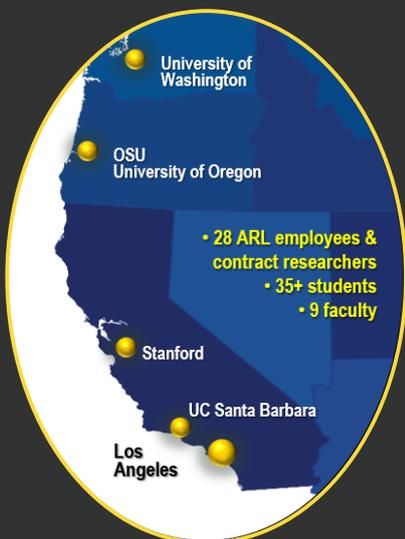Army Research Laboratory (ARL) West
12015 E Waterfront Dr
Los Angeles, CA 90094

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 is able to provide the best technologies for our Soldiers.

University of Washington

OSU
University of Oregon

• 28 ARL employees & contract researchers
• 35+ students
• 9 faculty

Stanford

UC Santa Barbara

Los Angeles

The ARL West regional ecosystem represents unique capabilities and partnerships from across the technical and entertainment industries, venture communities, private colleges and universities, in addition to other diverse academic partners across the West Coast.
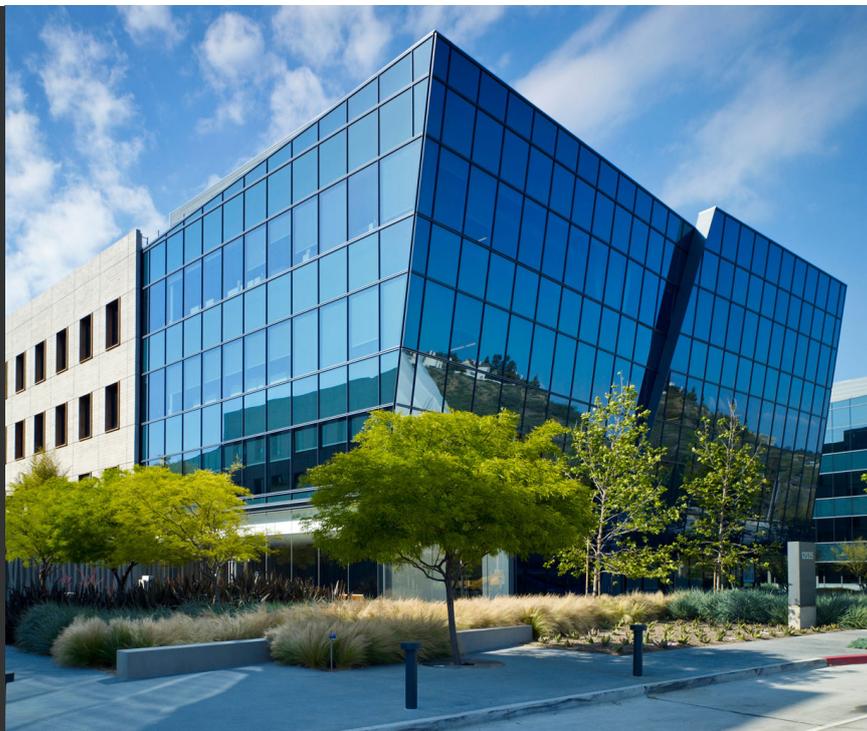
U.S. Army Combat Capabilities Development Command

ARL West

Welcome to the first ARL West newsletter. In this inaugural issue, you can read about some of the impactful Army research and the people behind it. These outcomes result because of the ecosystem we have created to attract and work with leading experts across the nation to address the Army's greatest challenges.

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:

- 18 ARL government employees and 10 contractors, student research assistants, post-docs
- Collaborating with several regional universities, co-located with the Army's University Affiliated Research Center, the University of Southern California Institute for Creative Technologies and Institute for Collaborative Biotechnologies

Contact Us:

For futher information, contact:
Dr. Pete Khooshabeh
Regional Lead, ARL West
310.574.7818

Inquiries can be sent to:
ARLWest@arl.army.mil

https://www.arl.army.mil/opencampus/ARLWest

ARL West and Academic/Industry Collaborators Brief SecArmy
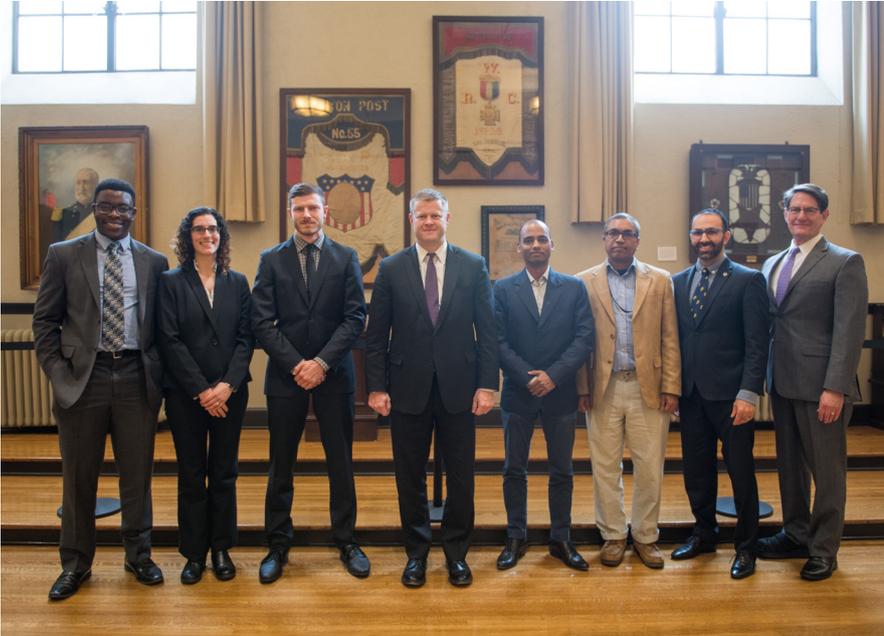
From left to right, Dr. Seyi Ayorinde, Dr. Stephanie Lukin, Dr. Mark Dennison, Honorable Ryan McCarthy, Dr. Ajitesh Srivastava, Dr. Raj Kannan, Dr. Pete Khooshabeh, Dr. Randy Hill

Earlier this fiscal year, at the request of the Greater Los Angeles Chapter of the Association of the US Army (AUSA), a number of researchers from ARL West and academic/industry collaborators met with the Honorable Mr. Ryan McCarthy. We discussed our STEM recruitment and a few ARL research initiatives in the ARL West Regional Ecosystem. This newsletter will introduce some individuals involved in that briefing and profile in more depth a couple of the stories behind their research.

Dr. Seyi Ayorinde
SEDD

Dr. Seyi Ayorinde is an integrated circuit designer within the ARL Sensors and Electronic Devices Directorate (SEDD). Dr. Ayorinde has developed a collaboration with a regional industry partner on

Artificial intelligence-Machine Learning (AI-ML) algorithms and hardware processors to support advanced Aided Target Recognition (AiTR) on tactical edge computing devices, such as future intelligent squad weapons. Dr. Ayorinde and collaborators research and develop innovative architectural solutions for the integration of AI-ML with state-of-the-art integrated circuit architectures for use in target detection and classification. In addition to his technical work, Seyi leads the ARL West Outreach Committee. As a result of his leadership, the ARL West GEMS Army Educational Outreach Program (AEOP) has grown from an inaugural 30 students to now four cohorts to involve 100 or more middle school students.

Dr. Stephanie Lukin
CISD

Dr. Stephanie Lukin is a Computer Scientist in the ARL Computational and Information Sciences Directorate (CISD), and has been at ARL-West since 2017. ARL-West's close proximity to the University of Southern California's Institute for Creative Technologies (USC-ICT) Army UARC has resulted in collaboration between Dr. Lukin, ARL researchers, and expert researchers in the USC-ICT's Natural Dialogue Group. The collaborative research is supporting the ability for the Army to enable efficient Soldier-robot teaming using natural language communication that alleviates the "Head Down, Hands Full" burden on the Soldier in the field when operating a robot. Dr. Lukin leads an effort on how an agent (e.g., robot, sensor, camera) should "talk about what it sees" and explain critical assumptions it makes while conducting Army-critical missions during, for example, search-and-rescue or reconnaissance for Intelligent Preparation of the Battlefield. Her work interprets what is happening in an image sequence or video clip, analyze and reason about the content and arrangement of objects in its visual field, and then generate a mission-specific, succinct narrative highlighting the important elements of the physical space for the mission.

From Summer Intern to Project Lead Within the Army's Network Cross-Functional Team (CFT)

Dr. Mark Dennison
CISD

Dr. Mark Dennison is a research psychologist in the ARL Computational and Information Sciences Directorate (CISD). While a PhD student at the University of California at Irvine, Mark was part of the inaugural ARL West intern cohort in 2016. He was selected as the top graduate student in his cohort and was awarded a trip to ARL HQ to present his work at the ARL Intern Symposium. After finishing his doctorate, ARL awarded Mark a postdoctoral fellowship to pioneer novel machine learning (ML) approaches for noxious human state tracking during head-mounted display use and to develop novel server and network technologies for distributed collaborative decision-making. His most recent work has been as technical lead on the ARL Internet of Battlefield Things (IoBT) Collaborative Research Alliance (CRA).

Mark leads a group of government researchers and contractors on project AURORA (Accelerated User Reasoning for Operations, Research, and Analysis) to research the role of immersive interfaces in command and control applications. Many of the senior leaders to whom Mark has demonstrated the project have remarked on the critical role of developing an adaptive cross-reality Common Operating Picture in AURORA for systems like Integrated Visual Augmentation System (IVAS) and the Army Network. Mark is now leading integration of AURORA as part of the Robust, Resilient, and Intelligent C3I program in the Network Cross-Functional Team (CFT) portfolio.

The Secretary of the Army, Honorable Ryan McCarthy, tries a cellphone based prototype of ISAGE's scene analysis technology demonstrated by Dr. Ajitesh Srivastava, a postdoc collaborating with Dr. Raj Kannan.

A Model Roadmap for Tech Transfer

The gap between academic theory and technological practice can be wide and difficult to bridge, but here is an example of how our Open Campus initiative is doing just that. Researchers from ARL and the University of Southern California (USC) have been engaged in collaborative research on developing algorithms for ultra-low latency ML training and inferencing on low-power hardware such as Field Programmable Gate Arrays (FPGAs). This work resulted in a series of academic papers published and presented in top journals and conferences. The accelerated ML techniques developed in these papers beat existing state-of-the-art performance metrics in the literature, earning several best-paper awards. But the team recognized the urgent need to transition these ideas into technology products for the Army, overcoming significant performance gaps in implementing these ML algorithms on Soldier hardware that could successfully perform on a wide range of edge platforms. To help achieve this transition of concepts into technology, ARL collaborating partners at USC formed a new startup (ISAGE Inc). Currently, ARL and ISAGE are in the process of filing several patents that go beyond the original academic work with some potentially exciting Intellectual Property for Army applications. The Army XTechSearch competitions also provided a mechanism for ISAGE to refine its approach and expand awareness of its work, such as highly in the advanced rounds in both the XTech 3.0 and 4.0 competitions. With the support of ARL's Signals and Information Processing Division within the Computational and Information Sciences Directorate, Dr. Raj Kannan is seeking broader industry collaboration on novel approaches enhancing warfighter lethality by providing the computational assets and algorithms to enable rapid information processing and decision-making capabilities through plug-and-play tunable performance mapping of deep learning models.

Through the ARL Open Campus ecosystem mission of fostering academic-military partnerships, and leveraging the unique partnerships at ARL West, ARL researchers, leading academics, and innovators are developing software-defined architectures for low-latency edge analytics to make Soldiers faster, and therefore more lethal.

ARL Expands to the Pacific Northwest

We are building a collaborative partnership with Oregon State University (OSU) to perform joint work on "Collaborative Robotics in the Modern Battlefield". OSU leadership and faculty invited ARL to present two-days of workshops with the OSU College of Engineering. Researchers from ARL briefed the faculty and students on the various ARL high Priority Research Programs. Among these were the impressive Collaborative Robotics and Intelligent Systems (CoRIS) Institute, pictured below. Nathan Schomer (second from the left), a computer engineer in the WMRD Guidance Technology Branch, is leading this collaboration with OSU's Prof. Julie Adams. Further Northwest, Dr. Chad Kessens (VTD) will embed with the robotics groups at the University of Washington to do joint work on mobile manipulation.

Next Issue:

- Pathways to Success: Stories of ARL interns and where they are now
  » Tiffany Raber ('17 intern) awarded the SMART DoD Scholarship to pursue PhD at University of California (UC) Irvine
  » Hector Gomez ('19 intern) admitted to UC Riverside PhD program
  » Md Lutfor Rahman ('18-'19 intern) transition to tenure track faculty at Calstate University at San Marcos
- Learn about new CRADA Partner Share.VC

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