AFRL FIGHT'S

THE AIR FORCE RESEARCH LABORATORY

VOLUME 35 SUMMER 2019

WRIGHT SCHOLARS SUMMER PROGRAM AT THE NEW DAYTON REGIONAL STEM SCHOOL

Photo by Mr. Will Graver

The Wright Scholar Research Assistant Program is a nine-week summer internship program for exceptionally talented students with a strong interest in future engineering or science career fields. These students apply to participate and are competitively selected and then matched with an Air Force Research Laboratory (AFRL) scientist or engineer during the summer following their junior or senior year of high school.

> "My most rewarding experience at the GRILL is watching students' excitement over solving a problem as a team and their eventual completion of the problem that they are given. In addition to this, being a witness to the intelligence these kids have and the future that awaits them is extremely rewarding."

> > -Gretchen Capogna. STEM Outreach Coordinator

The Gaming Research Integration for Learning Laboratory[®] (GRILL[®]) has hosted Wright Scholars since 2011 with a focus on modeling and simulation. The inaugural year of the GRILL's participation in the Wright Scholar program involved eight students and two local teachers. The 2019 summer program hosts 13 Wright Scholars, four Legacy students, 10 local teachers, two PhD researchers, six computer-science interns and one pre-service education intern. During the nine weeks, teachers work along with the students to develop science, technology, engineering and mathematics (STEM) focused curriculum that their school districts can implement during the academic year. The Wright Scholars focus their efforts on a set of challenge problems. Current AFRL research interests (i.e. autonomy, Live-Virtual-Constructive and high-fidelity simulation) drive the creation of the challenge problems. Upon completion, the students publish their work on the GRILL website and present it to stake holders within the community. In addition, the teachers publish their curriculum, syllabi and lesson plans on the GRILL website free-of-charge (www.gamingresearchintegrationforlearninglab.com).

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Based on the success of the summer program, the GRILL was able to relocate to a large custom-built location at the Dayton Regional STEM School (DRSS). The new GRILL location doubles its STEM summer program capacity as well as its year-round STEM outreach mission. The new location features a dedicated simulator-development room, data-collection room, staff room and doubled storage capacity as well as flexible space that GRILL and DRSS staff and teachers share. The new GRILL location between the Air Force and the local community.

Dr. Winston Bennett, Product Line Lead and GRILL Team Lead Lt Mitchell Lichtenwald, Program Manager

AIR FORCE ACADEMY CADETS SUPPORT SUMMER FACULTY RESEARCH

This summer, two United States Air Force Academy (USAFA) cadets, Cooper James Ramos and Jessica Frederick, along with University of South Florida Professor Michael D. Coovert PhD are working with the Air Force Research Laboratory's Gaming Research Integration for Learning Laboratory® (GRILL®) instructional team on training research. The focus of their collaborative effort is twofold.

THE TEAM IS:

- Evaluating current Synthetic Task Environments (STE [serious games]) for their usefulness in USAFA laboratory spaces
- Gaining an awareness of current research, while examining methods for assessing student engagement in learning situations

For the first part of the effort, the cadets are learning the process of developing assessments for inclusion in an STE. Dr. Coovert has given each cadet a construct to assess in an STE. The two constructs are active learning and analytical thinking. The cadets are targeting these constructs by first conducting a literature review and secondly proposing a measurement strategy within an STE context. In conjunction with the cadets' research, the instructional team is familiarizing the cadets with an unclassified version of the PRINCE (Predator Reaper Integrated Network Combat Environment), the Pilot Training Next, Antarctic Resource Allocation Task and CAS 2.0 environments. Based on the knowledge gained, the cadets are developing performance-based metrics that may be included in current and future STE.

For the second part of the effort, the cadets are working with Dr. Coovert and the GRILL team to identify assessment methods that could be applicable to learning contexts at the USAFA. They are becoming familiar with current and planned methods as well as the learning contexts in use currently. By the conclusion of the summer program, Dr. Coovert, the cadets and GRILL instructional team will develop a white paper on the best practice methods and tools that the GRILL could integrate in the future at one or more USAFA classrooms.

By going through the process of developing an assessment for analytical thinking and active learning, the cadets are developing an appreciation for what can be measured in an STE, how to develop an STE assessment and the different ways to define a construct and operationalize its measurement. \bigstar

Dr. Winston Bennett, Product Line Lead and GRILL Team Lead Dr. Michael D. Coovert, Professor Ms. Suzette Westhoff, Senior Technical Writer/Editor





Dr. Michael D. Coovert received his PhD in psychology from The Ohio State University with an emphasis in I-O. His doctoral minor work was in computer science. Dr. Coovert's interests include the changing nature of work, especially the impact of technology on individuals and organizations.

"I have methodological interests in modeling performance of individuals and teams over time, especially as they interact with computer mediated technology."

Cadet Jessica Frederick, a rising senior majoring in Behavioral Sciences and Leadership, has a career goal of becoming an Intelligence Officer. She grew up in a military family, so she knew from a young age that she wanted to serve her country and have a career that impacts thousands.

"I wanted a challenging career and to be surrounded by the comradery that the military provides."

Cadet Cooper James Ramos is entering his final year at the Air Force Academy, where he is majoring in Behavioral Science. He plans to become a Military Information Support Operations officer.

"The prospect of getting to work with and someday lead teams in the most technically proficient military in the world is very exciting to me. It's hard to imagine a career with higher stakes and a better opportunity to help make an impact."

MEET THE SUMMER FACULTY AND AIR FORCE ACADEMY CADETS

The Gaming Research Integration for Learning Laboratory[®] (GRILL[®]) is collaborating with the University of South Florida and the United States Air Force Academy (USAFA) for its Summer Program this year. The GRILL instructional team is delighted to have Dr. Michael D. Coovert share his knowledge and experience with them and two talented Air Force cadets, Jessica Frederick and Cooper James Ramos. Dr. Coovert's and the cadets' responses to the following interview questions provide a glimpse into their engaging work.

Ms. Suzette Westhoff, Senior Technical Writer/Editor



A: Certainly. Dr. Bennett and I have researched a variety of topics, including team decision-making; trust development in teams and individuals; performance measurement; and quantitative metrics to enhance assessment in Synthetic Task Environments. We have collaborated on more than 20 professional publications and presentations, many of which include students' contributions on projects.

Throughout the years, Dr. Bennett's support has provided unparalleled experiences to graduate and undergraduate students in my lab at the University of South Florida. The University's Industrial-Organizational (I-O) graduate program in psychology ranks in first place for faculty productivity and ties for second place in U.S. News & World Report for best overall I-O programs. The experiences provided by Dr. Bennett exposes the University's students to real-world problems of critical importance and helps train the leaders of tomorrow.

DR. MICHAEL D. COOVERT



U: What is the most interesting thing you have learned from your extensive literature review this summer?

A: I am researching how to assess analytical thinking within the scientific realm. The serious game that Dr. Coovert is designing needs to assess active learning, deductive reasoning and analytical thinking. In order to create measures and methods to assess these areas, it is important to read the current literature pertaining to that topic before creating a method to test these measures. By doing this research on the front end, it allows individuals to understand what has worked or not worked so far in the field of this particular study area.

The most interesting thing that I have learned through my literature review so far is that there is not a "universal" way to test analytical thinking. I thought that I would read several research articles and have a clear answer, but I did not. I have read many research articles at this point about analytical thinking and still have not found a super clear way to assess analytical thinking. However, this is a good thing. Research is not supposed to have a clear answer at first, if it did, there would be no point in researching and conducting experiments on certain topics and hypotheses.



Question: What work are you doing to support the Warfighter Readiness Research Division this summer?

A: Answer: I am helping with a project through the GRILL to develop an assessment that is better able to determine who would make a good cyber operator. I am just doing a part of the preliminary work on the literature review, but the hope is that the model developed will address gaps that paper and pencil tests do not measure sufficiently and will provide a foundation for future Air Force assessments and training.

"MY HEART IS IN THE WORK" AT CARNEGIE MELLON UNIVERSITY

Solving the military challenges of tomorrow demands strong research partnerships today. Both the 2018 "National Defense Strategy" and this year's "United States Air Force Science and Technology Strategy" emphasize the important role of external partnerships in the agile pursuit of innovative technological advantage. Members of the Cognitive Science, Models and Agents Branch are thinking outside the fence to develop deeper collaborations with academic partners at Carnegie Mellon University (CMU) by establishing a new operating location on the CMU main campus. This operating location enables the Air Force Research Laboratory (AFRL) to embed personnel on campus, working directly alongside faculty, post-docs and students on a daily basis. Consistent, direct interaction is opening new directions and identifying unique, interdisciplinary expertise to expand AFRL's ability to push the cutting edge of research in human-machine teaming.

Efforts emphasize cognitive modeling, interactive task learning between humans and machines, and validation and verification techniques for artificial intelligence (AI) models, including machine learning and human cognitive-processing models. A common challenge across all of these areas is in computational implementations of human and machine understanding, which has become an early focus of emerging collaborations.

Carnegie Mellon has a long history in pioneering AI, starting in 1955 with Herbert Simon and Allen Newell's "thinking machine." Logic Theorist was the first program modeling human problem-solving processes, providing a cornerstone to modern AI technologies. The tradition of pioneering AI for modeling and augmenting human cognition continues today. University researchers lead the development of computational cognitive architectures, brain-imaging technologies, software agents and autonomous robots. Together, CMU's experts across the Departments of Psychology, Social & Decision Sciences, Machine Learning, Computer Science, Engineering and Robotics, will work with AFRL scientists to address gaps in our knowledge of how to use AI to understand humans and how to improve capabilities for AI and humans to work collaboratively in challenging, dynamic task environments.

Following the establishment of AFRL's new operating location, CMU kicked-off a University Center of Excellence in Trusted Human-Machine Teaming, funded by Air Force Office of Scientific Research and the 711th Human Performance Wing. In February 2019, the Army AI Task Force launched its research hub at CMU's National Robotics Engineering Center. Connecting research to mission areas is bolstered by pioneering efforts in AI engineering at the Software Engineering Institute, a Department of Defense federally funded research and development center located on the CMU campus. Overall, our new AFRL operating location at CMU places us at the heart of efforts connecting Defense researchers with the broader AI research community.

Dr. Leslie Blaha, Lead for Carnegie Mellon University Operation Location Dr. Kevin Gluck, Lead for Personalized Learning and Readiness Sciences



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Carnegie Mellon University, located in Pittsburgh, Pennsylvania, boasts the top-ranked computer science program in the U.S. and is among the top 10 universities for innovation, according to U.S. News & World Report 2018 rankings.

Carnegie Mellon is home to more than 14,500 students and 1,300 faculty. Air Force Research Laboratory-Carnegie Mellon University operating location is led by Dr. Leslie Blaha at CMU and by Dr. Kevin Gluck at Wright-Patterson Air Force Base.

RECOGNITIONS

711TH HUMAN PERFORMANCE WING

RHA 2ND QUARTER WINNER

Company Grade Officer: Lt Mitchell Lichtenwald

711TH HPW/RHA

Hails

Mr. Gavin Anderson Lt Kyle Bucklew Capt Daniel Johnston Ms. Katelyn Kay Mr. Sean Kennedy Lt Andrew Kinzinger-Petroski Lt Chao Pan Col Danny Slifer

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Farewells

Capt Dallas Dooley Mr. Steve Evans Lt Alex Gaines Maj Kristen Grasser Ms. Julia Lee Lt Mitchell Lichtenwald Dr. Brad Schlessman Lt Col Ross Uhler

711/HPW RHA Branches:

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- Operations Support (RHAO)
- Continuous Learning and
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