

AFRL FIGHT'S ON!

THE AIR FORCE RESEARCH LABORATORY

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Photos by Mr. Will Graver / Screenshot by the GRILL®

A NEW FRONTIER OF COLLABORATION PEOTE Demonstration & 1:1 Simulation

On May 20th, Calamityville held the AFRL & Wright State University Partnership Agreement Demonstration Day event which was attended by State Senator Bob Hackett (escorted by Mr. Ted Harmer) and State Representative Tom Young (escorted by Ms. Ashleigh Coker). Hackett and Young were invited to the event so that the stakeholders could present summaries regarding the site's research and provide demonstrations. Through the combined work of Ted Harmer (RHW) and Eric Lam (RYA Branch Chief), the technology shown to the state officials, ultimately, showcased the benefits of collaborative efforts between WSU and the AFRL.

The primary focus of the event was Calamityville's Performance-Enabled Operational Training Environment (PEOTE). PEOTE captures and organizes objective data to fill in data sets across tactical mission locations. The software does this through the live, virtual, and constructive (LVC) focused technology (e.g., augmented reality (AR) and mixed reality (MR) hardware), providing thorough measures of data used in AR and virtual reality (VR). PEOTE uses LVC tech to map locations, bridging the gap between training in live and virtual environments. One example shown at the demonstration event was a mock .50 cal turret that fired at moving and stationary targets placed on the site's open field. Participants would fire the gun, hit their mark,



Top Left: State Senator Bob Hackett talks to Dr. Madhavi Kadakia, Ph.D., Vice Provost for Research and Innovation Wright State University, and Calamityville team members.

Top Right: State Rep. Tom Young test fires the .50 cal simulator.

Bottom Right: Screen shot of the Calamityville LVC Simulation.

and activate a rigged Improvised Explosive Device (IED) linked to a simulation of the site. The virtual hit would register and trigger an explosion to simulate users hitting their mark. Data of the users' accuracy via each shot would then be collected and stored.

In addition, the site's event included the Calamityville LVC simulation which uses the Gaming Research Integration for Learning Lab's® (GRILL®) Distributed Interactive Simulation (DIS) protocol for Unreal Engine plugin. The GRILL DIS plugin processed and displayed the network traffic while the simulation used an accurate map of Calamityville. The 1:1 recreation was developed using heightmap data and latitude/longitude coordinates. The Calamityville sim utilized the realistic data imaging in VR so that users could join the active scenario and visualize the activity live at Calamityville. ★

Mr. Ted Harmer, Electronics Engineer, 711 HPW/RHWL

THE FULL THROTTLED RETURN OF THE GRILL'S STEM EVENT

The Full Throttle STEM event is one of the most crucial public events for the greater WPAFB area, hosting several school districts that encourage their students to take on the creative crafting challenges focused around science, technology, engineering, and mathematics. May 10th saw the return of not one, but two Full Throttle STEM events—one hosted at Eldora Speedway in Rossburg, Ohio and the other at the National Museum of the United States Air Force. Both events were hosted by the Air Force Research Laboratory's (AFRL) Gaming Research Integration for Learning Lab® (GRILL®).

Full Throttle STEM saw a turnout of 12 schools at both event locations, with students that showcased their knowledge and skills in physics, graphic design, and marketing. The showcased projects included Virtual Reality (VR) simulations, drones, and autonomous and remote control vehicles. Consisting of students from various counties, Full Throttle STEM allowed classmates to contend with their peers, providing opportunities for competition and invaluable moments of learning. This was especially the case for those who surmounted the obstacles of constructing working models and designed vehicles that outperformed the competition.

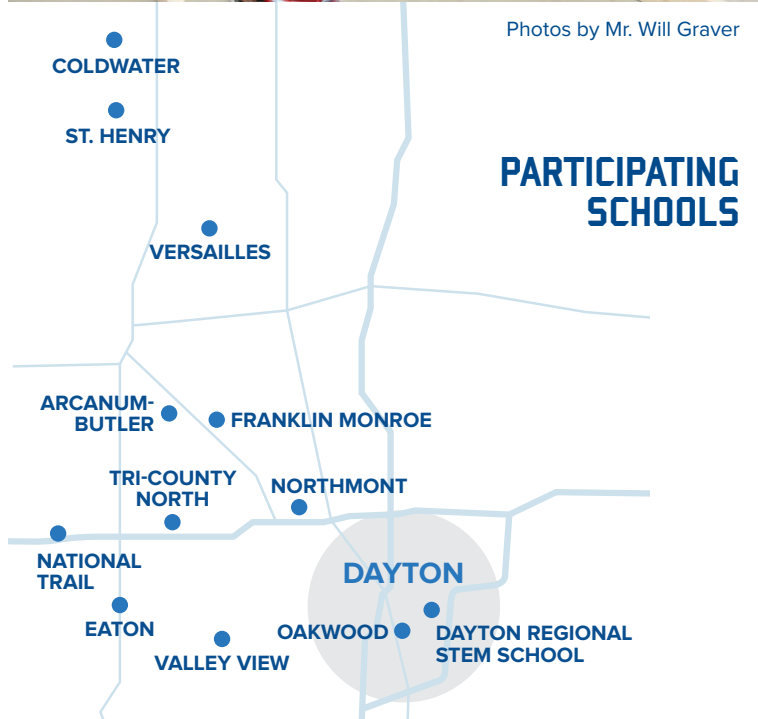
Along with miniature vehicles, some of the students had the opportunity to create VR simulations, one being a VR hotdog shop; however, this virtual food stand didn't start out serving hotdogs. The Arcanum High School students initially began development with the simulation as a VR pizza stand, changing it to a hotdog vendor over the course of their programming. The young developers approached the process as an opportunity for learning and adapted during development, producing a fully functioning simulation with dynamic, interactive elements that utilize the foundational digital components found within development software used by AFRL.

That is, ultimately, the end-goal (as expressed by Dr. Winston "Wink" Bennett): to ensure the development of a STEM-oriented workforce that can embrace and overcome the advanced challenges of the future. As in-person events find their way back into the daily schedules of the public, so too do the opportunities for young minds to directly interact with, learn from, and develop with their peers to ensure a triumphant tomorrow in the field of STEM. ★

Dr. Winston "Wink" Bennett, Readiness Product Line Lead, 711 HPW/RHW
Lt Kyle Bucklew, Program Manager, 711 HPW/RHWM



Photos by Mr. Will Graver



TIMING IS EVERYTHING: Updates for the Just-in-Time Multimission Support

In the Agile Combat Employment (ACE) environment where our air forces will be dispersed to many austere, forward operating sites, our multi-capable Airmen (MCA) will have to perform novel or rare tasks under pressure and time constraints. As Lt Col Adam “Trader” Chitwood, Air Combat Command’s (ACC) Agile Battle Lab (ABL) Commander, said, “For the last two years, the ABL has pursued a project called Tele-Maintenance under the hypothesis that salami-slicing our force across many operating locations would leave the right maintainer in the wrong place at the wrong time to fix a jet during a time of war.” To overcome this critical challenge to effective combat power generation in ACE and to support our multi-capable airmen, RHW has launched a project to create a training content creation, delivery, and assessment infrastructure that leverages Commercial-off-the-Shelf (COTS) and Government-off-the-Shelf (GOTS) technologies wherever possible through a series of technology evaluations and field experiments. While there are many possible use cases for this technology, the current focus is on maintenance in austere locations. RHW will be using model-based systems engineering processes and practices to integrate best-of-breed technologies in aiding/training agents, multimodal interfaces like speech recognition, AR/VR technologies, and a suite of

physiological sensors. The primary benefits include enhanced novel task performance in austere locations and unobtrusive person-state and performance tracking with analytics for assessment.

A team consisting of representatives from AFRL, Air Education and Training Command (AETC), ACC, and some industry partners (Dynepic, Enduvo [with S2RC], Moth+Flame, SoarTech, and Tangram Flex) recently attended the Raging Gunfighter 22-2 exercise and provided tech demos to maintenance Airmen from the 366 FW, leadership, and observers to garner insights about the usability and utility of these technologies in a deployed, austere, ACE environment. Field evaluations such as these are invaluable, providing Airmen and Guardians with awareness of our efforts and enabling us to develop critical technology that’s well-aligned to the users’ needs. This field evaluation was the first of many as we rapidly and iteratively create this critical enabling technology for our multi-capable Airmen. ★

Mr. David Malek, Senior Research Psychologist, 711 HPW/RHWL

Graphic by Mr. Will Graver

INDIVIDUAL PHYSICAL & COGNITIVE ASSESSMENTS

DIGITAL TWIN

ABILITIES
KNOWLEDGE
SKILLS

FATIGUE
STRESS
HEART-RATE
WORKLOAD

AUTOMATED THERAPEUTICS

INTELLIGENT DECISION AIDING

HANDS-FREE INTERFACES

SMART CONTENT MANAGEMENT & DELIVERY

F-15 STRIKE EAGLE
Maintainer's primary expertise

MQ-9 REAPER
Maintainer capabilities extended to unfamiliar

PROMOTIONS

NAME	PROJECTED GRADE
1Lt Luke Cofax	Capt
1Lt Eric Lawson	Capt
2Lt Brett Martin	1Lt
2Lt Patrick Mei	1Lt
1Lt Sarah Soffer	Capt
1Lt Meghan Strang	Capt
2Lt John O'Donnell	1Lt
2Lt Ludvig Oliver	1Lt

PUBLISHED CONTENT

ARTICLE

Halverson, T., Myers, C.W., Gearhart, J.M., Linakis, M.W. and Gunzelmann, G. (2022), Physiocognitive Modeling: Explaining the Effects of Caffeine on Fatigue. *Top. Cogn. Sci.*
<https://doi.org/10.1111/tops.12615>

CHAPTER

McCormick, E. N., Cheyette, S. J., & Gonzalez, C. (2022). Choice adaptation to changing environments: trends, feedback, and observability of change. *Memory & Cognition*, 1–27.
<https://doi.org/10.3758/s13421-022-01313-2>



RECOGNITIONS

FIRST QUARTER AWARDS

711 HPW

Collaboration Team Award:
Space Development Team (RHWC)

RH

Civilian-Category III:
Dr. Vincent Schmidt

Company Grade Officer:
1st Lt Patrick Mei

RHW

Civilian-Category II:
Mr. Michael J. Dougherty

Field Grade Officer:
Maj Jason Lingle

SPECIAL AWARDS

Technical Management Award (Science, Engineering & Technical Management (SE&TM)):
Dr. Taylor B. Murphy

Junior Civilian Scientist/Engineer Award:
Dr. Kathleen Larson

HAILS

Lt Joshua Broekhuijsen
 Dr. Regina Buccelo-Stout
 Mr. Joe Budinger
 Dr. George Chadderdon
 Mr. Elijah Crawford
 Ms. Levern Currie
 Mr. Joshua Dempe
 Mr. Patrick Ederer
 Mr. Bradley Hagan
 Capt John Hrabrovsky
 Mr. Lucas Keylor
 1st Lt Nicholas Kundrat
 Mr. Caleb Lees

1st Lt Brett Martin
 Ms. Lauren Morse
 2nd Lt John O'Donnell
 1st Lt Ludvig Oliver
 TSgt Andrew Pauldine
 Mr. Donald Pogoda
 Mr. Jonathan Stella
 Capt Jonathan Turner
 Lt Col Michael Walker
 Ms. Lindsey Wilcoxon

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 Ms. Heidi Harkins
 Ms. Shania Horner
 Lt Col Christopher James
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 Mr. Michael Neill
 Ms. Marlis Olson
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 Lt Col Catherine Wynn



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Fight's ON! Point-of-Contact
 Patricia D. Wood, 711 HPW/RHW
 patricia.wood.2@us.af.mil
 937-938-4051

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711 HPW/RHW Core Research Areas:

- Cognitive Models
- Personalized Learning and Readiness Sciences
- Systems Analytics
- Collaborative Interfaces and Teaming
- Multisensory Perception and Communication