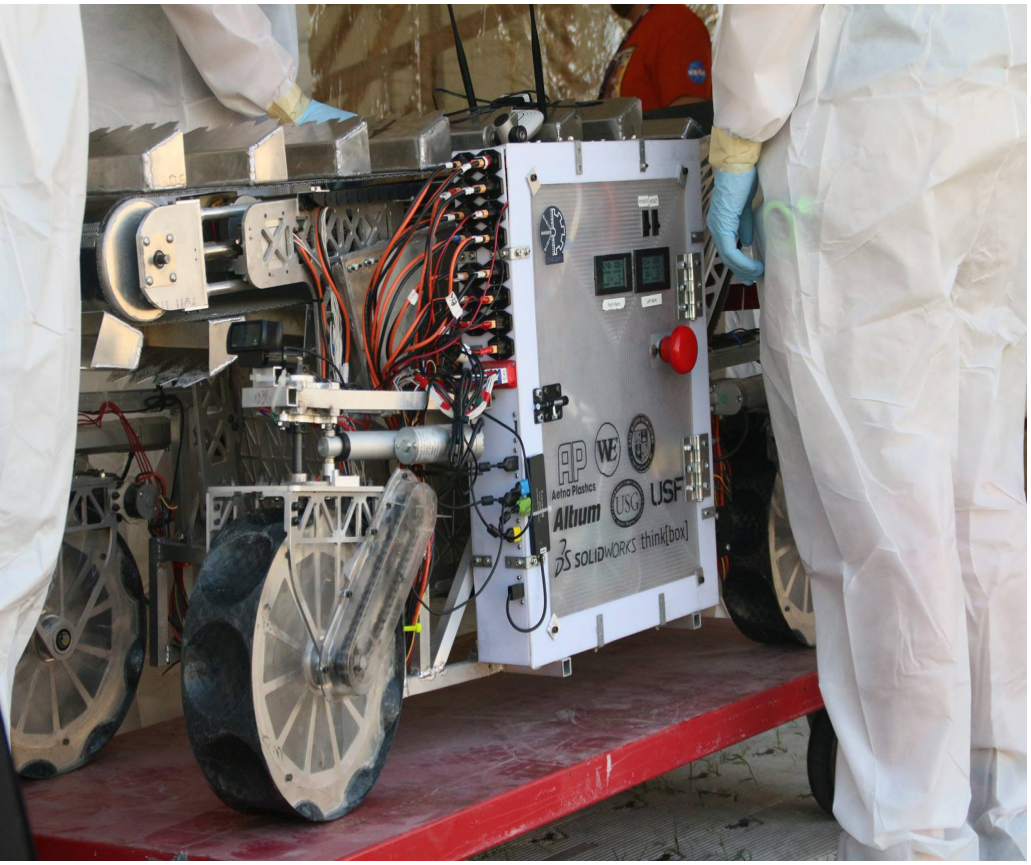
# CWRUbotix

2017-2018




## At a Glance...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Over the years, we have built Martian mining robots, combat robots, sumo-wrestling robots, maze-navigating robots, and much more. To ensure that all our members have the skill set to contribute to these projects, we run a practical robotics education and training program at the beginning of each school year. Students form small groups and tackle simple robotics challenges over the course of a month. We also deliver several weekly technical seminars covering topics from circuit design to 3D modeling to digital image processing that are open to all members of the Case community and local High schools.

Since our projects are multidisciplinary team efforts, members learn effective collaboration techniques, practice structured and thorough design processes, and take on leadership roles within the club. From Maze Robot Mechanical Lead to club President, students can gain a wide variety of technical and leadership experiences.

CWRUbotix is dedicated to positively impacting the Cleveland community. We partner with local middle and high schools to introduce students to robotics and engineering, assist the Leonard Gelfand STEM Center, and volunteer at several STEM related events for K-12 students in the area.

# Dear Potential Sponsor,

CWRUbotix's mission is to create robots that solve challenging and important problems. We expose students to technical concepts beyond the scope of their curricula, offer experiences in leadership and collaboration, and promote STEM through educational programs in the Cleveland community.

CWRUbotix seeks to build mutually beneficial relationships with industry sponsors, leveraging their invaluable support to train and widen the perspectives of the next generation of engineers and promote STEM to a wider community. Sponsorship has enabled CWRUbotix to bring hands-on experience to more students, enriching their college education and better preparing them for entering industry.

Thank you for taking the time to consider sponsoring CWRUbotix. If you have any questions or would like to sponsor us, please visit our website http://cwrubotix.case.edu/ or email us at robotics-exec@case.edu.

Sincerely,

Rhys Hamlet

Rhys Hamlet
President
rhys.hamlet@case.edu

We are CWRUbotix, Case Western Reserve University's robotics club. We like long walks on the beach (with robots), designing and building robots for a variety of robotics competitions, and engaging with the local STEM community

## NASA RMC

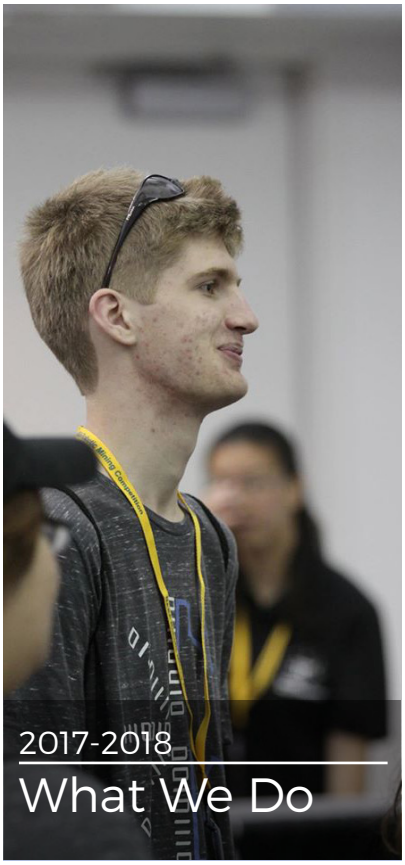
The NASA Robotics Mining Competition is a national collegiate competition where teams design a rover capable of autonomously excavating regolith in a simulated Martian environment. Teams can win awards for excavation, regolith handling, communications, outreach, public engagement, and more. The hope is that NASA may use some of the designs from this competition to inspire future Mars excavating rovers. The competition is held every year in May at the NASA Kennedy Space Center.

Each year, our team designs and fabricates a new robot from the ground up, building upon the lessons we have learned from past iterations. We take the challenge of building the best possible robot very seriously, pushing ourselves to optimise the robot's capabilities and design features. Beyond robot performance in the mining area, the competition places a strong focus on project management. Our team utilizes systems engineering to ensure we meet important deadlines and remain on budget. This approach prepares our members for the challenges and responsibilities they will face in industry.

NASA Robotic Mining Competition

In 2017, we earned 5th place overall out of nearly 50 teams at the NASA Robotic Mining Competition, a huge leap forward from our 32nd finish in 2016. We also won first place for our System Engineering paper and second for our System Engineering presentation!

This has been our first year applying system engineering principles to our robot design process, and we really threw ourselves into doing it well. It has paid off in more ways than one, as 2017's robot had the most successful mining run in team history.



2017-2018

## What We Do

1. NASA Robotic Mining Competition
2. National Robotics Challenge
3. Community Outreach

### CLUB INFO

CASE WESTERN RESERVE UNIVERSITY

LOCATION
10900 Euclid Ave.
Cleveland, Ohio 44106 USA

EMAIL: robotics-exec@case.edu

### EXECUTIVE BOARD

| | |
|---|---|
| PRESIDENT | - Rhys Hamlet |
| VICE PRESIDENT | - Lydia Sgouros |
| SECRETARY | - Clarissa Goldsmith |
| TREASURER | - Andrea Norris |
| LAB MANAGER | - Adam Cordingley |
| PUBLIC RELATIONS | - Seohyun Jung |
| FACULTY ADVISOR | - Richard Bachmann PhD |

The 2017-2018 CWRUbotix Team

## NRC

The National Robotics Challenge is a robotics event which offers a range of robotics competitions covering topics from combat robots to autonomous vehicles. For the past several years, CWRUbotix has participated in many of the available competitions, the most recent of which are showcased here.

### Combat Robot

Two robots enter, one robot leaves. Saws, rammers, grabbers, flippers, and weapons of all varieties are allowed. This year's 6lb, drum spinner robot improved on previous years' designs to challenge the competition and earn gold in the NRC 2017 competition.

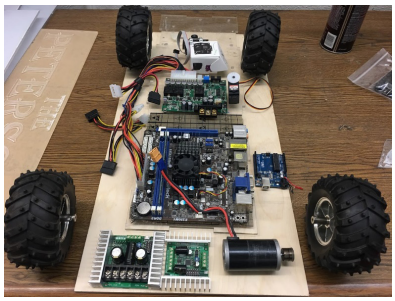
### Maze Robot

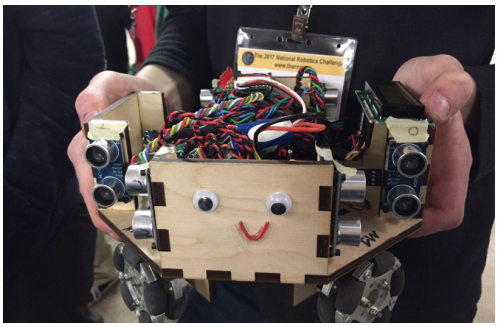
A NRC Maze robot is tasked with solving a complex maze without touching the walls. This year's robot used ultrasonic sensors and an omnidirectional drive system to sense and traverse the maze. A custom circuit and localization algorithm processes the sensor data so the robot can know where to go and reach the finish line as fast as possible.

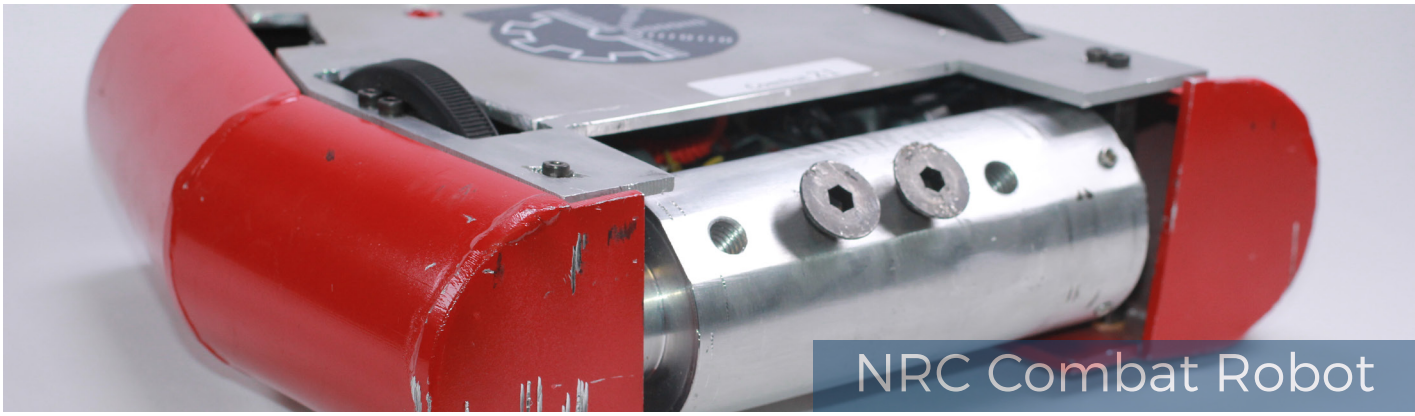
# WE BUILD ROBOTS BECAUSE ROBOTS ARE AWESOME

### Autonomous Vehicle Challenge

Our newest undertaking, this robot must navigate a roadway-like obstacle course marked with yellow way points entirely on its own. The challenge with this task is teaching the vehicle to recognize obstacles and turning points so that it can act on its own. Our team first attempted this competition in 2017 with a prototype system.







NRC Combat Robot

# Outreach

The biggest goal of our outreach projects is to share our passion for robotics and STEM with the greater Cleveland community by making our team both a technical resource and source of inspiration for students of all ages.

As a diverse team, we seek to broaden the reach of STEM education, particularly for those that might not otherwise have ready access the ideas and fields we seek to represent. By increasing awareness in our campus community and acting in the greater community around us, we can and have made an impact on lives through robotics.

Outreach as a whole is facilitated by the CWRUbotix executive board with individual events led by volunteer team members and run by the team as a whole. In particular, many of our members who participated in organizations such as FIRST, Science Olympiad, and Girl Scouts take the lead in our outreach efforts.

## K-12 outreach and community involvement is a big part of our club

In addition, we seek to:

1. Educate the campus community on robotics activities within the university

2. Unite the different departments within the Case School of Engineering such as Electrical, Computer, Computer Science/Software, Mechanical, and Aerospace Engineering.

3. Promote STEM education and awareness in the
Greater Cleveland community.

4. Foster an environment of outreach and volunteering within the team itself

## STEM Carnival at Independence Primary School


# Contribute

Direct contributions enable CWRUbotix to purchase the components, material, and resources that allow us to accomplish the core of our mission: building great robots. Direct contributions also allow the team to fund and expand its outreach efforts and bring the team to competitions that require overnight travel.

Donations of material, software, tools, workbenches, and more have made it possible for CWRUbotix to expand the complexity and performance of its designs, better develop and understand its projects, and work more productively.

Donating services, like machine-time, welding, facility-usage, and more allow us to expand our capabilities. It also allows our members to design and create even more innovative robots.