



**Afrobot**



**SPECIFICATIONS :**



**ASTerrain**

**ALL-Terrain Obstacles**



AUTONOMOUS  
SYSTEMS  
TECH CLUB

**NHSAST**

المدرسة الوطنية العليا لتكنولوجيا الأنظمة المستقلة  
NATIONAL HIGHER SCHOOL OF AUTONOMOUS SYSTEMS TECHNOLOGY



# **SUMMARY :**

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# INTRODUCTION :

**WELCOME TO THE FIRST EDITION OF THE AFROBOT FESTIVAL, A UNIQUE SCIENTIFIC AND CULTURAL EVENT TAKING PLACE IN ALGERIA. THIS PAN-AFRICAN COMPETITION BRINGS TOGETHER ROBOTICS ENTHUSIASTS FROM ACROSS THE CONTINENT IN A SPACE THAT CELEBRATES INNOVATION, STRATEGY, AND UNITY. THE FESTIVAL INCLUDES:**

- **5 ROBOTICS COMPETITIONS**
- **HANDS-ON WORKSHOPS**
- **TALKS BY LEADING INNOVATORS**
- **AN EXHIBITION ZONE DEDICATED TO GROUNDBREAKING TECH PROJECTS**

**WHETHER YOU'RE HERE TO COMPETE, LEARN, OR CONNECT, AFROBOT PROVIDES AN INCLUSIVE PLATFORM TO SHOWCASE THE FUTURE OF AFRICAN TECHNOLOGY.**



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## **Afrobot 2025: “Inspired by Algeria’s Revolutionary Spirit”**

AFROBOT IS MORE THAN JUST A ROBOTICS FESTIVAL — IT IS A TRIBUTE TO THE ROOTS OF INNOVATION AND UNITY. INSPIRED BY THE ALGERIAN REVOLUTION, WHICH BEGAN IN 1956, WE HONOR THE VITAL ROLE PLAYED BY THE SIX HISTORIC WILAYAS IN ORGANIZING THE STRUGGLE FOR INDEPENDENCE. EACH WILAYA — AURÈS, CONSTANTINOIS, KABYLIE, ALGIERS, SAHARA, AND ORAN — EMBODIED COURAGE, STRATEGIC THINKING, AND RESILIENCE. AFROBOT BRINGS THESE VALUES TO LIFE THROUGH TECHNOLOGY AND YOUTH EMPOWERMENT. WITH 5 COMPETITIONS, WORKSHOPS, AND INNOVATION SHOWCASES, AFROBOT 2025 CELEBRATES BOTH OUR REVOLUTIONARY PAST AND OUR VISION FOR A UNIFIED, TECH-DRIVEN AFRICAN FUTURE.

IN THE SPIRIT OF WILAYA III — KABYLIE, KNOWN AS ONE OF ALGERIA’S MOST SIGNIFICANT HISTORICAL AND CULTURAL REGIONS, A MOUNTAINOUS AREA RENOWNED FOR THE RESILIENCE OF ITS PEOPLE AND THEIR FIERCE RESISTANCE AGAINST FRENCH COLONIALISM — THE ALL-TERRAIN CHALLENGE INVITES PARTICIPANTS TO THINK LIKE REVOLUTIONARY STRATEGISTS.

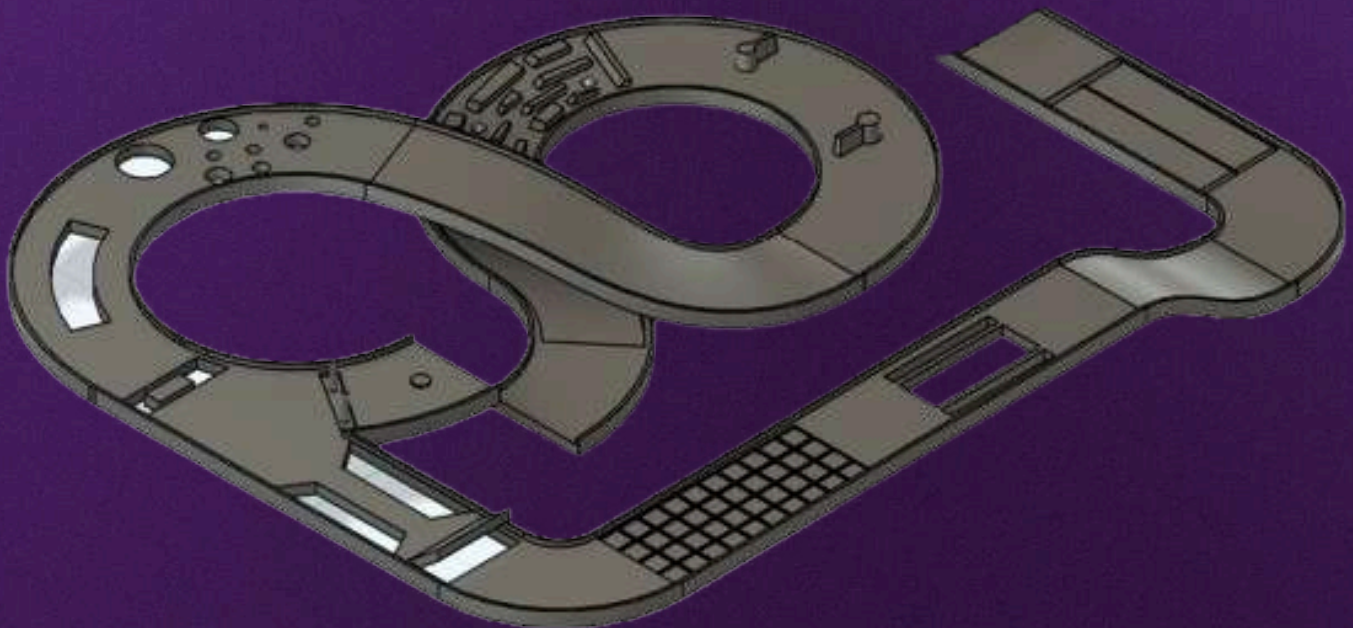
JUST AS WILAYA III LED OPERATIONS WITH TIGHT COORDINATION AND BOLD EXECUTION IN COMPLEX AND RUGGED MOUNTAIN ENVIRONMENTS, PARTICIPANTS MUST DESIGN ROBOTS THAT COMBINE INTELLIGENCE, AGILITY, AND SURVIVAL STRATEGIES TO OVERCOME A HARSH, OBSTACLE-FILLED PATH. THIS PATH REPRESENTS ONE OF THE MOST VITAL ROUTES OF THE ALGERIAN REVOLUTION — A NARROW MOUNTAIN PASS BETWEEN TWO TOWERING PEAKS, KNOWN AS "BAB EL BIBAN". IT WAS A CRITICAL WEAPONS TRANSPORT ROUTE THAT CONNECTED SEVERAL RESISTANCE ZONES.

NOW, THAT SAME TREACHEROUS PATH BECOMES YOUR BATTLEFIELD — YOU ARE THE FREEDOM FIGHTER, AND YOUR MISSION IS TO REACH VICTORY. BUT THIS TIME, IT’S NOT INDEPENDENCE THAT AWAITS, BUT TRIUMPH IN ONE OF AFRICA’S GREATEST ROBOTICS COMPETITIONS.

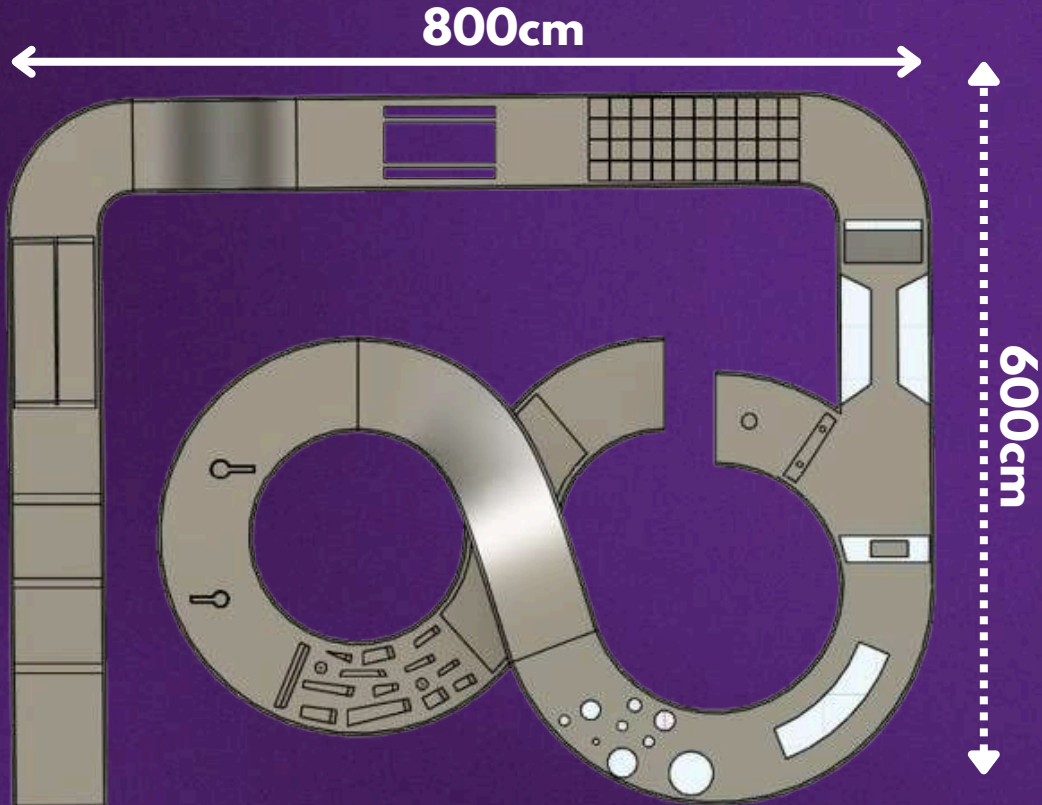


## DESCRIPTION OF THE CHALLENGE :

EACH TEAM IS TASKED WITH DESIGNING AND BUILDING A ROBOT CAPABLE OF NAVIGATING A DIFFICULT COURSE BETWEEN TWO STEEP MOUNTAINS. THE ROBOT MUST BE ABLE TO TRAVERSE THE NARROW AND CHALLENGING PATH, WHICH INVOLVES PASSING THROUGH VARIOUS AREAS CONTAINING A RANGE OF UNIQUE OBSTACLES. ADDITIONALLY, THE COURSE REQUIRES OVERCOMING CERTAIN AREAS THAT DEMAND INTELLIGENCE AND PRECISION IN HANDLING THEM. THE TERRAIN IS RUGGED AND UNEVEN, REQUIRING THE ROBOT TO DEMONSTRATE HIGH MOBILITY, ACCURACY, AND ADAPTABILITY TO COMPLETE THE JOURNEY FROM ONE SIDE OF THE MOUNTAINS TO THE OTHER. TEAMS WILL NEED TO TEST THEIR ENGINEERING SKILLS, PROBLEM-SOLVING ABILITIES, AND INNOVATIVE SOLUTIONS TO CREATE A ROBOT CAPABLE OF OVERCOMING NATURAL OBSTACLES AND SUCCESSFULLY COMPLETING THE COURSE.



## SCENE DESCRIPTION :

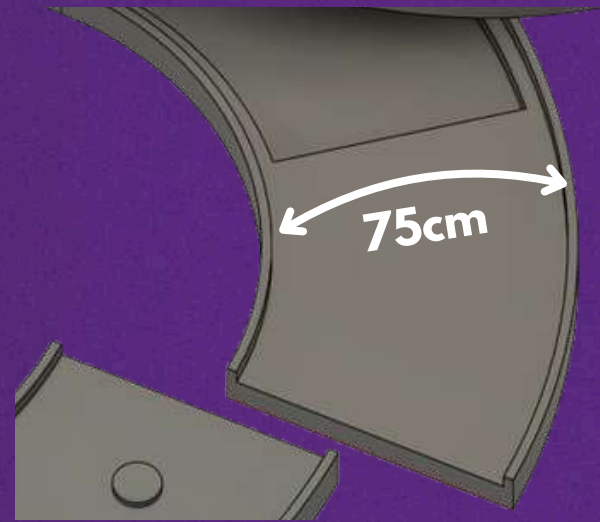


**THE CHALLENGE MAP IS DIVIDED INTO 13 DISTINCT ZONES, EACH DESIGNED TO REPRESENT A CORE VALUE OR OBSTACLE FACED BY REVOLUTIONARIES — SUCH AS INTELLIGENCE, RESILIENCE, PRECISION, DIFFICULT TERRAIN, AND STRATEGIC MOBILITY. COMPETITORS MUST GUIDE THEIR ROBOTS THROUGH EACH ZONE, ADAPTING TO ITS UNIQUE DEMANDS WHILE MAINTAINING EFFICIENCY AND CONTROL. WE WILL NOW EXPLAIN EACH PART OF THIS MAP IN DETAIL.**



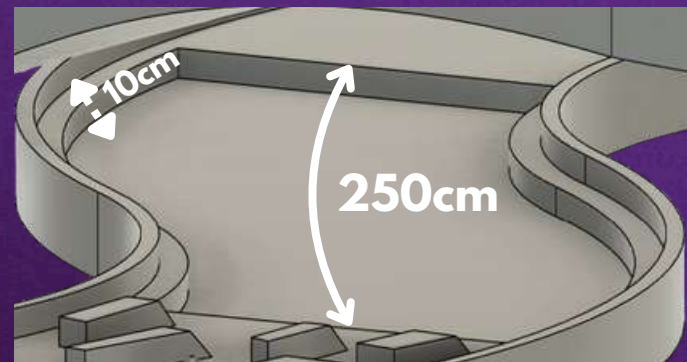
## **ZONE 01 : THE STARTING LINE**

**FOUR ROBOTS ARE PLACED AT THE STARTING POINT AND BEGIN THEIR JOURNEY ALONG THE DESIGNATED PATH.**



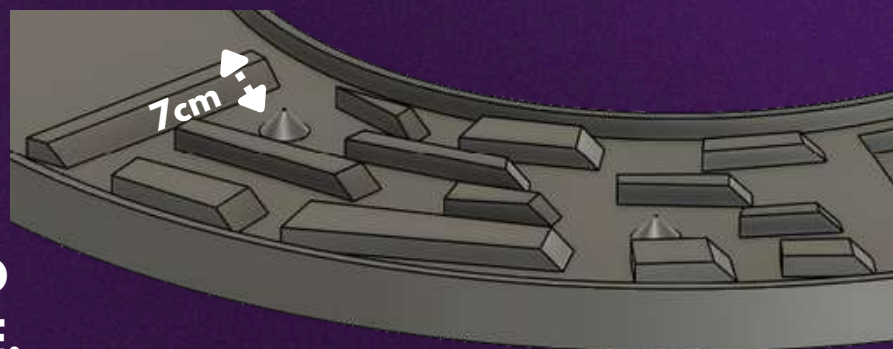
## **ZONE 02 : SAND BATTLE**

**THE ROBOT MUST CROSS A PIT FILLED WITH SAND.**



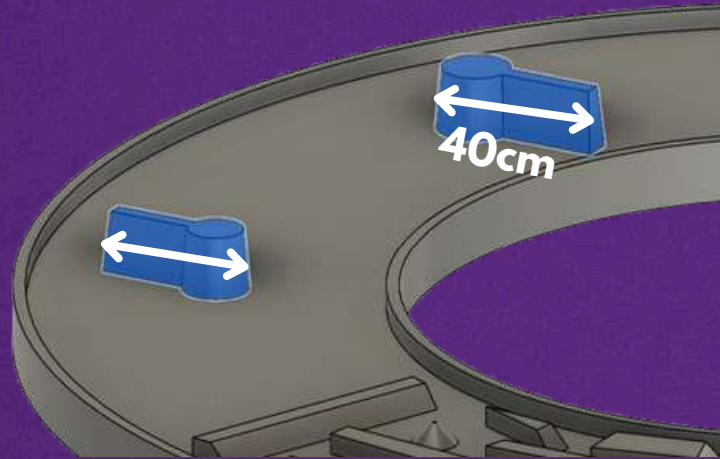
## **ZONE 03 : ROCKFALL**

**THE PATH IS FILLED WITH ROUGH TERRAIN AND SCATTERED ROCKS CAUSED BY A MOUNTAIN LANDSLIDE.**



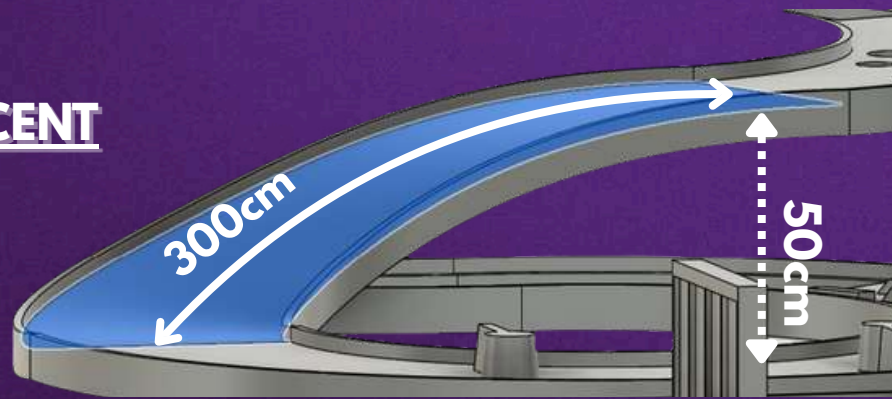
## **ZONE 04 : ROTATING BARS**

TWO HORIZONTAL ROTATING BARS BLOCK THE PATH — ONE SPINS FROM LEFT TO RIGHT, THE OTHER IN THE OPPOSITE DIRECTION. THE ROBOT MUST TIME ITS MOVEMENT PRECISELY TO PASS THROUGH WITHOUT BEING HIT AND DELAYED.



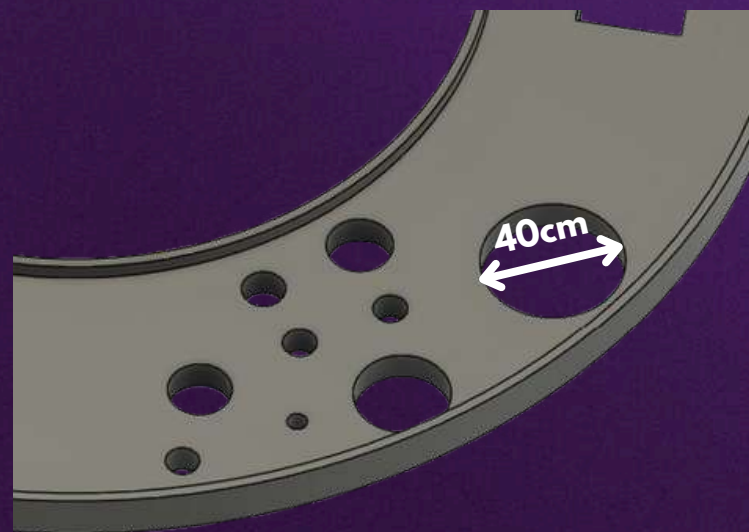
## **ZONE 05 : GLORY ASCENT**

YOU MUST CLIMB THE HILL IN ORDER TO CONTINUE THE JOURNEY.



## **ZONE 06 : KABYLE CHEESE**

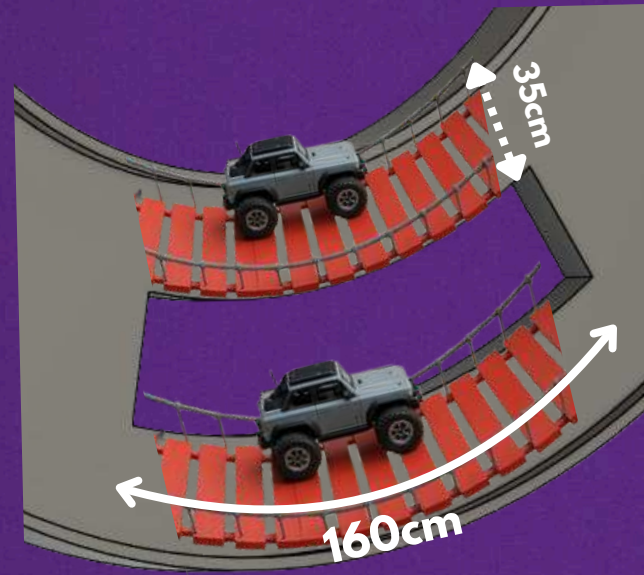
AVOID THE HOLES SCATTERED ALONG THE PATH.





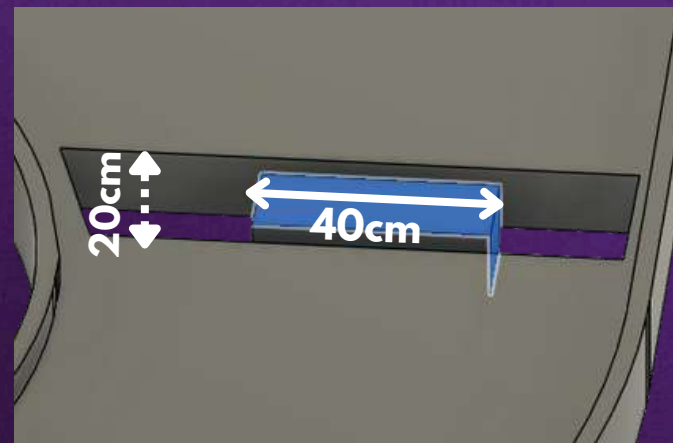
## ZONE 07 : SWINGING STAIRS

WOODEN STAIRS SUSPENDED  
BY ROPES THAT SWAY  
SLIGHTLY WHEN CLIMBED.

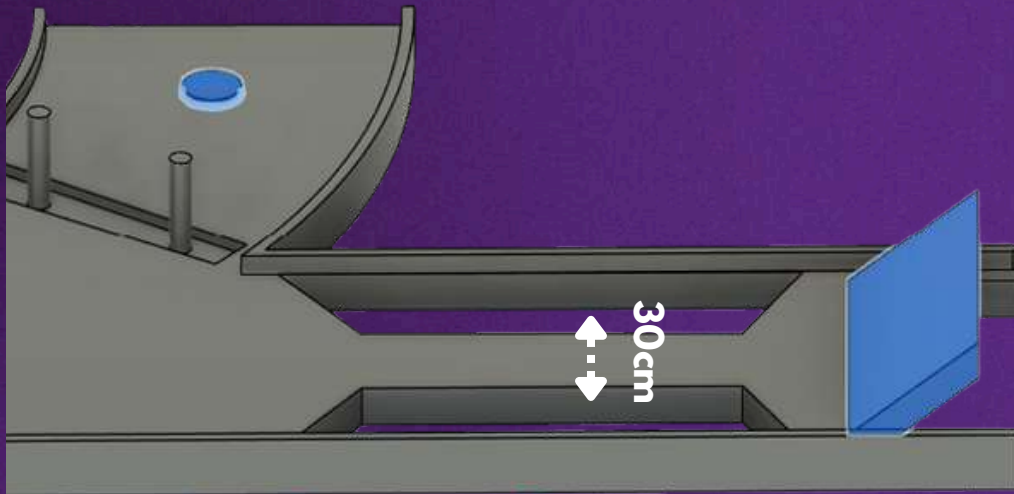


## ZONE 08 : MOVING PASSAGE

A NARROW PLATFORM THAT  
SHIFTS LEFT AND RIGHT —  
YOU MUST TIME YOUR  
APPROACH CAREFULLY TO  
STEP ON IT AND CROSS TO  
THE OTHER SIDE.



## **ZONE 09 : THE STRAIT BRIDGE**

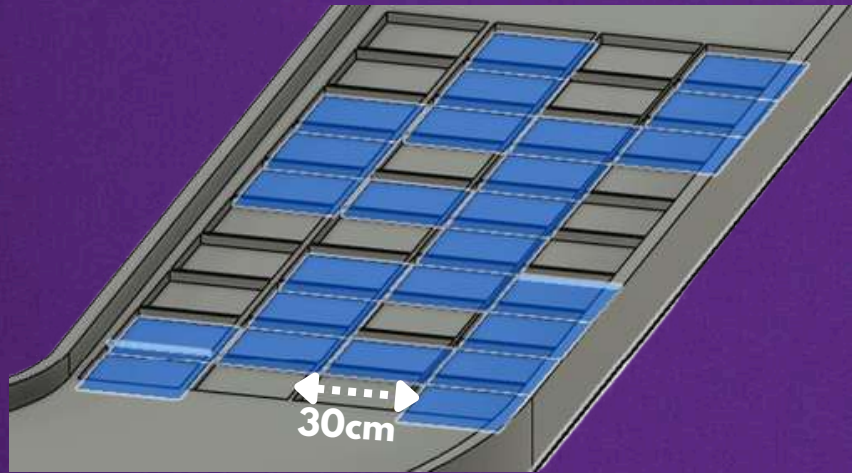


**IN THIS ZONE, THE ROBOT MUST MOVE TOWARD THE EDGE WHERE A BUTTON IS LOCATED, CROSSING OVER TWO MOVING RODS THAT SWING IN OPPOSITE DIRECTIONS (LEFT AND RIGHT). PRESSING THE BUTTON LOWERS THE BRIDGE, ALLOWING PASSAGE TO THE OPPOSITE SIDE. AFTER THAT, THE ROBOT MUST RETURN VIA THE SAME TWO RODS, NAVIGATE A NARROW PATH, AND THEN CROSS THE LOWERED BRIDGE. THERE IS AN ALTERNATIVE OPTION: FLYING DIRECTLY OVER THE BRIDGE (NOT RECOMMENDED).**



## ZONE 10 : MINEFIELD

IN FRONT OF YOU LIES A PATH DIVIDED INTO A 4×10 GRID. YOU MUST CHOOSE THE CORRECT SQUARES TO REACH THE END.

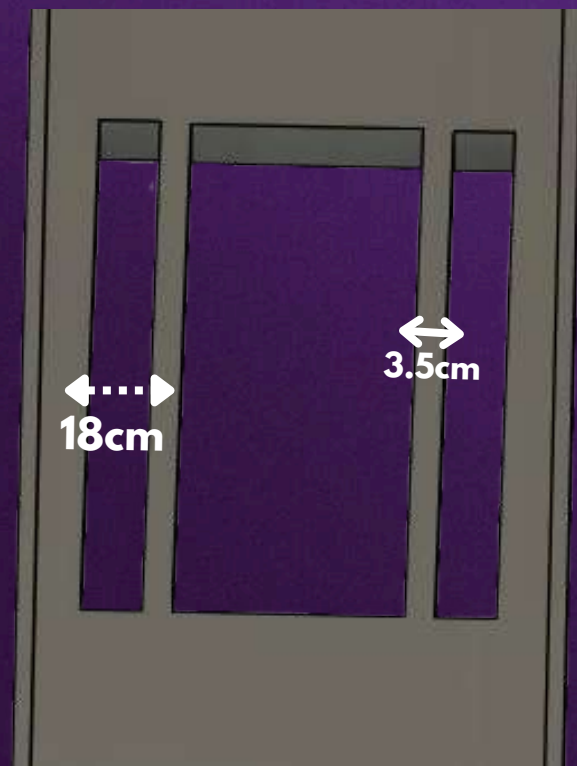


(AS AN EXAMPLE, THE CORRECT PATH MAY BE MARKED IN BLUE.) IF YOU STEP ON THE WRONG SQUARE, IT WILL COLLAPSE BENEATH YOU.

FOR EASIER NAVIGATION, MOVEMENT IS ONLY ALLOWED FORWARD, TO THE RIGHT, OR TO THE LEFT — BUT THE DIAGONAL MOVES (LIKE FORWARD-RIGHT OR FORWARD-LEFT) ARE NOT PERMITTED.

## ZONE 11 : THE ABYSS

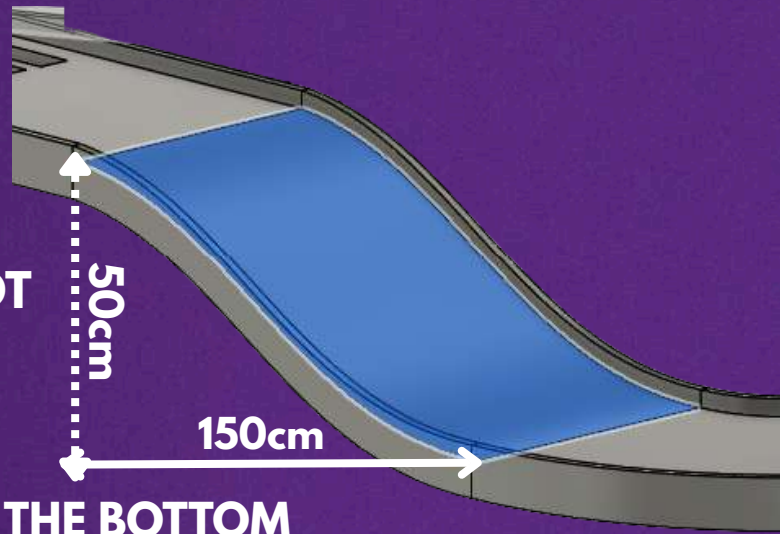
THE ROBOT MUST CROSS A PATH MADE UP OF FOUR PARALLEL RAILS, BUT IT IS ONLY ALLOWED TO PASS OVER THE TWO CLOSELY SPACED ONES—EITHER ON THE LEFT OR THE RIGHT. THIS CHALLENGE REQUIRES HIGH PRECISION, AS THE ROBOT MUST KEEP ITS WHEELS STRICTLY ON THE TWO RAILS TO AVOID FALLING.



## ZONE 12 : OLIVE OIL SLOPE

THIS CHALLENGE FEATURES A SLIPPERY SLOPE THAT THE ROBOT MUST DESCEND WITH PRECISE CONTROL.

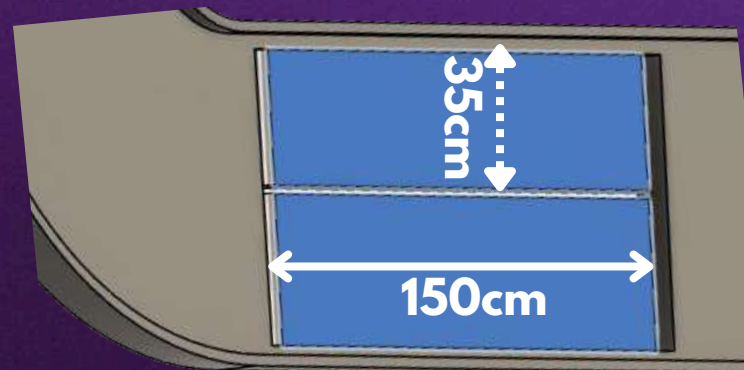
HOWEVER, THE REAL TEST LIES AT THE BOTTOM OF THE SLOPE, WHERE TWO LIGHTS — GREEN & RED — ALTERNATE EVERY 5 SECONDS. THE ROBOT MAY MOVE ONLY WHEN THE GREEN LIGHT IS ON. IF IT MOVES WHILE THE RED LIGHT IS ACTIVE, IT MUST RETURN TO THE BEGINNING OF THE SLOPE AND TRY AGAIN.



## ZONE 13 : ROTATING BELT

THIS CHALLENGE FEATURES TWO CONVEYOR BELTS THAT ALTERNATE IN MOTION. THE FIRST BELT MOVES BACKWARD FOR 5 SECONDS WHILE THE SECOND REMAINS STILL,

THEN THEY SWITCH — THE FIRST STOPS AND THE SECOND MOVES BACKWARD FOR 5 SECONDS. THE ROBOT MUST CROSS THIS ZONE BY EITHER BRAVING THE BACKWARD MOTION OF THE BELTS OR TIMING ITS MOVEMENT TO SWITCH FROM ONE BELT TO THE OTHER EVERY 5 SECONDS.





## **ROBOT CHARACTERISTICS :**

- **THE ROBOT MUST BE REMOTELY CONTROLLED AND NOT GUIDED BY WIRES.**
- **THE USE OF PREFABRICATED ROBOTS IS STRICTLY PROHIBITED (LEGO ROBOTS ARE NOT ACCEPTED).**
- **IT IS HIGHLY RECOMMENDED TO PROVIDE IMPACT PROTECTION AND USE SHOCK ABSORBERS.**
- **THE EJECTION OF LIQUIDS, GASES, POWDERS, OR FLAMES IS STRICTLY PROHIBITED.**
- **THE MAXIMUM ALLOWED DIMENSIONS OF THE ROBOT ARE:**
  - **HEIGHT: 25 CM**
  - **WIDTH: 25 CM**
  - **LENGTH: 35 CM**
  - **WEIGHT: 5 KG**

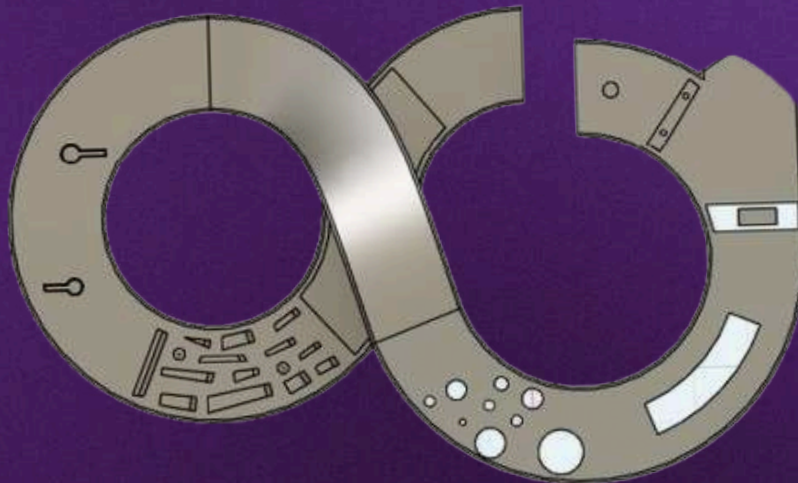
**A TOLERANCE OF UP TO 10% IS ALLOWED IN CASE OF EXCESS.**

## QUALIFICATION :

### QUALIFICATION PHASE :

**FOUR COMPETITORS FACE OFF IN A MATCH ON A SPECIFIC ZONE. THE FIRST TWO TO PRESS THE FINAL BUTTON WINS AND QUALIFIES FOR THE NEXT PHASE.**

**NOTE : THIS PHASE CAN BE REPEATED AMONG THE WINNERS IF THE TOTAL NUMBER OF MATCHES EXCEEDS FOUR (I.E., MORE THAN 4 WINNERS).**



### GRAND FINALE :

**THE FINAL 4 WINNERS FROM THE QUALIFICATION PHASE COMPETE IN ONE ULTIMATE MATCH. THE FIRST TO COMPLETE THE ENTIRE COURSE (14 ZONES) IS DECLARED THE WINNER.**





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## **SCORING SYSTEM :**

### **TECHNICAL EVALUATION:**

- **DURING THE PRELIMINARY TEST (HOMOLOGATION), IN ADDITION TO VERIFYING THE ROBOT'S DIMENSIONS AND WEIGHT, PARTICIPANTS ARE REQUIRED TO SUBMIT A TECHNICAL FILE THAT WILL BE EVALUATED BY THE COMMITTEE. THIS FILE MUST INCLUDE AN EXPLANATION OF THE ROBOT'S WORKING MECHANISM, A 3D DESIGN, A PCB (PRINTED CIRCUIT BOARD) DESIGN, AND OTHER RELEVANT TECHNICAL DOCUMENTS.**
- **THE TECHNICAL FILE MUST BE SUBMITTED 24 HOURS BEFORE THE START OF THE COMPETITION.**

### **MATCH EVALUATION:**

- **THE ROBOT THAT REACHES THE FINISH LINE FIRST IS DECLARED THE WINNER AND QUALIFIES FOR THE NEXT ROUND.**
- **IN THE CASE OF A TIE, THE TECHNICAL EVALUATION IS TAKEN INTO ACCOUNT, AND THE TEAM WITH THE HIGHER SCORE IS DECLARED THE WINNER.**
- **IF THE MATCH TIME EXPIRES WITHOUT A WINNER, THE ROBOT THAT COVERED THE LONGEST DISTANCE IS CONSIDERED THE WINNER.**
- **AT THE END OF THE MATCH, NO ONE EXCEPT THE REFEREE IS ALLOWED TO TOUCH THE ROBOT OR ANY GAME ELEMENTS.**

## **REGULATIONS :**

- **THE PRINCIPLE OF THE GAME CONSISTS OF PASSING THROUGH ALL THE DIFFERENT SECTIONS OF THE ARENA AS PREVIOUSLY DESCRIBED.**
- **THE ROBOT MUST BE APPROVED BY THE JURY IN ORDER TO PARTICIPATE IN THE COMPETITION.**
- **TEAMS ARE SELECTED BASED ON A RANDOM DRAW, AND THE PLACEMENT OF THE ROBOT AT THE STARTING LINE DEPENDS ON THE ORDER IN WHICH THEY ARE CALLED.**
- **EACH MATCH LASTS FOR 10 MINUTES.**
- **APPROVED ROBOTS ARE GROUPED IN SETS OF 2 OR 3, AND THE WINNER ADVANCES TO THE NEXT ROUND.**
- **EACH PARTICIPATING TEAM MUST SELECT ONE REPRESENTATIVE.**
- **ONLY THIS INDIVIDUAL IS ALLOWED TO ACCESS THE GAME ARENA.**
- **TWO MINUTES ARE GIVEN TO PREPARE AND PLACE THE ROBOT.**
- **ONLY ONE TEAM MEMBER IS ALLOWED TO CONTROL THE ROBOT DURING THE MATCH.**

### **IMPORTANT NOTE:**

**IF THE ROBOT IS NOT READY AFTER THE 2-MINUTE PREPARATION TIME, IT WILL BE DISQUALIFIED FROM THE COMPETITION.**



## **DISQUALIFICATION REASONS :**

**AS GENERAL RULES, ANY OF THE FOLLOWING ACTIONS IS CONSIDERED A VIOLATION AND RESULTS IN THE IMMEDIATE DISQUALIFICATION OF THE ROBOT:**

- **DAMAGING THE GAME FIELD (THROWING LIQUIDS, POWDERS, OR USING FLAMMABLE, TOXIC, OR EXPLOSIVE SUBSTANCES).**
- **ANY UNSPORTSMANLIKE OR UNETHICAL BEHAVIOR TOWARDS OPPONENTS OR THE REFEREE DURING THE RACE OR DURING THE PRELIMINARY TEST (APPROVAL).**
- **LEAVING THE STARTING LINE BEFORE THE REFEREE'S SIGNAL.**
- **THE ROBOT REMAINING STATIONARY FOR 20 SECONDS.**
- **INTERFERING WITH THE GAME FIELD DURING THE MATCH.**
- **ANY MODIFICATION TO THE ROBOT AFTER PASSING THE APPROVAL TEST.**

### **IMPORTANT NOTE:**

- **CONTACT BETWEEN ROBOTS IS ALLOWED ONLY FOR PUSHING PURPOSES. THE USE OF ANY KIND OF WEAPON LEADS TO PERMANENT DISQUALIFICATION FROM THE COMPETITION.**
- **ANY VIOLATION OF THE RULES OR CAUSING ISSUES WILL RESULT IN IMMEDIATE TEAM DISQUALIFICATION.**

### **OBJECTION REQUESTS:**

- **NO OBJECTIONS TO THE REFEREE'S DECISIONS WILL BE ACCEPTED.**
- **ANY PARTICIPANT WISHING TO OBJECT TO THE TOURNAMENT RULES MUST EXPRESS THEIR CONCERNS TO THE TOURNAMENT OFFICIALS BEFORE THE START OF THE MATCH.**