The MATE ROV Competition is pleased to announce the 2019 Microsoft Azure Machine Learning ROV Challenge!

Your mission: Harness the power of cloud computing to identify and analyze underwater objects with the data you've collected from your ROV. Start with pre-built Artificial Intelligence models like Computer Vision and Video Indexer OR take it to the next level by building your own machine learning models.

The MATE ROV Competition and Microsoft are challenging EXPLORER class teams to use the Microsoft Azure AI Platform to innovate on decisions that might be made from ROV information and the machine learning process (data acquisition, transformation, classification, visualization, etc.). Here are some scenarios you might consider:

- Classify aquatic species (like identifying then counting specific species or anomalies)
- Predictive maintenance for underwater infrastructure (i.e. crack detection or discoloration)
- Analyze fault lines to predict natural disasters
- Discover and explore underwater shipwrecks and analyze date, origin, root-cause

This is in the spirit of an open hackathon – feel free to use both data acquired from your ROV, simulated data for your scenario, or public data sets. Pick your preferred platform, libraries, & developer tools – it's all up to you with the distributed computing scale of Azure. Teams that participate will be judged on how they embrace this philosophy and will be recognized for their approach to collaboration as well as embracing the power of the "cloud" to cross boundaries and build cooperative solutions.

Participation in Microsoft Azure Challenge is OPTIONAL, but it is intended to foster creativity, develop skills for "the future of work," and provide a new, fun approach to competition tasks. It is a way for teams to learn and grow, rather than compete for maximum points.

Each participating team member may each register for Azure for Students to get $100 cloud credit plus free developer tools like Visual Studio Code and Python libraries for data science. Teams that qualify to attend the MATE ROV international championship will receive additional Azure cloud credit with the value to be determined at the time of the event based on the number of teams selected.

What are the prizes for this challenge?
In addition to learning / applying your career-building skills in Cloud Computing – the #1 in-demand "hard" skill according to LinkedIN – we offer some fun prizes to inspire you:

- **First Place:** Surface Go + 3D Printer + Underwater Drone
- **Second Place:** 3D Printer + Underwater Drone
- **Third Place:** Underwater Drone

Or if these devices are unavailable at the time of the event, a prize of equivalent value will be selected.

In addition to using Azure, what are you required to do?

You'll be required to develop a 10 minute presentation explaining the opportunity / problem you sought to address, your solution, and why your project contributes to ROV innovation, how you overcame technical obstacles to achieve it. Be sure to conclude what decisions you might make from your project and next steps you'd take with more time and resources. You are welcome to use presentation software, data visualizations, and live or recorded demos. 5 minutes of Q&A will be allotted for judges after the presentation.

Teams will also have the opportunity to:

1) execute the task they selected in the pool during a bonus round not part of their regularly mission scored runs
2) select another task/activity they would like to apply the technology to and engage that within their report and mission runs instead of, or in addition to, the official mission tasks
3) develop, upload, and use new data sets / machine learning models / algorithms of your own design

(Note that items 2 and 3 are a wide open category where your imaginations will be most at work!)

Teams will be judged qualitatively (with weighting, see below) by a panel of senior MATE judges and Microsoft engineers. Because this is an open-ended hackathon format, we will use the same general criteria used in the Imagine Cup – Microsoft's premiere higher education student technology competition. Projects will be judged in the spirit of the team's targeted objective – not all criteria need be addressed but teams should make a reasonable attempt to address as many as possible as it pertains to ROV-specific scenarios.

Criteria	Description	Weighting
Technology	▪ Does the project make effective and appropriate use of the major features of its chosen platform(s)? Were there significant platform features or even platforms the project could have benefitted from but failed to utilize? ▪ Does the project include innovations in technical design and/or implementation? ▪ Does the project include innovations in user experience? ▪ Does the project have a professional degree of production in terms of performance, user interface, visuals, and audio?	50%
Innovation	▪ Does the project create a new category of product or service? ▪ Does the project clearly and meaningfully innovate beyond existing products or services?	20%
Concept	▪ Does the project have a clear target market or audience? ▪ Does the project address a clear need, problem, or opportunity and is the solution clearly explained?	15%

	▪ Is the project's purpose and basic functionality easily understood?	
Feasibility	▪ Does the team have a credible plan for getting their project to market in terms of business model, any required partnerships, or other factors? ▪ Does the team have any form of external validation for their project such as customer surveys, focus group tests, an active beta-test program, recommendations from subject-matter experts, or potential investors? ▪ Does the project have a reasonable chance of success in its appropriate market given the team's existing plan?	15%

How do you get started?
Submit your intent to participate to the 2019 Microsoft Azure Machine Learning ROV Challenge by March 16th, 2019.

How do you access Microsoft Azure?
Start with Azure for Students, which provides $100 cloud credit for students that verify with their accredited school's email address. Enrolling does not require a credit card. There is no obligation to pay for Azure in the future. If you are unable to verify online because your school is not supported, contact MATE for a one-time code.

Each student in the project team may obtain **Azure for Students**. For example, if you have a team of 7 students, this team can collectively receive $700 worth of credit but each $100 increment cannot be combined into one Azure account. But one student can give access to other team members through role-based access control so practically this means that students can experiment independently and then contribute to one designated student's account (representing the team's contribution).

Teams are not required to use the **Azure for Students** offer to participate. Your team can choose to pay for additional Azure credit. For example, if your team has been sponsored by other organization or group, they may choose to support you by paying for Azure independently.

What technical support and resources are available?

Complete tech documentation on Azure is here. Try these specifically:

- AI & Machine Learning services (pre-built AI and flexible tools for building models)
- Data Science Virtual Machine (pre-built VM for Linux or Windows)
- Python SDKs and libraries (for your preferred IDE)
- Using Python in Visual Studio Code (cross-platform IDE with extensions)
- Azure Notebooks (free implementation of Jupyter Notebooks with Python runtime)
- SQL Database as a service (for relational database, non-relational options available too)
- Power BI as a service with Azure (for data visualization)

New to Azure or want to start learning with some hands-on tutorials? Try Microsoft Learn with these labs here. These are designed as "micro-learning" – modules that get you coding and building a solution in 30-90 minutes.

Questions?

Limited technical support will be available prior to the MATE ROV Finals event. Please consult the documents above. However if you are stuck and need some help, Microsoft engineers will occasionally monitor the MATE forums here: http://forums.marinetech2.org/index.php.