



Army Research Laboratory (ARL) West
12015 E Waterfront Dr
Los Angeles, CA 90094



Welcome

Our Mission

The laboratory's purpose is to create and exploit scientific knowledge for transformational overmatch. By combining its in-house technical expertise with those from academic and industry partners, ARL focuses on knowledge products that offer incredible potential to improve the Army's chances of surviving and winning any future conflicts.

The ARL West regional ecosystem represents unique capabilities and partnerships from across the technical and entertainment industries, venture communities, colleges and universities, in addition to other diverse academic partners across the West Coast.

Resiliency: What Scientific Research Needs in the Face of COVID-19

While the COVID-19 pandemic has affected student research experiences across the country, we have remained resilient and steadfast in developing a pipeline of top technical talent through research collaborations. In this issue, we profile science and technology research with highlights of student contributions at various educational levels. First, we review the progress students made this past summer through the DoD, the Army Institute for Creative Technologies at USC, and National Security Innovation Network (NSIN) X-Force internship programs, even while working remotely from their own universities. We also reflect on the impactful journeys our past student interns have taken in their educations. The final section demonstrates our focus on broadening and enriching a pipeline for future Science, Technology, Engineering, and Math (STEM) talent through our third Army Educational Outreach Program (AEOP): Gains in the Education of Mathematics and Science (GEMS). Because of the multitude of ARL West research collaborations that attract top students from across the world and socio-economic backgrounds, we are fostering and maintaining a climate where people want to be by having a diverse and inclusive workforce.

Technical Focus Areas

- Human and Information Interaction (HII)
- Natural "Hands-Free" Communication and Multi-Agent UAS Simulation
- Computer Vision
- Machine Learning Software and Hardware
- Emerging Semiconductor Materials

People

- 23 ARL government employees and 27 contractors, faculty, student research assistants, and post-docs
- Collaborating with several regional universities, co-located with the Army's University Affiliated Research Centers, the University of Southern California Institute for Creative Technologies, and Institute for Collaborative Biotechnologies

Contact Us

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ARL West 2020 Student Intern Spotlights

There are two primary programs that involve student collaborations with ARL West staff. Through the DoD Internship Program led by the ARL Outreach Office, we are able to collaborate with students from Historically Black Colleges and Universities (HBCU) and other Minority-Serving Institutions. We also partnered with the University of Southern California (USC) [Institute for Creative Technologies \(ICT\)](#) to perform collaborative research that often involves summer student internships. This summer was no exception as we worked with the ICT to list [15 projects](#) to which over 350 students/researchers applied to collaborate with us. Several students made technical contributions to a subset of these projects that we prioritized and highlighted in this newsletter.



Simba Nyatsanga

[Simba Nyatsanga](#) recently completed the first year of his PhD at the University of California (UC) at Davis where he works with Prof. Michael Neff. This summer he worked with Dr. Celso de Melo at ARL West on engineering methods to synthesize plausible data to train machine learning algorithms to perceive human activities.

[Alice Qiao](#) and [Sarah Kusumastuti](#) (both from the USC Psychology Department) contributed to a research program led by Dr. Benjamin Files on individualized training for adaptability and decision-making using visualized uncertainty. Alice is focused on measuring and understanding individual measures of traits that predict the effectiveness of training interventions, and Sarah is focused on understanding how specific decision characteristics relate to the difficulty of decision-making.



Alice Qiao



Sarah Kusumastuti



Colleen Chen

[Colleen Chen](#) from the UC Irvine Cognitive Sciences program worked with Dr. Mark Dennison and Tiffany Raber, both alumni of the 2016 and 2017 ARL West/ICT intern programs, on comparing multiple-user interaction techniques within AURORA cross-reality (XR) environments. Alice, Sarah, and Colleen all continue to work with ARL West staff during their respective PhD research as Oak Ridge Associated Universities (ORAU) Journeyman Fellows.

[Channing McGee](#) is also a UC Davis student rising into the third year of undergraduate studies in Electrical Engineering. He collaborated with Dr. Seyi Ayorinde to develop digital code blocks in the Verilog language to develop energy-efficient integrated circuits. Channing learned about ARL West when he was a high school intern at USC ICT.



Channing McGee



Anubhab Sen



Peter Hanson

Master's students [Anubhab Sen](#) (USC) and [Peter Hanson](#) (University of Texas, El Paso) worked on a team led by Drs. Steven Thurman and Russell Cohen Hoffing. They applied various analytical techniques to distinguish how pupil size changes, i.e., pupillometry, during eye tracking studies and how pupillometry reflects both cognitive (mental arithmetic) or non-cognitive factors (e.g., luminance). Peter was a finalist at the ARL Summer Student Symposium.

[Aishwarya Sapkale](#) is a master's student at the University of Maryland, Baltimore County (UMBC), where she works on joint modeling of images and natural language text for answering complex questions. Over the summer, she collaborated with Dr. Stephanie Lukin at ARL West on how to maintain consistency and relevancy in multi-image visual narratives for the purpose of explaining what is seen during remote exploration of unknown environments. Aishwarya published a technical report detailing her novel contributions to this emerging area and is planning to defend her thesis in November, for which Dr. Lukin will serve as a committee member.



Aishwarya Sapkale

Continue to next page for more Intern features...

Intern features continued...



Aaliyah Bratcher

Aaliyah Bratcher (Bowie State) worked with Drs. Pete Khooshabeh, Celso de Melo, and collaborators at Share Ventures. Aaliyah previously interned with the ARL APG Vehicle Technology Directorate to apply Microsoft AirSim to generate synthetic data for machine learning based on visual sensor information. With ARL West, she worked on human activity recognition and applied that to develop a prototype of the WarFyter mobile app. She will be going into the Howard University applied mathematics PhD program.

[Erik Guzman](#) is a master's student from the California State University (CSU) at Northridge and Jenille Cruz is an undergraduate from CSU Fullerton. They both worked with Dr. Mahesh Neupane on characterizing and simulating diamond materials for emerging electronics. In fact, they both respectively placed second in the graduate and undergraduate categories of the ARL Summer Student Symposium. Erik will continue to collaborate with Dr. Neupane as he embarks on a PhD program in the UC Riverside Physics Department and Jenille will embark on an MS program at CSU Fullerton, continuing her work on diamond electronics.



Erik Guzman



Jenille Cruz



Anthony Sevarino

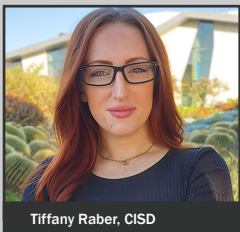


Amir Tamim

Through X-Force, [Anthony Sevarino](#) and Amir Tamim worked with Dr. Russell Cohen Hoffing to do market research and develop a marketing strategy for an ARL-West centric gameshow based podcast. The podcast will support ARL-West outreach efforts targeting young professionals.

Past Interns - Where are they now?

Tiffany Raber ('17 intern) awarded the SMART DoD Scholarship to pursue PhD at UC Irvine

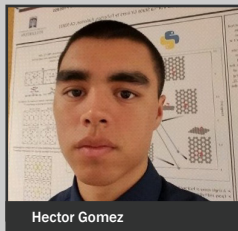


Tiffany Raber, CISD

Tiffany Raber is a researcher in the ARL Computational and Information Sciences Directorate (CISD). Following the completion of her Masters from

the University of Illinois at Chicago's Biomedical Visualization Program, she began as a 2017 ARL West intern. Pursuing a project in virtual reality data visualization, Tiffany was selected as the top graduate student in her cohort and was awarded a trip to ARL HQ to present her work at the ARL Summer Student Symposium. After her internship, she was offered a full-time position at ARL West working with the Data & Analysis Center, and currently CISD. This year, Tiffany was awarded the SMART DoD Retention Scholarship to pursue her PhD in Cognitive Science at UC Irvine. She plans to conduct foundational research on the role collaborative XR environments and immersive interfaces play in command and control applications that will contribute to her team's research goals in the near term, as well as make a meaningful impact on future Army decisions and development.

Hector Gomez ('19 intern) admitted to UC Riverside PhD program



Hector Gomez

Hector Gomez ('19-20 intern) recently transitioned to the University of California, Riverside (UCR)'s PhD Program in Materials Science and Engineering. Prior to joining UCR, Hector interned with ARL's Diamond Electronics Team in the Sensors and Electron Devices Directorate (SEDD) and was mentored by Dr. Mahesh R. Neupane, who was recently awarded the SEDD Diversity Award for his mentoring and advising of students from diverse socioeconomic backgrounds and helping them succeed in their academic and/or professional careers of choice. Hector was instrumental in designing and characterizing diamond surface models used in device design. Because of his research achievements as an intern with DEVCOM, he was awarded the Presidential Fellowship Award for his graduate studies. As a graduate student, he will pursue his research in the field of materials and device modeling and complement ARL's internal efforts.

Md Lutfor Rahman ('18-19 intern) transitions to tenure track faculty at California State University at San Marcos



Md Lutfor Rahman

As a result of his research collaboration, Lutfor identified his Ph.D. dissertation topic back at UC Riverside. With ARL he worked on a project named Neuro-Adaptive System under the supervision of ARL mentors Dr. Ben Files and Dr. Antony Passaro (now with Deloitte Consulting). Lutfor adapted his work with ARL to decode human skepticism in phishing detection for his PhD dissertation work. While his background is computer security, he benefited from the interdisciplinary ARL project related to brain-computer interface, neuroscience, and cognitive science. At ARL he learned how to design empirical studies to evaluate scientific theories. More importantly, he observed his technical mentors and learned from them key leadership skills in how to execute a large research project. This scientific knowledge, leadership, and mentoring skills will serve him well as he embarks on a tenure track as an Assistant Professor.

GEMS 2020 Goes Virtual

Human-Autonomy Teaming studies at CCDC Army Research Laboratory

Keep talking and nobody explodes!

- Why is team stuff important for the US Army?
- Why do we need to study team stuff?
- What are the underlying features to teams? (Physiology, Neuroscience, Communication)
 - How could we develop robots to help us?
 - What capabilities do they need?

What kind of challenges did you face?

What could this research be used for?

What other studies are going on?

A committee of five DEVCOM ARL West scientists and engineers immersed 57 middle and high school students in technical disciplines important for Army research priorities.

Image (top): Dr. Javi Garcia leading a GEMS session on Human Autonomy Teaming
 Image (bottom): Dr. Pat Baker, ARL Director (bottom right), and Dr. Pete Khooshabeh (bottom left) welcome NFL Hall of Famer and successful businessman, Mr. Ronnie Lott (top left). SGM(R) Keith Taylor (top right), led the discussion.

The students learned about computer programming, perceptual science important for human performance, computer-aided design for additive manufacturing, and fundamentals of aerospace engineering through weather balloon exercises. The Greater Los Angeles Chapter of the Association of the US Army (GLAC AUSA) Board of Directors facilitated the relationship with the local campus of the DoD [Starbase campus](#) at the Joint-Forces Training Base in Los Alamitos, California. Starbase and ARL developed an MoU and the former contributed resource teachers to the GEMS summer program. Senior high school students from Compton Unified School District (CUSD) returned to serve as near-peer mentors for consecutive summers, as did other returning students. The ARL West GEMS program included 70% of students

from ethnically and/or socioeconomically underserved groups in STEM fields. The ARL West Outreach Committee works year round to ensure the success of its summer GEMS program through actively recruiting students from the CUSD Computer Science Expo, speaking at the Alliance for Southern California Innovation Diversity and Inclusion Forum, and volunteering at the Girls Academic Leadership Academy of Los Angeles. As a result, ARL West Outreach broadens and enriches the pipeline of future STEM talent from the California region. It establishes an enduring culture that attracts talent, fostering a diverse and inclusive workforce by maintaining a climate where people want to contribute their best. For more on this story, click [here](#).

MG John George Visits ARL West

MG George visited DEVCOM ARL West in person at Playa Vista, CA. Dr. Pete Khooshabeh briefed an overview of the ARL Open Campus model and highlighted how it establishes an enduring culture that attracts top technical talent. Several staff gave 3-min theses of their work, ranging from topics on emerging diamond electronic materials to hybrid thinking planned work and various human autonomy teaming related research. Colleagues at the Army's Institute for Creative Technologies briefed on the One World

Terrain project and multimodal machine learning research. ARL West partners from the Space Ventures Coalition briefed on opportunities for DEVCOM to collaborate over the horizon targeting as a hard problem that sits at the intersection of Intelligence Surveillance and Reconnaissance sensors, autonomy, and satellite systems. Tectus Corporation (dba Mojo Vision) briefed and demonstrated their smart augmented reality contact lens. Way forward: ARL is working with the Commander's Action Group to contribute to metrics for science and technology progress. Dr. Mark Dennison and the Adaptive Cross-Reality Information Mediation (AXRIM) team will work to integrate the AURORA AXRIM in the C5ISR Center System Integration Laboratory (CSIL).



From left to right, Dr. Mahesh Neupane, Davey Lind, MG John George, Dr. Russell Cohen-Hoffing, Dr. Pete Khooshabeh, and Dr. Mark Dennison

BG Bienlien Spends Two Days Exploring SoCal Innovation



BG Bienlien explores the AURORA XR environment while Dr. Mark Dennison explains the research and innovative technical advancements. Christian Salvador (left) is the IT support across all the Regional Sites.






The DEVCOM Deputy Commanding General, BG James Bienlien, visited ARL West in the summer for two days. During the visit, BG Bienlien heard from a wide assortment of briefers, including colleagues from the Institute for Collaborative Biotechnologies (ICB), our co-located partners at ICT, and the USC Center for Body Computing.

Prof. Richard Murray from Caltech highlighted the unique work his research group does to support the Army's interest in synthetic biology. Prof. Barry Giesbrecht highlighted cognitive neuroscience collaborations with ARL scientists as well as those from the DEVCOM Soldier Center. Following this initial foray into the ARL West Regional Site, BG Bienlien invited the entire Regional Site Synchronization Office (RSSO) to brief the DEVCOM Council of Colonels who serve as military deputies to each of the DEVCOM units. ARL West and the entire RSSO support broader AFC persistent modernization.

Next Issue:

- Learn about Share Ventures CRADA partner
 - » Instill.AI Culture Operation System
 - » Diversity in startups
- Focus on ARL in the Pacific Northwest

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