

# **WELCOME to The 2020 Capstone Award Ceremony**

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**Rutgers  
Electrical and Computer Engineering  
Department  
May 6, 2020**



# Dr. Narayan Mandayam

Department Chair, ECE, Rutgers



# Dean Thomas Farris

School of Engineering, Rutgers







# Judges Panel

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**Thank You  
2020  
Panel of Judges**

# Judges Panel 2020

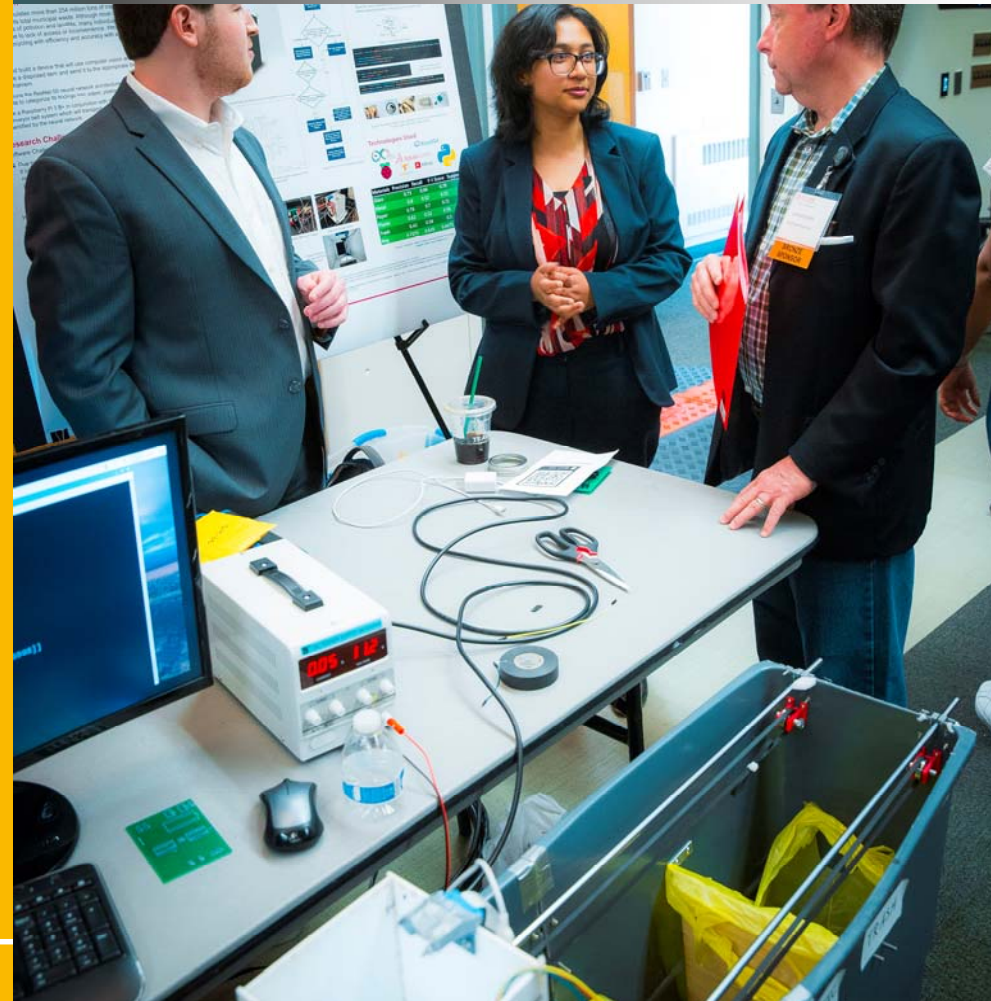
- Donald Levy, AT&T
- Marina Eskander, Stantec (BS'17)
- Richard Huber, AT&T
- David Galbi, Galbi Research
- Ahmed Turk, Samsung Electronics America (BS'02, MS'05)
- Douglas Galbi, FCC
- Gihan Oraby, US Army (BS'02)
- Dafna Shochat, Blackrock (BS'19)
- Kamal Abburi, Microsoft
- Ludwig Randazzo, Juniper Networks
- Govindaraj Muthukrishnan, Morgan Stanley (BS'17)
- Harry Li, MIT Lincoln Laboratory (BS'18)
- Jonathan Ksiezopolski, KAMTech Solutions (BS'16)
- Anand Bhagwat, JP Morgan (MS'91/MBA'94)
- Marc Campos, JP Morgan
- Mareesh Kumar Issar, WINLAB, Rutgers University





# Judges Panel 2020

- Umama Ahmed, L3Harris (BS'19)
- Bill Marushak, Lutron Electronics
- Kshitij Minhas, SRI International (BS'16)
- Teddy Brown, Verizon
- Shahab Jalalvand, Interactions LLC
- Zeid Abdulrazeq, Verizon Wireless (BS'19)
- Nazmul Islam, Qualcomm (PhD'14)
- Keon Kim, Verizon Wireless (BS'19)
- Nicholas Frost, Morgan Stanley (BS'17)
- Samuel Ramrajkar, Ford Motor Company (MS'15)
- Daniel Romero, Verizon (BS'19)
- Franke Hubertus, IBM
- Sarah Hallac, Blackrock
- Akanksha Pathak, Verizon (BS'18)
- Srinivas Bangalore, Interactions



# Judges Panel 2020

- Jane Luo, Qualcomm (PhD'04)
- Mhammed Alhayek, Bloomberg (BS'18)
- Ashwin Sampath, Qualcomm Inc. (PhD'97)
- Ed Knapp, American Tower
- Stephen Wilkus, Spectrum Financial Partners
- Mike Dolan, L3Harris (BS'99)
- Nikhil Shenoy, Siemens Healthineers (BS'16)
- Joseph Conticchio, L3Harris
- Don Bachman, ASCO (BSEE, MBA )
- Salman Hoque, L3Harris Technologies (BS'19)
- Daniel Arkins, Blackrock
- Ed Cordero, Protiviti
- Jon Pucila, Blackrock
- Nagi Naganathan
- Neharika Bhandari, NBCUniversal (BS'18)



**SIEMENS**

**BLACKROCK**

**JPMorganChase**

 **mongoDB**



**L3HARRIS™**

**24  
7XChange**



**interactions**

## **2020 SPONSORS**

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**Thank You  
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our  
SPONSORS**



# Applause



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



**TOP 10...**

**10<sup>th</sup>  
PLACE**

**(\$100)**

Presented by:

**Ashwin Sampath**

Qualcomm





Team number: **S20-01**

## Title: **Phased Patch L-Band Antenna Array**

**Members:** Alexander Cid, Daniel Toth, Marissa Navarro, Cameron Greene, and Stephen Dahl

**Advisers:** Dr. Anand Sarwate, Dean Telson (L3Harris), and Alejandro Pieroni (Cellgain)

**Abstract:** The project seeks to fill the need for a low-cost solution to tracking and acquiring satellite signals in support of future infrastructure needs. Traditionally, ground stations are mechanically steered, clunky, and high cost. Taking a note from cutting-edge 5G cellular networks, we propose a light-weight solution by using digital beamforming techniques through a phased array to implement electronic steering and improved signal-to-noise ratio.

Our Team



The team consists of five members, each with a portrait and role:

- Marissa Navarro**: Signal Processing
- Stephen Dahl**: Systems Engineering Manager
- Alexander Cid**: Systems Engineering
- Daniel Toth**: Antenna & Signal Path Design
- Cameron Greene**: Antenna & Signal Path Design

**10<sup>th</sup>**

**PLACE**

**9<sup>th</sup>  
PLACE**

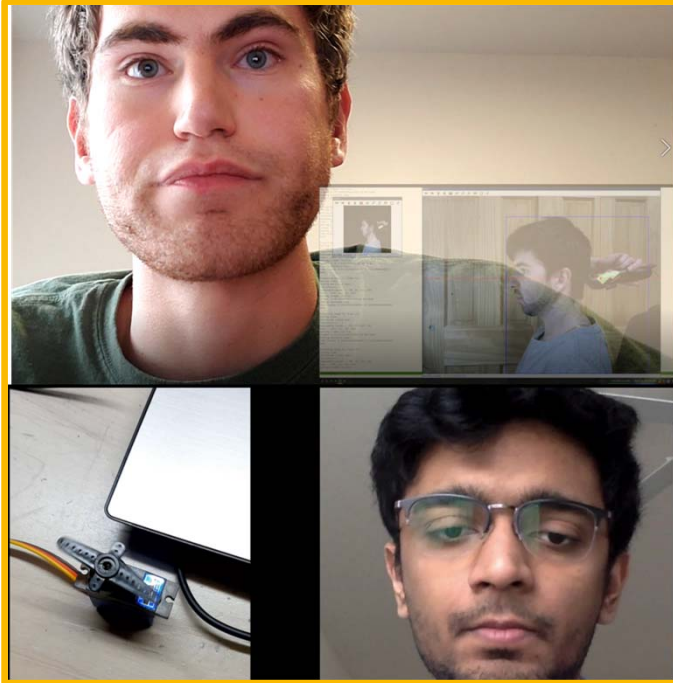
**(\$100)**

Presented by:

**Salman Hoque**

L3Harris Technologies





**9<sup>th</sup>**

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**PLACE**

Team number: **S20-12**

Title: **Smart Hair-Clipper**

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**Members:** Urmil Bhansali, Jovan Konatar, Eric Roberts, and McWilliam Mawuntu

**Adviser:** Dr. Yingying Chen

**Abstract:** The team designed a Smart-Hair Clipper that people can use to cut their own hair. The hair-clipper is designed with a self-adjusting guard. The guard will adjust the length of the hair being cut based on the location of the device. A Raspberry Pi was used to control a motor placed on the device. The motor will be connected to the gears that will adjust the guard length. The tracking of the device will be explored in different ways.



**8<sup>th</sup>  
PLACE**

**(\$100)**

Presented by:

**Kamal Abburi**

Microsoft



## Meet the Members of hARK - Team 45



Aditya  
Verma



Joshua  
Siegel



Phurushotham  
Shekar



Shantanu  
Laghate



8<sup>th</sup>

PLACE

Team number: **S20-45**

Title: **hARK, the Next Generation Hearing Aid?**

**Members:** Joshua Siegel, Aditya Verma, Shantanu Laghate, and Phurushotham Shekar

**Adviser:** Dr. Waheed Bajwa

**Abstract:** According to the World Health Organization, 1 in 20 people worldwide suffer from disabling hearing loss. We identify three specific problems that these people face and propose a solution that attempts to solve them: Identifying the direction of incoming sound; Hearing and understanding conversation in social interactions; Identify life-threatening noises, such as cars while crossing roads and fire alarms. Our solution has two distinct portions that when used in conjunction attempt to resolve these three issues. The first component is a hat with microphones and four vibration motors, which vibrate in the direction of the incoming sound. The second component is an augmented reality headset which can perform real-time closed captioning of noises.

**7 TH  
PLACE**

**(\$100)**

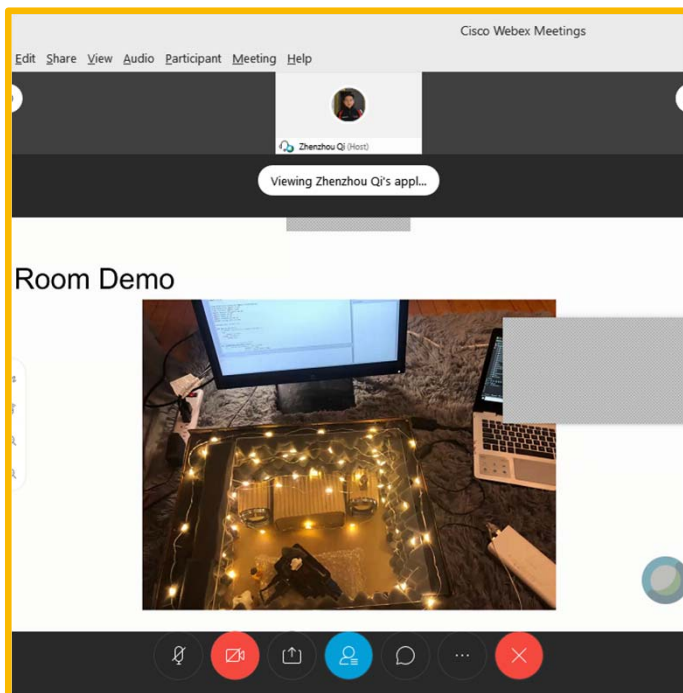
Presented by:

**Ed Cordero**

Protiviti







7<sup>th</sup>

PLACE

Team number: **S20-70**

Title: **Smart Sweet Spot of Your Home Stereos**

**Members:** Zhenzhou (Tom) Qi

**Advisers:** Dr. Xiaoran Fan and Dr. Richard Howard

**Abstract:** Home stereos are common in most families. Either implemented in basements or living rooms, playing music, movies or even live concerts, it is a great way to relax. However, people may find that aligning the speakers in their home stereos tedious. What annoys them most is that even when they move around their furniture, the positions of the speakers have to move accordingly. We came up with a novel way to solve this problem by using the technique of beamforming. Which we can make the speakers automatically adjust their positions so that the sweet spot is always around the person no matter where he stands. And the following will be our method and systems.

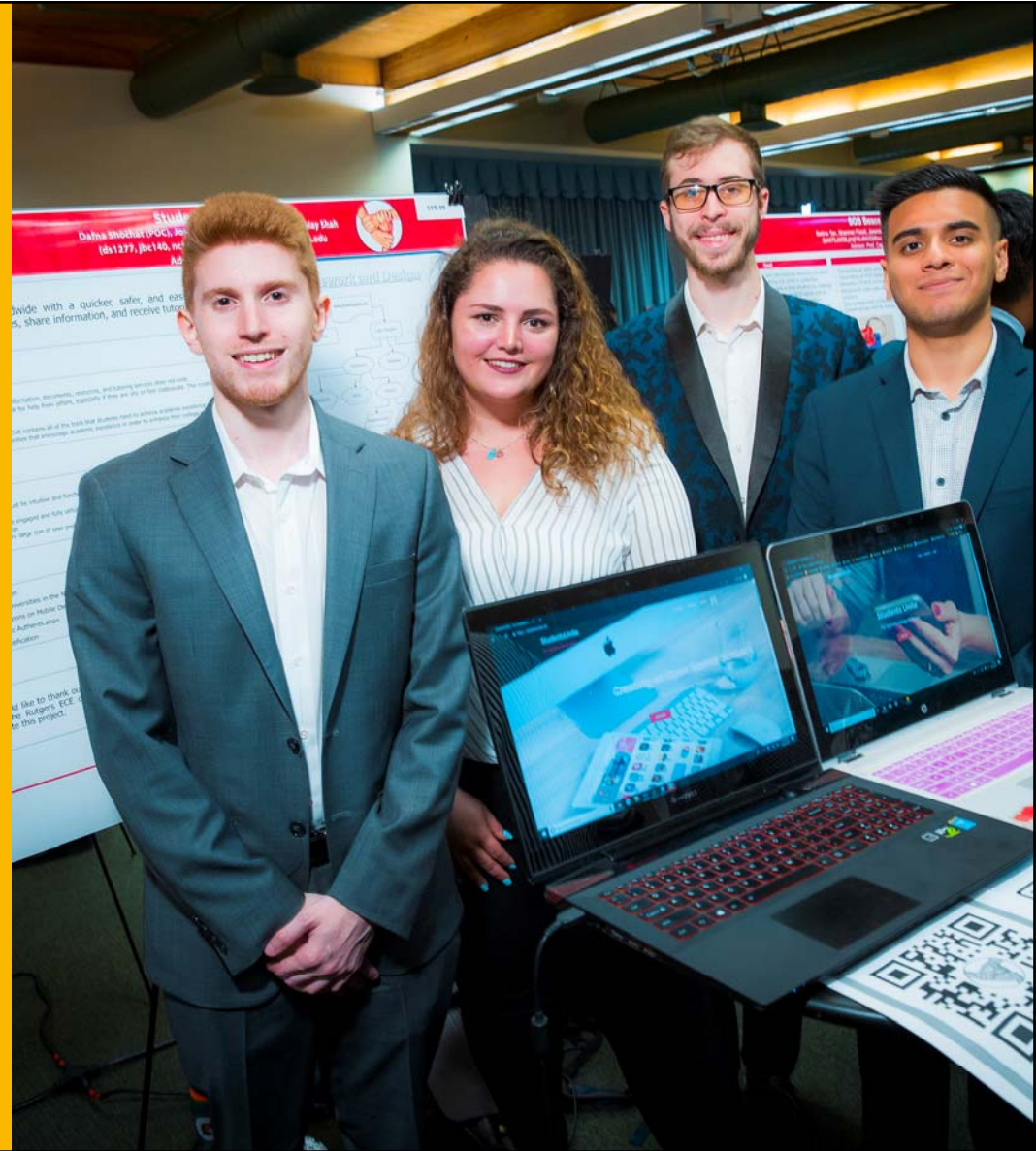
**6 TH  
PLACE**

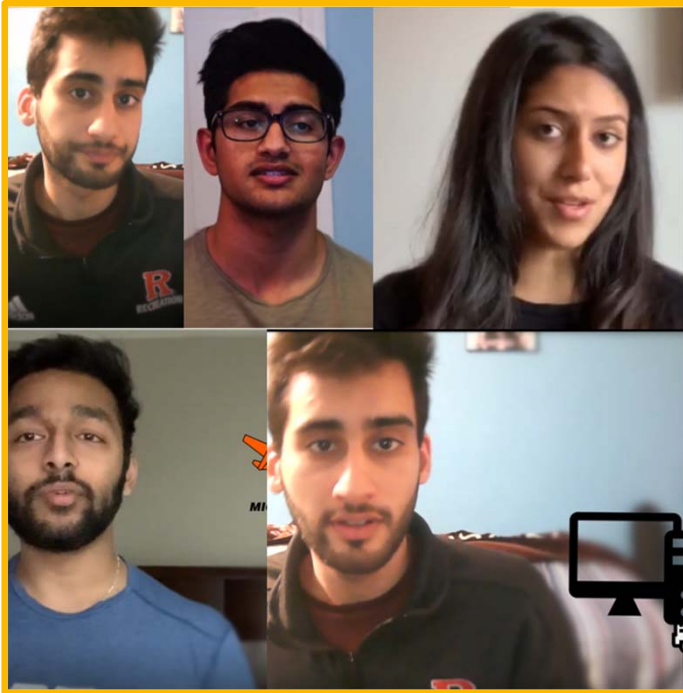
**(\$100)**

Presented by:

**Dafna Shochat**

Blackrock





**6<sup>th</sup>**

**PLACE**

Team number: **S20-35**

Title: **Eagle Eye – Multi UAV Reconnaissance**

**Members:** Kaavya Krishna-Kumar, Sagar Shah, Harmit Badyal, and Abhishek Kondila

**Adviser:** Dr. Narayan Mandayam

**Abstract:** From 2006 to 2015 there have been approximately 70,000 deaths and missing people due to natural disasters occurring worldwide. Using small unmanned aerial vehicles (UAVs) is a possible solution to aid in search and rescue of missing people. With UAVs, we have the ability to scan the disaster zones and take images of the land. Then, using machine learning models we can process images to help identify humans that may be stuck in disaster zones. In real situations however, this task might be more difficult due to drone limitations in flight times and processing power needed to classify images. In addition, network connectivity and transmission may be compromised during the disaster making it difficult to transmit images from the drones to the servers for processing.



**5 TH  
PLACE**

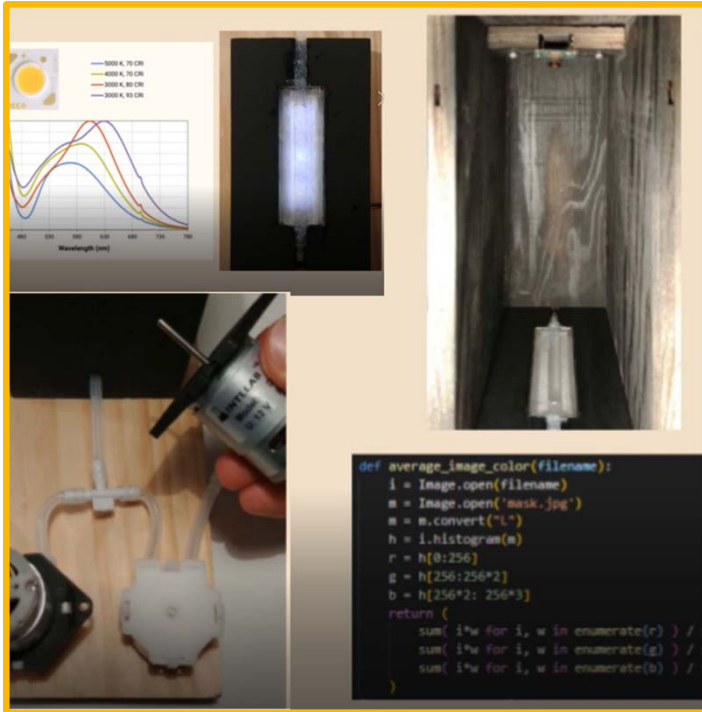
**(\$100)**

Presented by:

**Richard Huber**

AT&T





5<sup>th</sup>

PLACE

Team number: **S20-47**

## Title: **Low-Cost Ion-Selective Sensing for Hydroponics Solutions**

**Members:** Jacob Battipaglia, Andrew Cecil, Krishna Gotur, and Einar Magnusson

**Adviser:** Dr. Richard Howard

**Abstract:** Our aim is to develop a low-cost ion-selective sensor for managing hydroponics solutions using color chemistry and computer vision. Many standardized colorimetric procedures exist for determining the concentrations of hydroponics macronutrients, such as nitrites, nitrates, ammonia, ammonium, orthophosphates, and potassium ions. These chemical reactions produce color changes that vary visibly based on the concentration of the desired ion. We aim to automate these color-chemical procedures and use computer vision to precisely quantify the results.

**4 TH  
PLACE**

**(\$100)**

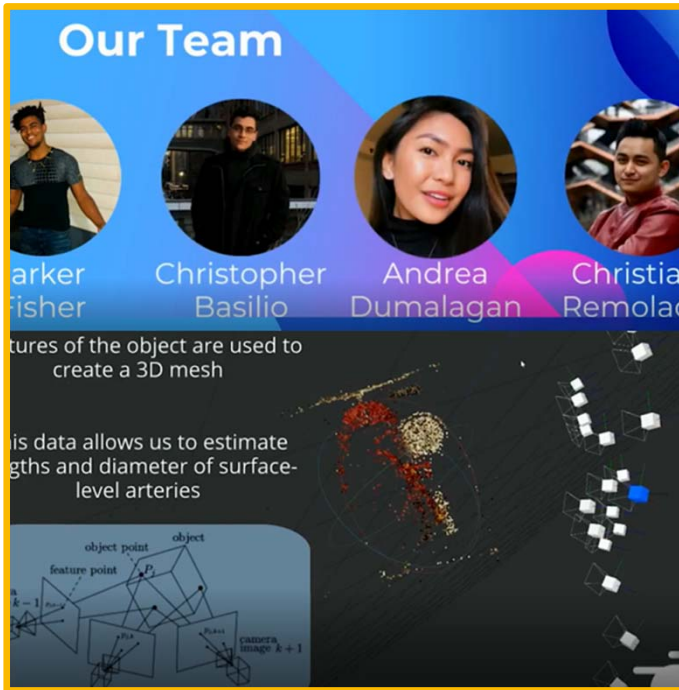
Presented by:

**Soyab Khatumbra**

L3Harris







4<sup>th</sup>

PLACE

Team number: **S20-51**

Title: **Nephroto: Kidney Modeling App**

**Members:** Christopher Basilio, Andrea Dumalagan, Parker Fisher, and Christian Remolado

**Adviser:** Dr. Deborah Silver

**Abstract:** Our mobile application will be developed using Android Studios and it will cater to two user models--the organ transporter and the transplant surgeon. The organ transporter is responsible for specifying key components and taking pictures of organ where it will then be stored in a database; the information will be used to construct a 3D model of the organ, and the model, along with the organ specifications, will be transmitted to the transplant surgeon for initial pre-operative planning. Not only will surgeons be able to spot nuances from one organ to another, but this application will also create a more direct line of communication between an organ's transporter and a surgeon.

**3 RD  
PLACE**

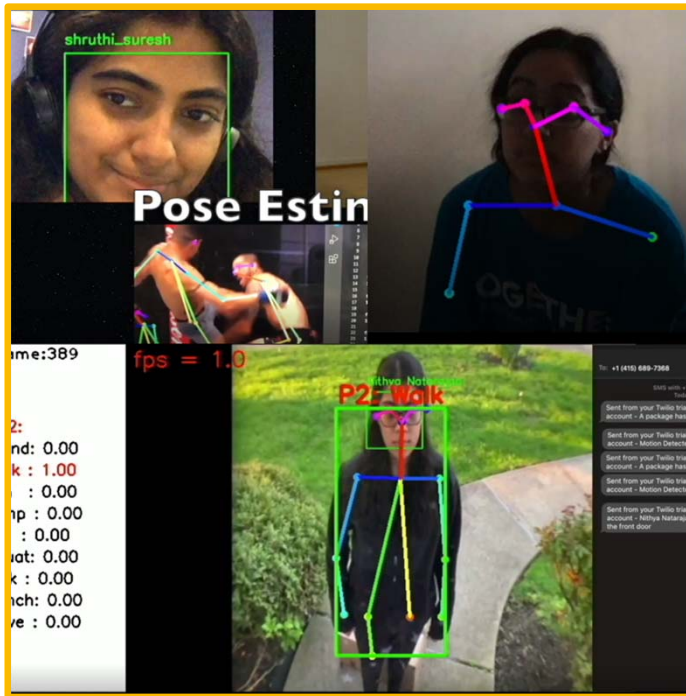
**(\$300)**

Presented by:

**Donald Bachman**

ASCO





3<sup>th</sup>

PLACE

Team number: **S20-56**

Title: **2020Vision**

**Members:** Roshni Shah, Shruthi Sureshkrishnan,  
and Nithyasree Natarajan

**Adviser:** Dr. Kristin Dana

**Abstract:** The goal of 2020Vision is to utilize computer vision and facial recognition to help everyone, even those with visual impairments, feel safe and secure in their homes and out in public. Often, those with visual impairments are vulnerable to safety threats in the form of home attacks and burglaries. To prevent this, 2020Vision provides security by identifying if the person at the door is a known connection before alerting the homeowner to open the door.



**2 ND  
PLACE**

**(\$400)**

Presented by:

**Daniel Arkins**

Blackrock





**2<sup>th</sup>**

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**PLACE**

Team number: **S20-14**

Title: **Refrigerated Delivery Drone System**

**Members:** Peter Doroshenko, Alex Ameri, Eric Kraut, Philip Jeszeck, and Williear Glimniene

**Adviser:** Dr. Laleh Najafizadeh

**Abstract:** During emergencies, people need rapid access to refrigerated supplies, such as vaccines, medicine, and a variety of other goods. For our project, we decided to tackle this problem by designing a lightweight thermoelectric refrigerator that can be transported autonomously by a drone. Our drone is designed specifically for the task of carrying a cargo box and utilizes artificial intelligence to guide its takeoff and landing procedures. This approach is both affordable and scalable, allowing multiple drones for when more supplies need to be shipped. Our primary objective is to transport small cargo at temperatures below 10°C, for at least 15 minutes, on an automated drone mission, and record data to verify that temperature requirements were met for transporting vaccines.

**1 ST  
PLACE**

**(\$600)**

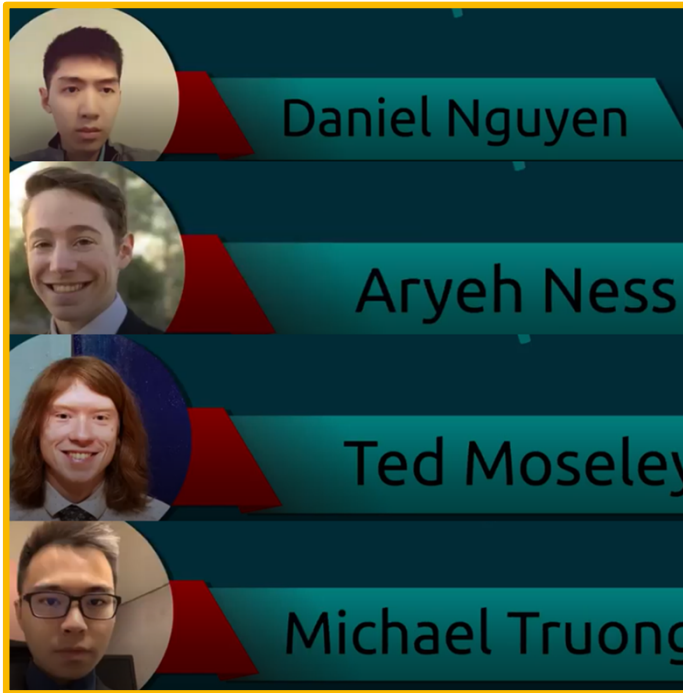
Presented by:

**Nikhil Shenoy**

Siemens Healthineers







**1<sup>th</sup>**

**PLACE**

Team number: **S20-61**

Title: **Agora VR: Virtual Reality Exposure Therapy of Agoraphobia & Social Anxiety Disorders**

**Members:** Aryeh Ness, Daniel Nguyen, Michael Truong, and Ted Moseley

**Adviser:** Dr. Grigore Burdea

**Abstract:** There are many types of social anxiety disorders. Agoraphobia is defined as “a type of anxiety disorder in which you fear and avoid places or situations that might cause you to panic and make you feel trapped, helpless or embarrassed”. Some conventional treatment methods include self-help, therapy sessions, or medication. People who have these disorders find it difficult or impossible to go out for help and receive treatment and in other cases start to distrust the therapist. Utilizing the Oculus Quest, our solution will immerse the patient within a virtual environment that dynamically adapts to the stage of treatment, severity of the disorder, real time integrated biosensor readings, and external inputs from a clinician and caregiver. The system will integrate several conventional therapy methods such as psychotherapy, exposure therapy, and metacognitive interpersonal therapy (MIT). The option to use a low-cost, portable system in the safety of their home gives the patient with a low barrier of entry into exposure therapy.



**BEST in...**

# BEST in RESEARCH

(\$200)

Presented by:

**Stephen Wilkus**

Spectrum Financial Partners







**BEST**  

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**RESEARCH**

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# **BEST in IMPACT**

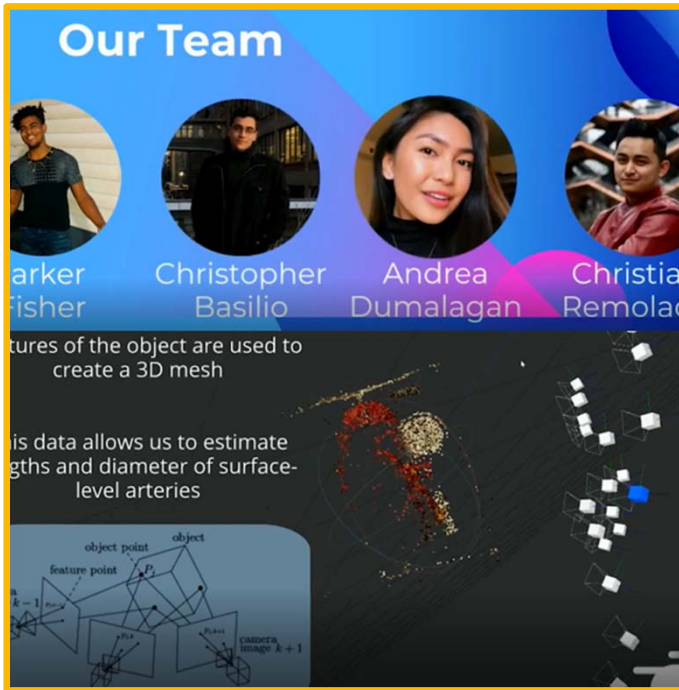
**(\$200)**

Presented by:

**Srinivas Bangalore**

Interactions LLC





**BEST**

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**IMPACT**

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# **BEST in COMMERCIALIZATION**

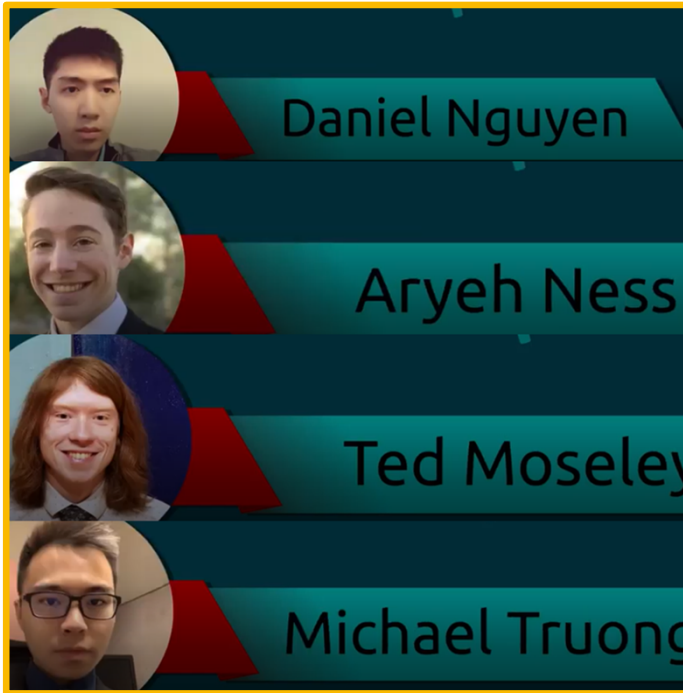
**(\$200)**

Presented by:

**Anand Bhagwat**

JP Morgan





**BEST**

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**COMMERCIALIZATION**

Team number: **S20-61**

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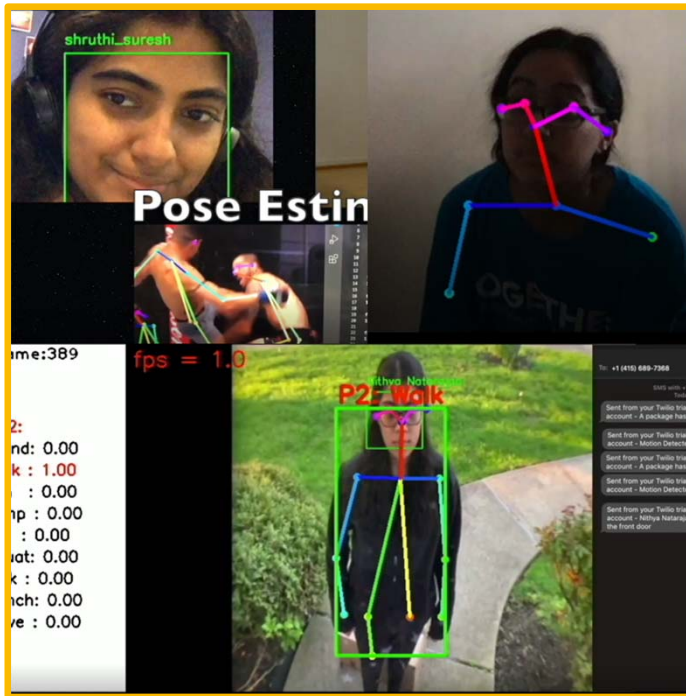
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# **The Galbiati Entrepreneurial Awards...**





**\$1,000**  
**Galbiati**

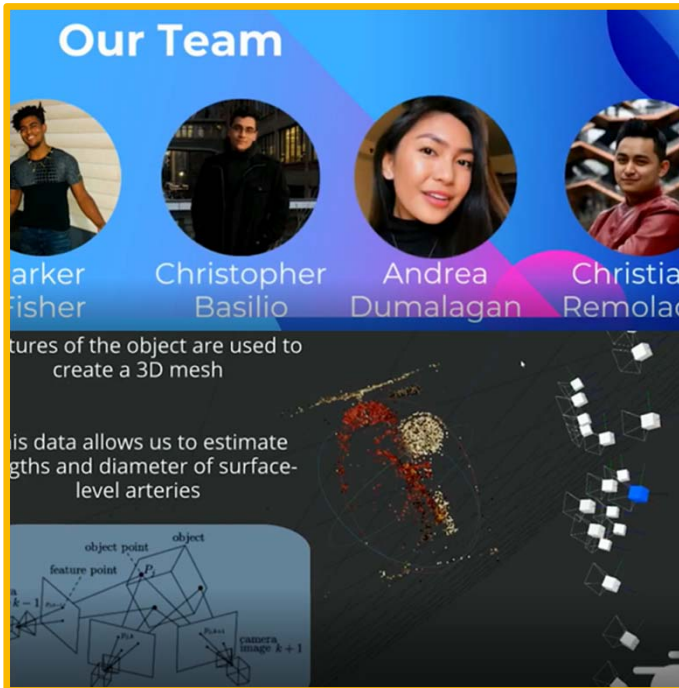
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**\$1,500**  
**Galbiati**

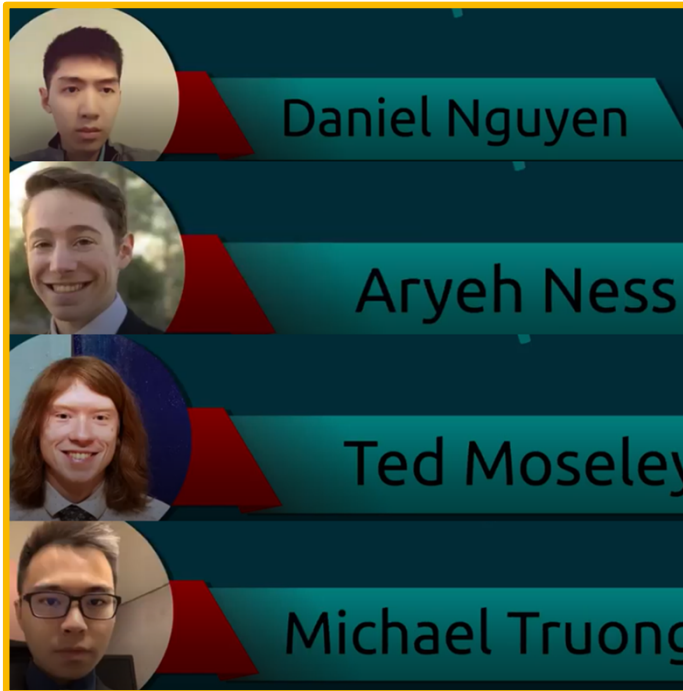
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**\$2,500**  
**Galbiati**

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**Congratulations!**

**Proud of you all**