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DEVCOM Chemical Biological Center Places Third in Machine Learning Challenge

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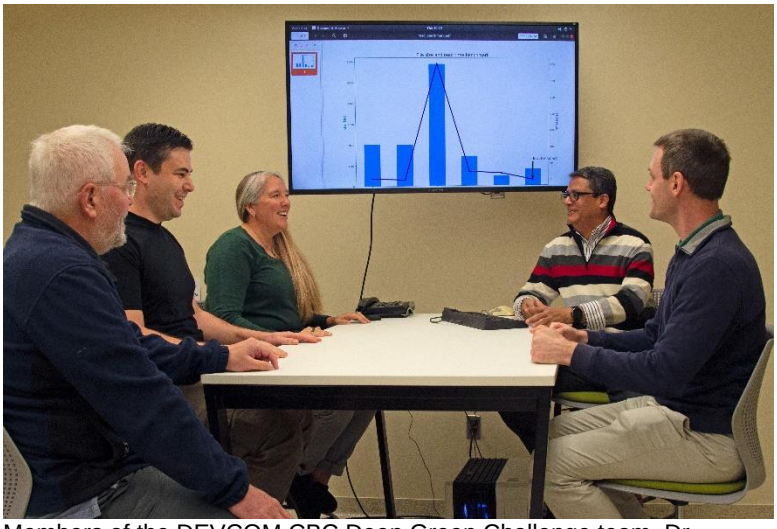

Members of the DEVCOM CBC Deep Green Challenge team, Dr. Thomas Ingersol, Edward Emm, Julie Renner, Dr. Samir Deshpande and Matt Browe, gather to work on improving their AI perception model for unmanned ground vehicles to navigate across land. (Photo by Ellie White) (Photo by Ellie White)

Aberdeen Proving Ground, MD -- "None of us is as smart as all of us," is an old saying in business management, and it held true for a team of six U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) researchers, all with different technical backgrounds, when they placed third in a U.S. Army machine learning contest.

The Army's Office of Business Transformation joined up with the DEVCOM Army Research Laboratory to create the Deep Green Challenge in 2021. Its purpose is to improve Army organizations' skill in applying artificial intelligence and machine learning (AI/ML) to their technology development programs. For 2022, the challenge was to build AI perception models to solve the real-world challenge of getting unmanned ground vehicles (UGV) to navigate over land. UGVs have to be able to distinguish between an obstacle that requires rerouting such as a lake or a fallen tree from non-obstacles such as a puddle or fallen branch.

DEVCOM CBC's team of six researchers competed against 11 other teams from around the Army to see which team could develop the most accurate prediction model for UGVs to use for its computer vision algorithm. The team consisted of a team captain, Dr. Samir Deshpande, a computer engineer, plus two toxicologists, a mathematician, a biologist and a chemical engineer. Only Deshpande and the chemical engineer, Matthew Browe had much prior AI/ML experience.

"We didn't know each other at first," recalled Julie Renner, a biologist. "We communicated remotely most of the time. But over time, holding frequent remote meetings, sometimes even on weekends and evenings, comparing notes and teaching each other what we were learning, we really started to pull together around the challenge."

“The challenge was really hard,” said Browe, “But we had each other to work it out with.” “I’ll always remember the pleasure of feeling like a team,” added Deshpande. “There were no individual egos, just all of us doing our best to contribute solving the problem.”

The problem was highly complex. They had to develop an AI model, and begin coding in the computer language, Python. The team members worked on it whenever they had time. They had to go down to the level of individual pixels, teaching the algorithm how to increase the accuracy of each iteration as the model interpreted the two-dimensional images they were given. They then had to submit their models to a leaderboard, like in sports, to validate the results.

Renner and Browe agreed that it was Deshpande’s skill and patience as a mentor that got them up to speed in their programming. “Samir spent many hours answering our questions and making helpful suggestions. He was the perfect leader for this kind of challenge,” said Renner.

The DEVCOM CBC finished behind the DEVCOM Analysis Center at first and the DEVCOM Army Research laboratory at second. However, Deshpande, Browe and Renner, plus their other teammates, Edward Emm, Dr. Thomas Ingersoll and Dennis Miller (now retired) were delighted to come in third in such a field. They will now compete in the Phase II competition which goes from January through March 2023. This phase will continue the effort to improve AI/ML for UGVs using computer vision to navigate. It will be open to students in service academies and select military colleges as well as Army research laboratories.

For the members of the DEVCOM CBC team, the prize is much more than a third-place trophy. It is having increased their AI/ML skills so that they can apply it to their day-to-day research. “I can now apply the skills I built through this challenge to things like better designing molecules to trap and neutralize chemical agent,” said Browe. Renner added that she could use these skills to create better models for virtually staining cells that she views under a microscope to identify agent exposure effects.
Every Army organization that participated improved its AI/ML sophistication. That makes them better at accomplishing their individual missions, and that makes team America the biggest winner.

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