School of Aerospace
and Automotive Engineering
COLLEGE OF ENGINEERING & ARCHITECTURE

2nd edition

AUTONOMOUS AEROSPACE APPLICATIONS CHALLENGE

Innovate and Automate

22ND MAY 2025

2 CHALLENGES

Drone and Sumo Robot

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INTRODUCTION

- In a world increasingly dominated by technology, mastering robotics has become essential,not only as a tool for innovation but as a means of adapting to the complex challenges of the modern era. In Morocco, despite the presence of numerous public and private engineering schools, there is still a notable absence of structured academic training in robotics, even within programs like electrical, mechanical, electromechanical, and mechatronics engineering.
- As a result, students passionate about robotics often turn to extracurricular activities and university clubs to pursue their interest, develop skills, and engage in hands-on projects. Recognizing this gap and the growing demand for real-world experience, student-led robotics clubs have taken the initiative to organize and participate in competitions that foster learning, creativity, and teamwork.
- It is in this spirit that the A3C (Autonomous Challenges for Collaborative Creativity) competition was born at the International University of Rabat (UIR). This event aims to inspire, challenge, and unite young minds from across the country, offering them a platform to showcase their technical abilities and innovative thinking in a competitive and collaborative environment.

01

School of Aerospace & Automotive Engineering

The School of Aerospace and Automotive Engineering at UIR offers high-level training in the fields of aeronautics, space, and automotive engineering, encompassing a wide range of skills that combine rigorous theoretical training with applied technological research. The School of Aerospace and Automotive Engineering engages students in a diverse array of activities designed to enhance their academic experience and prepare them for their future careers. The curriculum is complemented by hands-on laboratory work, where students apply their theoretical knowledge in practical settings, and collaborative projects that simulate real world engineering challenges. Additionally, the school organizes workshops, seminars and events to foster a dynamic and innovative learning environment that equips students with the skills and knowledge necessary to excel in their future career

02

ABOUT THE ORGANIZING CLUB – I-ROBOT

The I-ROBOT Club is a student-led club at the International University of Rabat that focuses entirely on robotics.
Over the past year, the club has organized several workshops and a robotics competition, giving students the chance to learn, build, and work together on exciting tech projects.

Because robotics is at the heart of what we do, the I-ROBOT Club is proud to organize the A3C competition at UIR.

This second edition is designed to be even more fun, challenging, and rewarding. The goal is to offer all participants a memorable and enriching experience through teamwork, innovation, and creativity.

COMPETITION BACKGROUND

A Legacy of Innovation and Excellence

The first edition of the A3C – AUTONOMOUS AEROSPACE APPLICATIONS CHALLENGE, held at the International University of Rabat, was proudly organized by the School of Aerospace and Automotive Engineering.

This landmark event reflected the school's unwavering commitment to academic excellence, technological advancement, and the promotion of innovation in engineering education.
Conceived as a dynamic platform for showcasing the talents of young engineers, the first edition gathered passionate and skilled students from across Morocco, challenging them to design, build, and compete with autonomous robotic systems. The event was met with resounding success, marked by outstanding technical demonstrations, exemplary teamwork, and a shared vision for the future
of intelligent mobility and automation.
Encouraged by the remarkable enthusiasm and the high caliber of participation, the School of Aerospace and Automotive Engineering is honored to announce the second edition of A3C.
This renewed edition aims to empower the next generation of robotics and engineering students, providing them with a unique opportunity to apply their knowledge, develop practical solutions, and engage in constructive competition.

The A3C competition continues to serve as a national stage for future engineers, encouraging innovation, collaboration, and excellence. By welcoming students from institutions across the country, the challenge promotes the development of real-world skills, while celebrating the spirit of ingenuity and rewarding achievement through recognition and prizes.

03

PARTICIPATION RULES

01. Eligibility and Registration

Participation in the A3C competition is open to students under 26 years of age, affiliated with a university, engineering school, or robotics club.
Each participant may only register with one team. However, multiple teams may represent the same institution or club.
A team must consist of 3 to 4 members from the same institution.
Respecting the registration conditions is mandatory for participation.

02. Equipment and Materials

Only electronic components provided by the organizing committee are permitted during the competition.
Any team using unauthorized components may face immediate disqualification.
Customized parts are allowed, provided they meet the technical specifications. For sumo robots, the front piece must be metallic. If it does not comply, the team must use an approved replacement provided by the organizers.
All modifications to robots must be reported to the organizing team before implementation

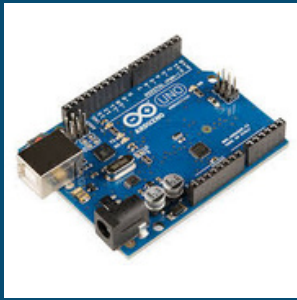
03. General Rules During the Competition

Each team must designate a single representative who is authorized to:
Present the robots or drones during evaluations.
Communicate with the jury for questions, complaints, or specific needs.
Stay near the competition area during their performance.
The order of participation and team pairings for the second phase will be determined by random draw.
At the end of the development phase, each team leader must present their robots (sumo or drone) to the jury. No further changes to the code or hardware are allowed after this presentation.
Between two competition phases, teams may access their robots to make improvements and upload new code, provided the robot is returned before the next phase begins.

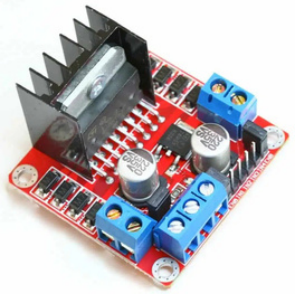
04. Penalties and Disqualification

Any attempt to adjust or fix a robot during an active match will result in a penalty.
If a team damages competition equipment, they will be penalized in points, and the equipment will be replaced if possible.
A team may be disqualified for the following reasons:
Disrespectful behavior towards other teams or jury members.
Aggressive or inappropriate challenges to jury decisions.
Repeated failure to comply with technical or conduct rules.

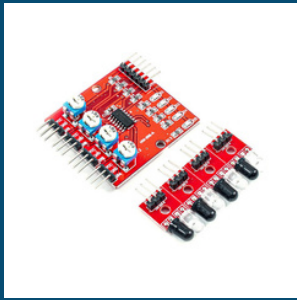
EQUIPMENT PROVIDED
SUMO ROBOT



Arduino uno



Motor driver



Infrared sensors

Wires

Ultrasonic sensor

Power supply

DC motors

Kit

05

SUMO ROBOT

Sumo Robot Competition Rules

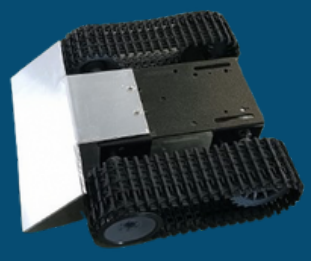
Competition Format

The competition will follow a bracket-style tournament format
Teams will compete head-to-head in matches
Each match consists of 3 rounds between two competing robots
The team that wins the majority of rounds advances to the next bracket

Round Rules:

Arena Boundaries:
If a robot forces its opponent out of the arena boundaries, the opponent loses that round
If a robot exits the arena boundaries on its own, it loses that round
Robot Positioning:
If a robot flips its opponent (turns it upside down), the opponent loses that round
Mandatory Movement:
Robots must demonstrate movement during each round
If a robot fails to move, the opposing team automatically wins that round
This rule applies even if the moving robot accidentally exits the arena
Judges will determine if movement is sufficient to satisfy this requirement
Scoring:
Each round has one winner
The team that wins 2 or more rounds wins the match and advance

Starting Procedure
The initial starting position and orientation of robots will change every round
Judges will provide specific instructions for robot placement before each round begins
Teams must follow the judges' instructions precisely for robot positioning
The match will only begin after both robots are correctly positioned according to judges' instructions



DRONE ROBOT

EQUIPMENT PROVIDED:

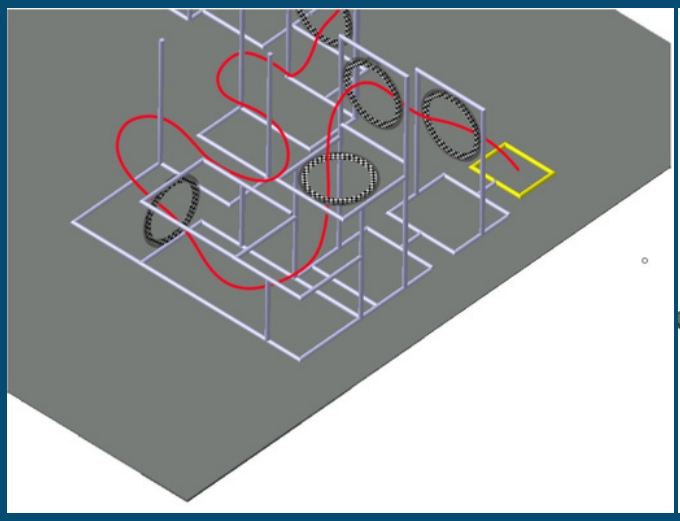
RULES

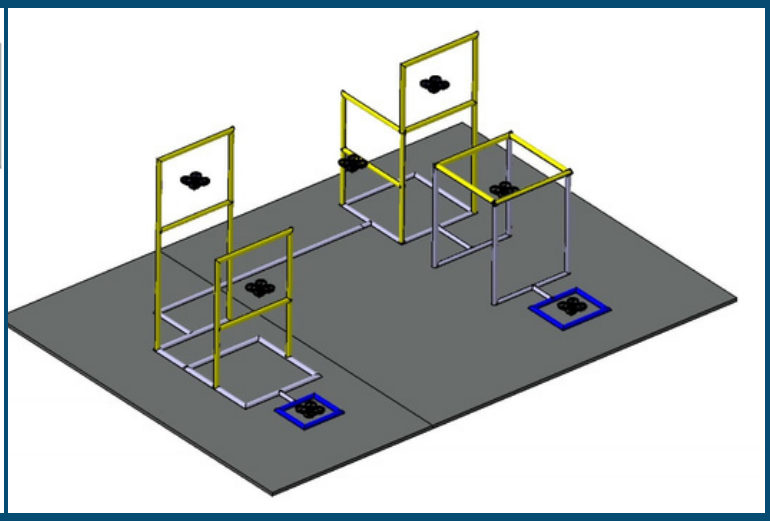
- **Course Time:** time is measured from the time the robot crosses the starting line until the time it crosses the finish line.
- A robot is deemed to have crossed the line when the drone crosses the last ring.
- **Timekeeping:** time shall be measured by a judge with a stopwatch, based on the availability of equipment.
- A penalty will be applied to a robot that cannot complete the course
- A penalty will be applied if the robot touches an obstacle
- **Autonomous Control:** Once a robot has crossed the starting line it must remain fully autonomous, or it will be disqualified.
- **Second Attempt:** any robot that falls down will be allowed two more reattempts.

DRONE ROBOT

01 Manual control: The drone robot consists of controlling manually a drone to complete the trajectory and to avoid touching the obstacles 2 .

02 Automatic control: In the automatic control, the drone should be 100% autonomous and should detect the obstacles to avoid them.
The drone should complete the trajectory in a limit time.





PLANNING

• 08:30 to 9:00	Participant Reception and Welcoming - 2nd building
• 09:00 to 9:30	Opening Ceremony of the Competition – Amphi
• 09:30 to 10:30	Coffee Break – Sports Hall
• 10:30 to 12:00	Start of the Hackathon: Sumo Robot Challenge
• 12:00 to 13:00	Lunch Break
• 13:00 to 14:30	Resumption: Manual Drone Challenge
• 14:30 to 16:00	Autonomous Drone Challenge
• 16:00 to 16:30	End of the Competition & Coffee Break
• 16:30 to 17:00	Closing Ceremony, Certificates, and Rewards – Amphi

SPECIAL THANKS

We would like to extend our heartfelt thanks to the school **Aerospace and Automotive Engineering,** whose unwavering support and commitment to excellence provided the foundation for the success of this competition. A special thanks goes to the **I-ROBOT** Club for their active involvement, enthusiasm, and dedication, which were key to the event's success. We are deeply grateful to **AEA** for their generous sponsorship, which made this event possible.

We also want to express our sincere appreciation to the participants for their remarkable engagement and effort, demonstrating outstanding creativity and skills. Your dedication was truly inspiring.

Our gratitude goes out to the supervising professors, whose invaluable guidance and mentorship helped ensure the competition ran smoothly and successfully.

Finally, we would like to extend a special thank you to the organizers.