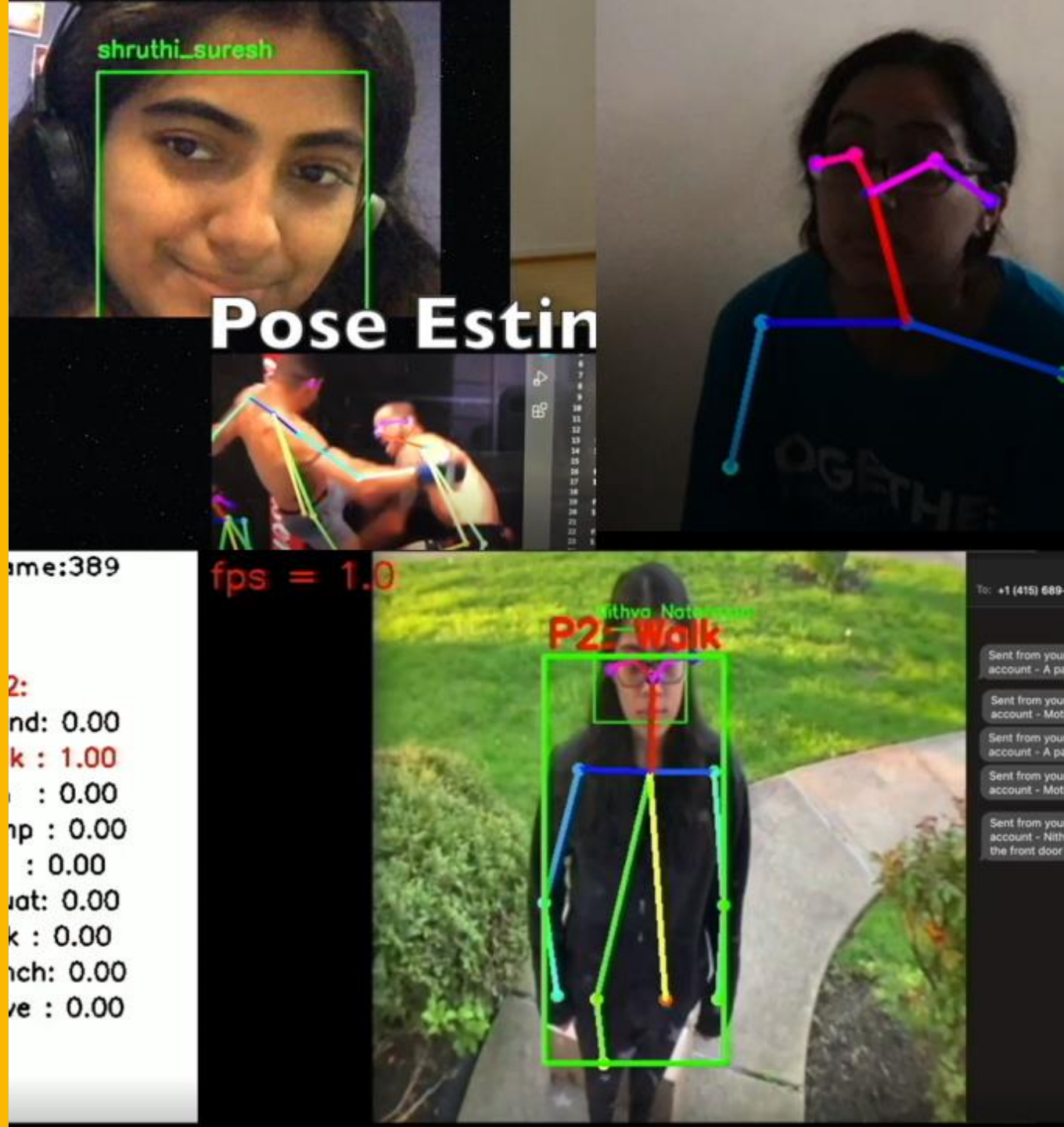
3 RD PLACE

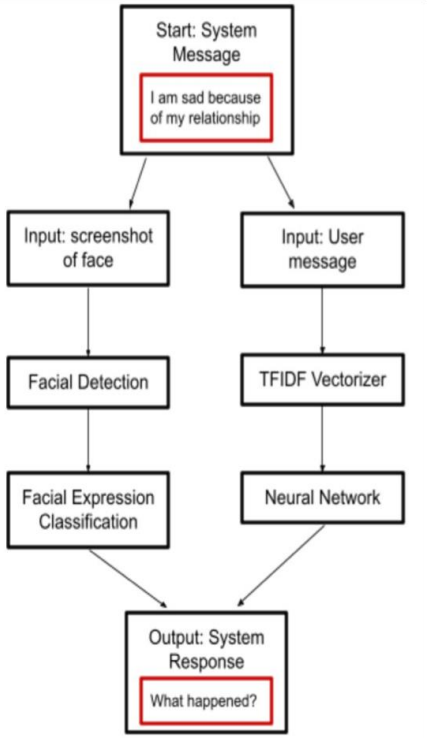
($50 per student)

Presented by:

Roshni Shah

American Express





3th

PLACE

Team number: **S21-49**

Title: **Mental Health Chatbot: KANA**

Members: Jennifer Huang, Samuel Zahner, Nishad Nalgundwar, and Vincent Chan

Adviser: Dr. Kristin Dana

Abstract: People often overlook how mundane daily tasks serve as a stressor to our day-to-day lives, thus leading to overwhelming negative feelings which will accumulate to have detrimental effect(s) on an individual's mental health. With our Artificial Intelligence Dialogue system, individuals will now have a means to prevent the aggregation of obstructive feelings and thoughts. Our system is designed to help individuals locate resources for their unique situation through an emotionally aware virtual dialogue system. With this system in place, anyone will be able to have access to comfort, companionship, as well as unbiased information from accredited sources. While the system is not meant to be a replacement for therapy, it provides people with a means to take a further step towards the positive growth of mental health.

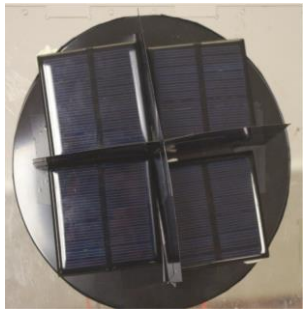
2 ND PLACE

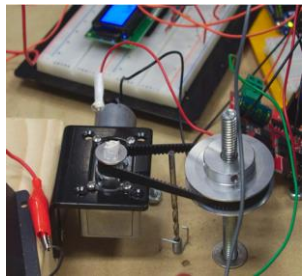
($75 per student)

Presented by:

Donald Bachman

Siemens





2th

PLACE

Team number: **S21-10**
Title: **Improvements to the Viability of. Solar Panels in the Field**

Members: Nathaniel Glikman, Alexander Laemmle, Nicholas Meegan, Bhargav Singaraju, Sukhjit Singh

Advisers: Dr. Michael Caggiano, Cameron Greene (L3Harris)

Abstract: The capstone project, Improvements to the Viability of Solar Panels in the Field, aims to increase the amount of sunlight received by a solar panel in the field each day. According to statistics collected by Wholesale Solar, "Although your panels may get an average of 7 hours of daylight a day, the average peak sun hours are generally around 4 or 5 [hours]", where peak sun hours offer the maximum amount of power received. The proposed capstone project attempts to rectify this shortcoming of solar panel design by introducing a method to track the sun throughout the course of the day which increases the power absorbed, and efficiency.

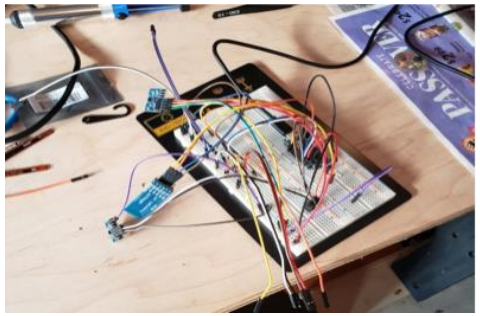
1 ST PLACE

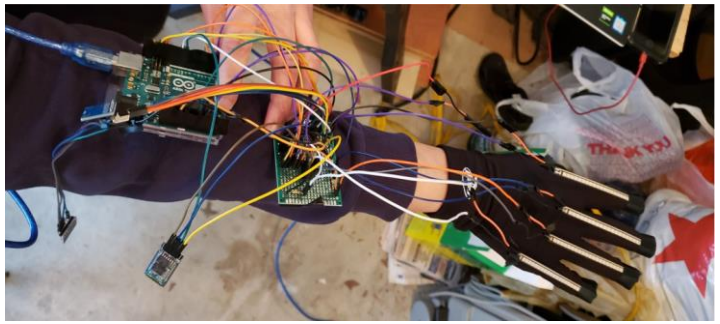
($100 per student)

Presented by:

Daniel Arkins

Blackrock





Team number: **S21-34**

Title: **SMART Glove**

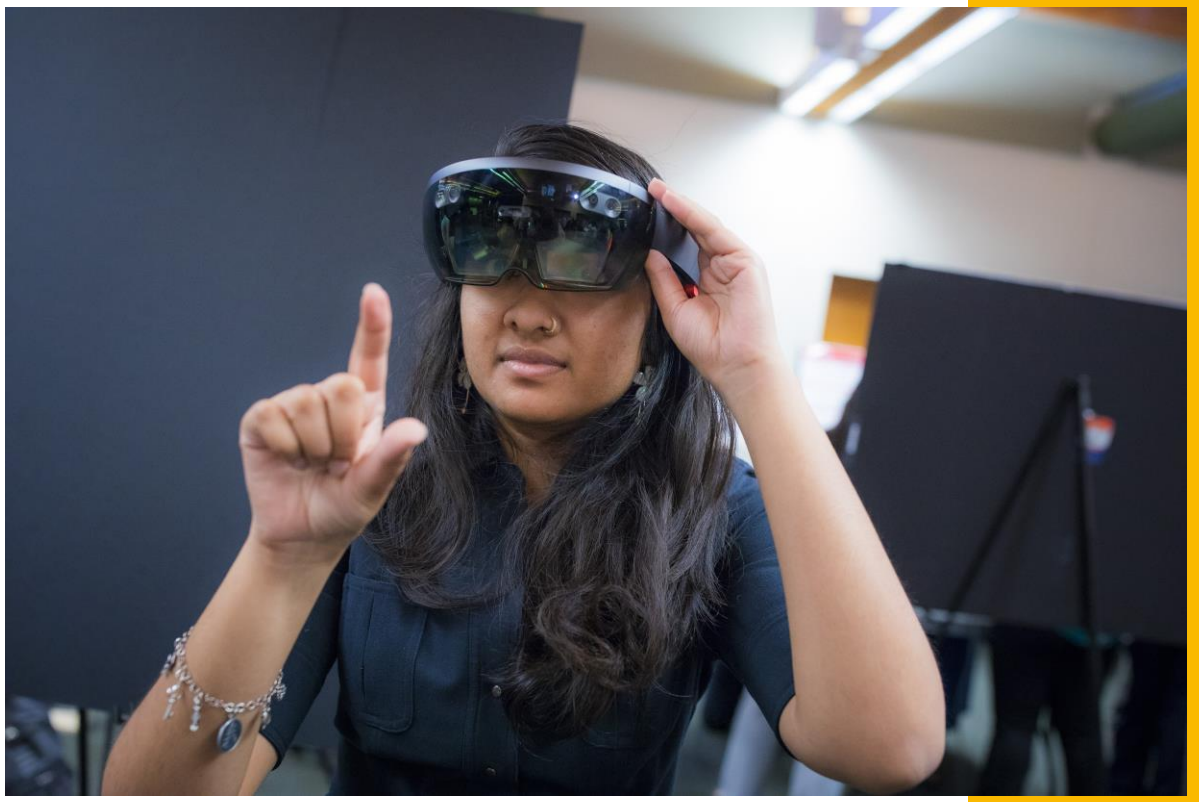
Members: Erik Castro, Brian Cheng, Nicholas Chu, Gary Qian, Thomas Luy

Adviser: Dr. Hana Godrich

Abstract: Our specific focus on this project is to help people learn sign language. This will be done by using the glove's sensors as feedback to help users learn sign language interactively. The glove will be able to detect the bend of every finger, rotation of the hand, and acceleration of the hand. The glove will be wirelessly connected to a smartphone app which will have sign language learning modules. The app will be split into two separate sections, one for learning, and the other for testing the user on their sign language accuracy. In the learning section, pictures will be provided for the user to mimic in order to move on to the next letter. Feedback will be given if the fingers are not in the right position. The user would also have the option to choose which letters to practice more. In the testing section, both games and quizzes will be used to test the user's sign language knowledge. We will use the results of these tests to give feedback on the letters the user may be struggling to sign. Other than sign language, this glove and app configuration could be set up for other creative functions such as controlling your smartphone, giving PowerPoint presentations using gestures, and directing remote controlled cars.

1th

PLACE



BEST in…

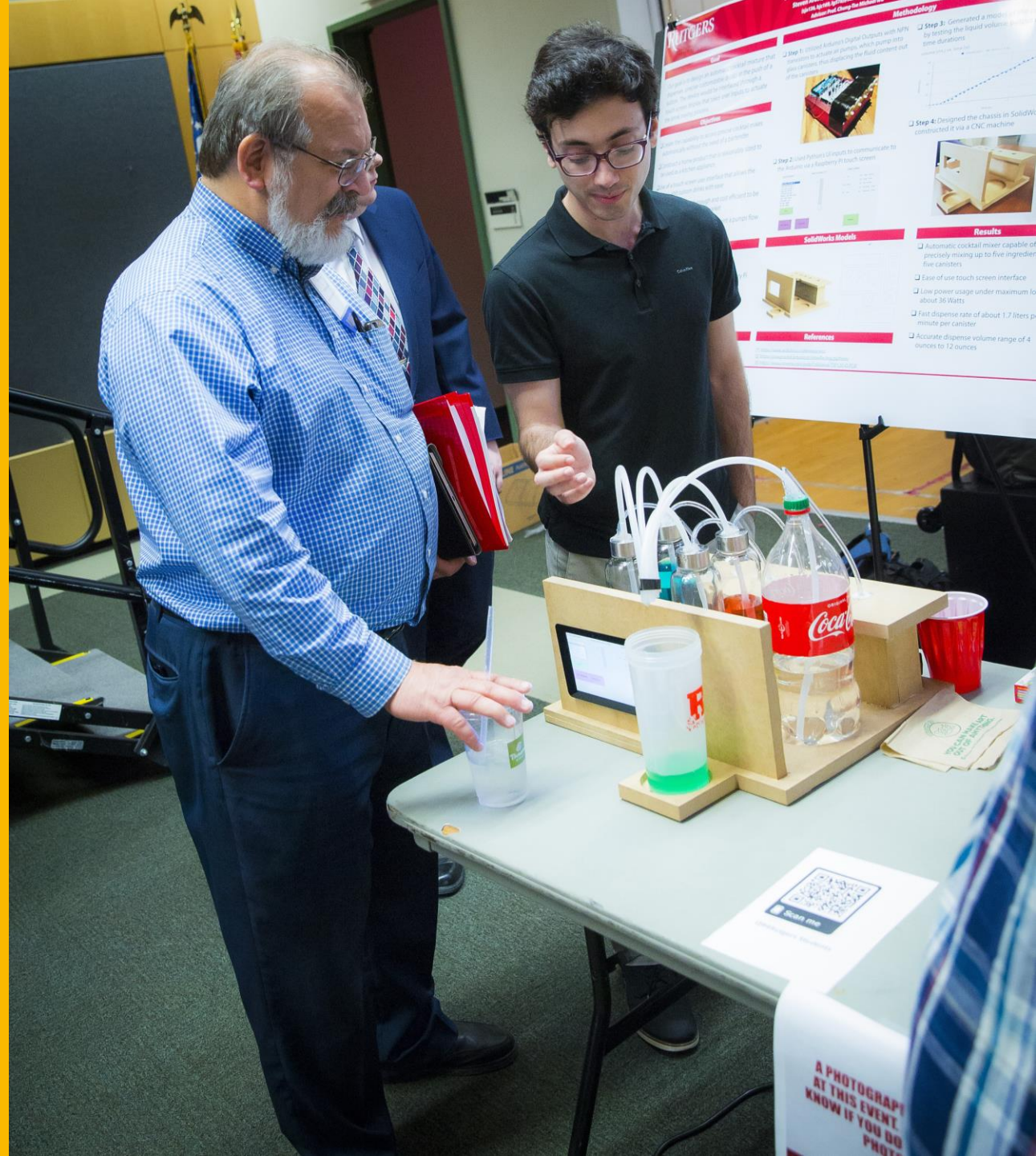
BEST in RESEARCH

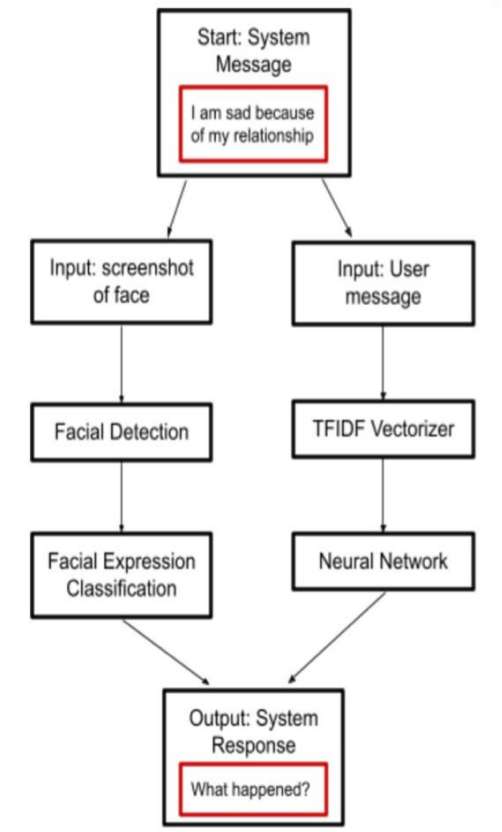
($50 per student)

Presented by:

Demetrios Lambropoulos

Rutgers University





BEST

RESEARCH

Team number: **S21-49**

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Members: Jennifer Huang, Samuel Zahner, Nishad Nalgundwar, and Vincent Chan

Adviser: Dr. Kristin Dana

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BEST in IMPACT

($50 per student)

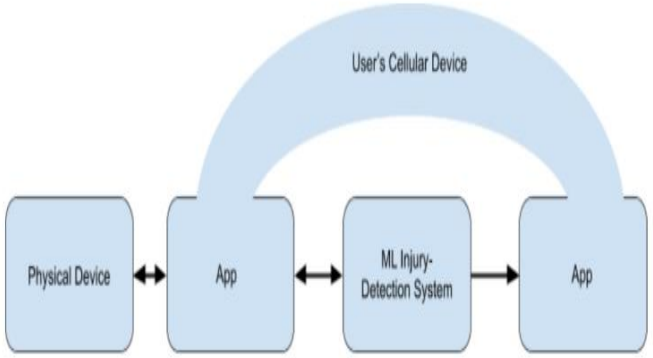
Presented by:

Prof. Hana Godrich

Rutgers University

Team number: **S21-38**

Title: **F-SCAN DS: Foot Splinter, Cut, and Nick Detection System for the Purpose of Preventing Amputations in Diabetics**



Members: Amber Haynes and Maria Rios

Adviser: Dr. Jorge Ortiz

BEST IMPACT

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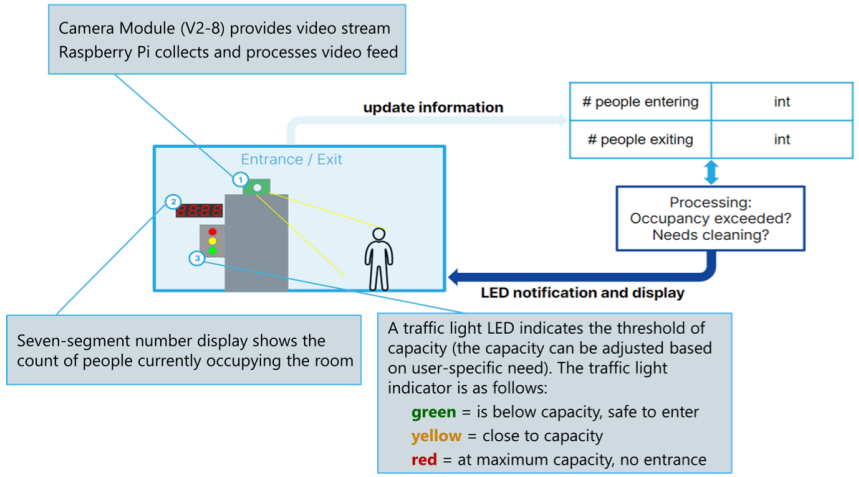
BEST in COMMERCIALIZATION

($50 per student)

Presented by:

Tim Petersen

L3Harris



BEST

COMMERCIALIZATION

Team number: **S21-31**

Title: **Occupancy Monitoring System with Computer. Vision Algorithms**

Members: Samantha Cheng, Kylie Chow, Sonia Hua, Sneh Shah

Adviser: Dr. Yuqian Zhang

Abstract: The Occupancy Monitoring System will keep track of the traffic in a small area to avoid spreading infectious diseases and to keep these areas clean. Currently, many stores keep track of the number of customers by stationing an employee by the doorway to monitor the statistics manually. However, this process becomes increasingly inefficient in establishments such as department stores where there are multiple entries, as well as clusters of people going in and out at once. Furthermore, as indoor dining opens up, bathrooms are another important entrance to monitor since the foot traffic directly relates to the sanitation quality. The data collected can help store management determine how often the bathrooms should be cleaned and can help notify customers if the bathroom is safe. The system will have a camera module at the entrances of these areas that monitors incoming and outgoing traffic with the use of computer vision. This data will be used to determine if the room/area needs cleaning or if the maximum capacity of a room is exceeded. The camera would keep track of how many people have been in this area and once the number passes a certain threshold, the management will be notified that the bathroom needs to be cleaned.

Team number: **S21-52**

Title: **I.O.Clean**

Members: Jonathan Banks, Edward Gaskin, Alex Martorano

Advisers: Kevin Lu (Stevens) and Dr. Hana Godrich

Abstract: Hygiene is essential for health and safety, and yet can be difficult to manage. A survey by the American Cleaning Institute found that 34% of respondents were concerned about whether they were cleaning enough, and 31% were not sure they were cleaning correctly. Users of real estate, public or private, owner or renter, would all benefit from having an easy way to manage the cleanliness of their property. I.O.Clean utilizes IoT smart technology to give users a dashboard on their phone to help keep their spaces hygienic. The system is modular, which enables it to be easily scaled, customized, and future-proofed. It is easy to forget about an invisible threat. I.O.Clean smart devices work to assist in the management of cleanliness as well automating certain cleaning processes within a work or living space. Utilizing I.O.Clean deters virus and bacteria accumulation, and helps maintain the overall safety of families, tenants, and employees occupying a space.

BEST

COMMERCIALIZATION

Congratulations!

Proud of you all