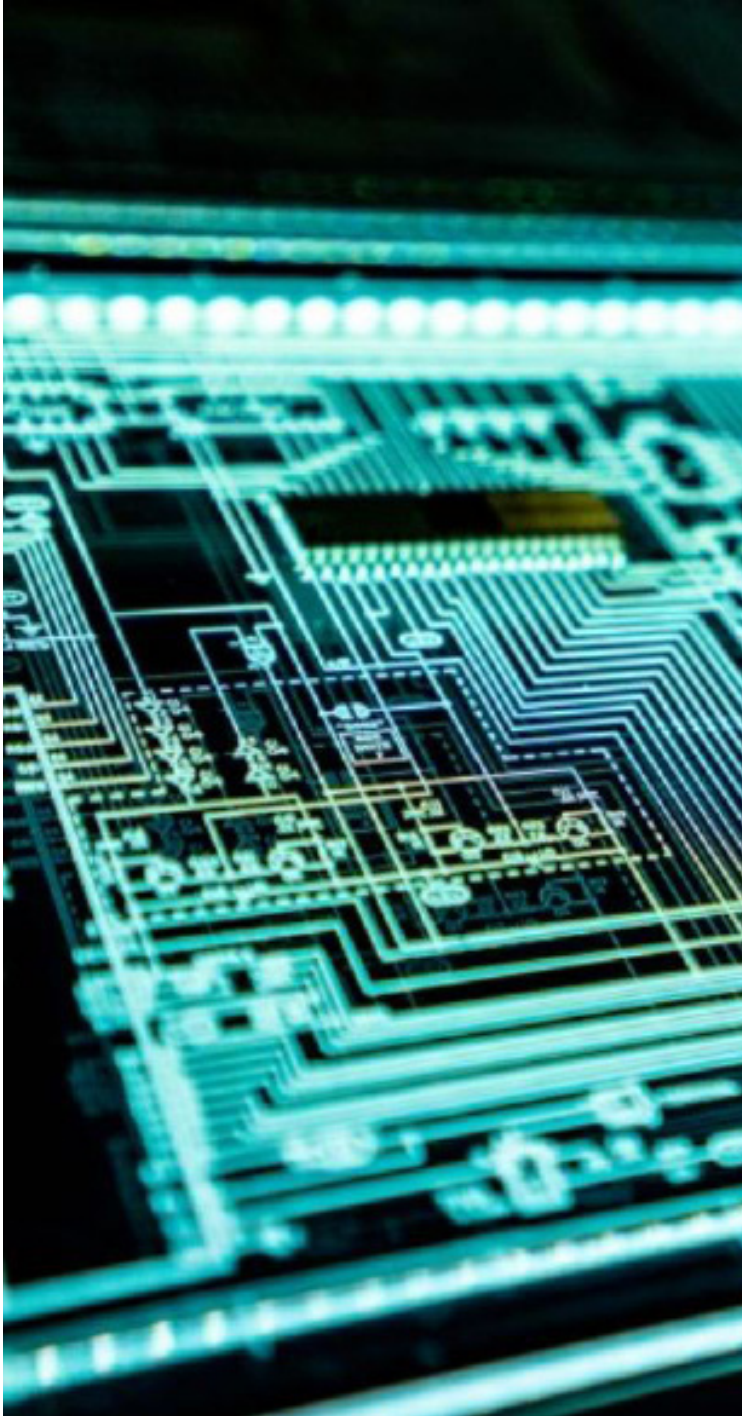
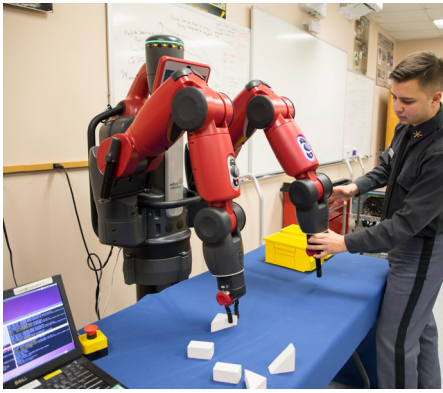


# ROBOTICS & CYBER INITIATIVES



West Point  
**READY**   
READY TO SERVE. READY TO LEAD.



## ROBOTICS INITIATIVES

The mission of the Robotics Research Center (RRC) is to educate cadets in the field of robotics and provide them with opportunities to perform cutting-edge research in support of Department of Defense (DoD) agencies and program offices to solve complex problems and mature robotic technologies for warfighting applications. The RRC prepares cadets to lead in an Army more reliant on unmanned systems with increased autonomy and artificial intelligence.

Established in 2017, the RRC is the newest of the 27 research centers at West Point but also the largest by any metric including the number of research projects and research faculty employed. The core competencies of the RRC include:

- Development and rapid prototyping of aerial, ground, and aquatic robots
- Multi-agent teaming
- Human machine interfaces and field tactics with robotics
- Localization and mapping
- Artificial intelligence and machine learning

### *Research*

Cadet research has grown significantly at West Point over the past decade. RRC advised cadets across all year groups enroll in independent study courses focused on robotics research. All EECS honors cadets are required to complete independent research leading to a publishable journal or conference paper. Gift funds allow the RRC to purchase state of the art tools and robotic components to support cadet research, and they also allow cadets to travel to military installations to demonstrate their research contributions to the United States Army Forces Command (FORSCOM) units and DoD program offices.

Consistent with the established fact that highly developed faculty produce highly developed cadets, the RRC invests in the Academy's "second class of graduates," the junior rotating faculty, by engaging them in relevant cutting-edge robotics research within the DoD to enhance their competency.

### *Robotic Curriculum Development and Teaching*

The United States Military Academy (USMA) offers a three-course robotics depth option to electrical and mechanical engineers, a robotics minor open to all cadets, and a separate three-course robotics sequence for non-STEM majors.

The RRC also supports common core classes which introduce concepts in artificial intelligence and ethics of lethal autonomous systems.

### *Robotics Competitions*

Cadets compete annually in a number of robotics competitions across the United States. The RRC oversees the following teams:

- The Future Applied Systems Team (FAST) is a cadet tactics team that conducts force on force infantry squad level competitions against the midshipmen of the United States Naval Academy. The squads are augmented with emerging robotic technologies designed for enhanced lethality and situational awareness.
- The Astrobotics Team competes in the NASA Lunabotics Challenge which is an annual engineering competition hosted at Kennedy Space Center in which robotic teams from across the country develop autonomous lunar mining robots.
- Electronic Experimenters (ELEX) allows cadets to learn about, design, and build electronic projects without needing prior experience. Projects start as small circuit kits and increase in complexity as cadets gain skills proficiency.

### *Cadet Senior Design Capstone Projects*

Each year, the EECS Department administers four to six year long senior design capstone projects with a concentration in robotics. Each robotics capstone team is composed of five to eight cadets often from multiple departments across the Academy. EECS faculty members from the RRC serve as capstone advisors, and the RRC purchases the required robotic equipment. The robotics capstones are generally the most expensive capstones to administer due to the high cost of robotic equipment such as sensors, actuators, and processing units.

Research, competition, and hands-on-experience support the robotics program, which is necessary not only at West Point, but is critically important to our country's ability to fight our nation's future wars.

## »»» CYBER INITIATIVES

Cybersecurity is critical to our national defense and prosperity. As the scope and capabilities of technology expands, so too does the need for cyber-savvy leaders with technical expertise and agility. The U.S. Army has continued to increase the size of its cyber corps and create new cyber programs; therefore, it is imperative to develop a robust pipeline of technical leaders to fill these key roles and strengthen our nation's cyber resiliency.

West Point offers a range of cyber initiatives aimed at educating and preparing cadets while simultaneously strengthening the Army's and nation's pipeline of cyber professionals. The Department of Electrical Engineering & Computer Science (EECS) leads one of West Point's essential cadet-oriented cyber initiatives: the **Cyber Team**. This team is comprised of two complimentary elements: the **Operations Team** and the **Policy Team**.

These programs advance cadets' expertise at the technical and policy levels through intercollegiate competition and invite them to pursue solutions to real-world problems. Furthermore, through these programs, cadets hone leadership and communication skills and develop relationships with prominent members of the cybersecurity community in academia, industry, and government.

### *Cyber Operations Team*

The Cyber Operations Team is a nationally ranked team focused on developing cadets' technical expertise to attack and defend cyber networks. This team of about 20 cadets prepares for and competes in a series of prominent cybersecurity competitions throughout the year. While the Team is overseen by EECS, its cadets span academic departments, reflecting the multidisciplinary nature of cyber operations.

The Team trains twice a week and competes in about eight competitions throughout the year, including the prestigious Cybersecurity Awareness Worldwide (CSAW) Competition as well as the Cybersecurity & Infrastructure Security Agency (CISA) President's Cup, Collegiate Cyber Defense Competitions, SANS Academy Cup, and NSA Cyber Exercise, among others.

These one- to three-day competitions span the full cyber security spectrum from Defensive Cyber

Operations to Offensive Cyber Operations; cadets must work as a team to effectively attack and defend network systems. In both scenarios, students conduct data forensics and analysis, effectively communicate findings, and develop software-based solutions to network attacks. In short, these competitions offer cadets the chance to practice skills that have direct applications to military cyber operations.

### *Cyber Policy Team*

While cyber officers require technical competency, they must also understand how cyber policy fits into the larger strategic picture. The Cyber Policy Team serves to cultivate future leaders with a sophisticated understanding of cyber policy.

Similar to the Cyber Operations Team, the Cyber Policy Team is a multidisciplinary team comprised of about 20 cadets from a variety of academic departments. The Policy Team competes in six to seven competitions each year and has a history of winning and placing. The Atlantic Council's Cyber 9/12 Challenges serve as the foundation of the competition schedule. This series of competitions brings together students from around the world to compete in developing effective responses to policy scenarios related to a national and/or international cybersecurity crisis. Other competitions include the NYU Cybersecurity Awareness Worldwide (CSAW) Policy competition and the WMGIC x NATO Countering Disinformation Challenge.

Whereas the Operations Team focuses on the technical applications of cyber warfare, the Policy Team focuses on legal and policy implications. For the Cyber 9/12 Strategy Challenges, the Cyber Policy Team works together to research and develop a security briefing related to the crisis scenario. Once students arrive at the three-day competition, they present their briefing to a panel of subject matter experts and respond to questions. Cadets are then challenged to adapt their recommendations as the policy situation evolves. Through this rigorous competition, cadets gain invaluable experience in developing and communicating cyber-related policies and strategies. They also develop their professional network through interactions with teams, judges, and subject matter experts.





Photo: Lee Ross '73

# FUNDING OPPORTUNITIES

## Robotics and Cyber Initiatives ..... \$4.5 million

### Robotics Initiatives Endowment & Fund .. \$3.5 million endowment / \$140,000 annual

Cadet Capstone Design Program .....	\$1.3 million endowment / \$52,000 annual
Sensor Systems .....	\$500,000 endowment / \$20,000 annual
Unmanned Aerial System (Drone) .....	\$275,000 endowment / \$11,000 annual
Computing & Communications Equipment .....	\$525,000 endowment / \$21,000 annual
Cadet Independent Research Program .....	\$1.2 million endowment / \$48,000 annual
Cadet Travel .....	\$300,000 endowment / \$12,000 annual
Equipment Endowment .....	\$900,000 endowment / \$36,000 annual
Robotics Competitions .....	\$1 million endowment / \$40,000 annual
Cadet Travel .....	\$400,000 endowment / \$16,000 annual
Training & Field Equipment .....	\$250,000 endowment / \$10,000 annual
Competition Robotic Equipment .....	\$350,000 endowment / \$14,000 annual

### Cyber Initiatives Endowment & Fund ..... \$1 million endowment / \$40,000 annual

Competition Travel .....	\$700,000 endowment / \$28,000 annual
Domestic .....	\$300,000 endowment / \$12,000 annual
International .....	\$400,000 endowment / \$16,000 annual
National Security Agency Cyber Exercise (under consideration) .....	\$300,000 endowment/\$12,000 annual

MARGIN OF EXCELLENCE



James Brandenburg | West Point Association of Graduates

698 Mills Road, West Point, NY 10996

Phone 845.446.1592

[WestPointAOG.org](http://WestPointAOG.org)

as of August 7, 2024