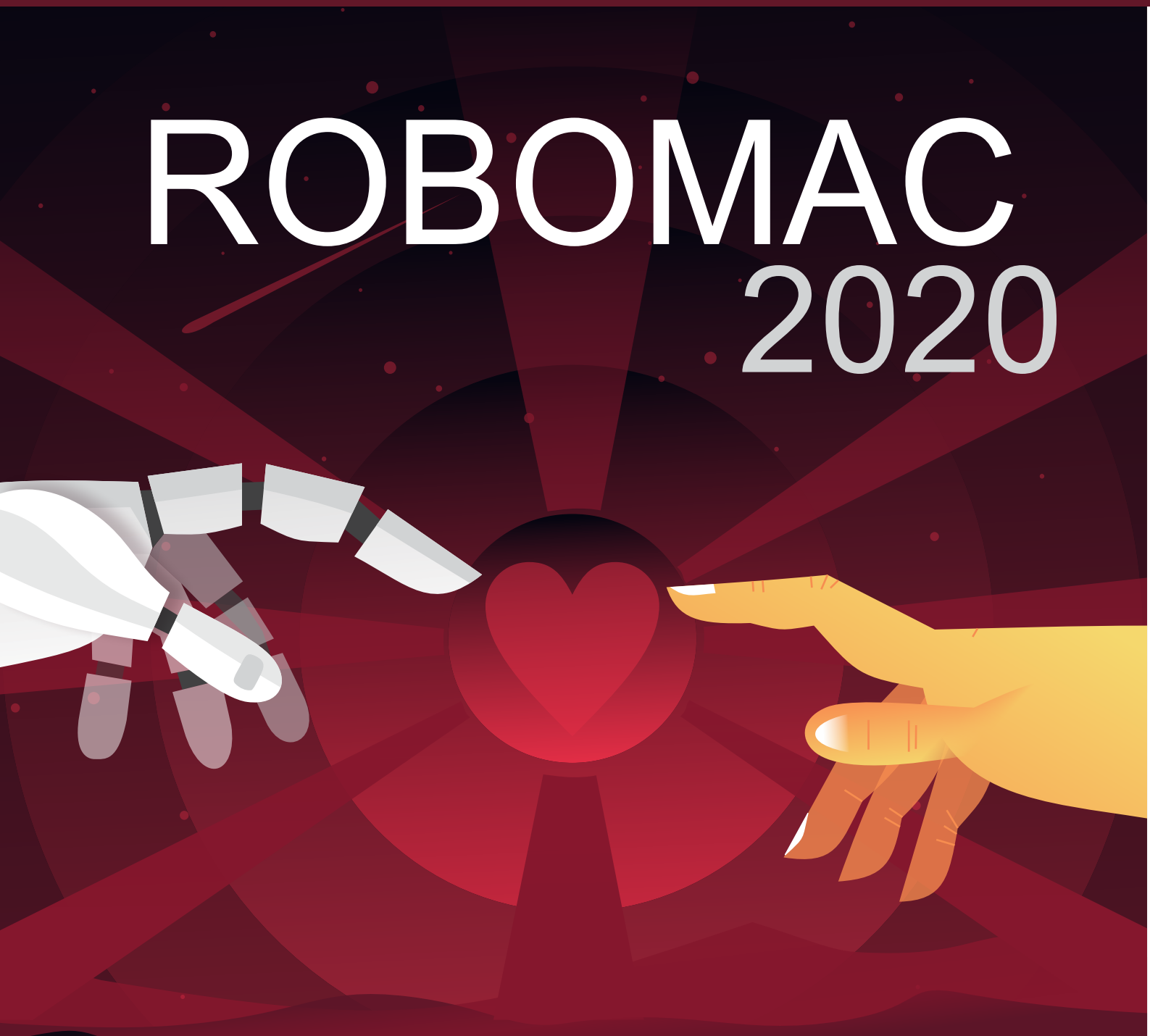
IEEE SB Macedonia

Faculty of electrical engineering and information technologies

ROBOMAC 2020



www.robomac.mk

ORGANIZATIONAL TEAM OF ROBOMAC 2020

IEEE SB Macedonia

IEEE student branch - Macedonia

IEEE SS Cyril and Methodius University Student Branch Macedonia (Republic of Macedonia Section) was formed in 2000 at the Faculty of Electrical Engineering and Information Technology, SS Cyril and Methodius University, in Skopje. Lead by the students' aspiration to actively take part in the technological progress on a global scale, we believe that we as an organization should constantly encourage research among students and represent the current needs of the labor market in order to create qualified experts with successful careers.

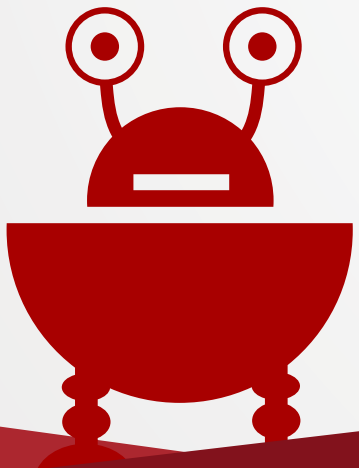
WHAT IS ROBOMAC?

RoboMac is an international competition in the field of robotics, electronics, programming and artificial intelligence, organized by the Student Branch of IEEE in Macedonia. This year it will take place for the tenth time. There are new categories, robots and topics every year. Through this event the students are able to witness the latest technological achievements in these fields as well as apply their practical knowledge.

With RoboMac introduce the general public to these fields, we rise the awareness for the artificial intelligence, which has many everyday applications, encouraging the youth to think about these topics. During the event the Macedonian students have the opportunity to work in international teams which results in them expanding their views, thinking globally and exchanging ideas, experiences and knowledge. The main goal is for the students to get practical skills beside their theoretical knowledge from school.

This year the event will take place on **March 9th through 14th** at the Faculty of electrical engineering and information technology which is located in Skopje.

The participants in RoboMac 2020 will earn 2 credits for completing the workshop.



BENEFITS FROM THIS PROJECT

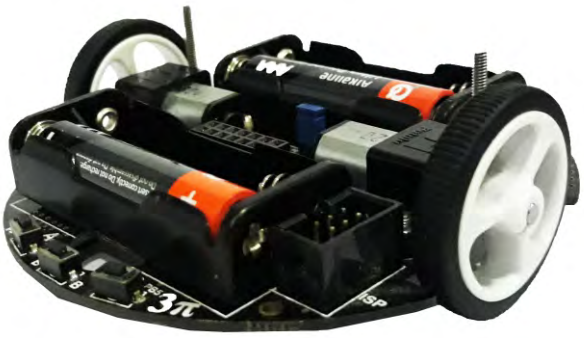
1. Contact between the participants and potential employers
2. Engineering sciences outreach to high school students
3. Popularization of electronics, robotics, programming and artificial intelligence in Macedonia
4. Quality education and practical work for participants
5. Encouraging teamwork
6. Exchanging experiences and knowledge between participants
7. Work in international teams
8. Networking - possibility of international collaboration between participants in the future
9. A chance for the participants to meet with experts from these fields

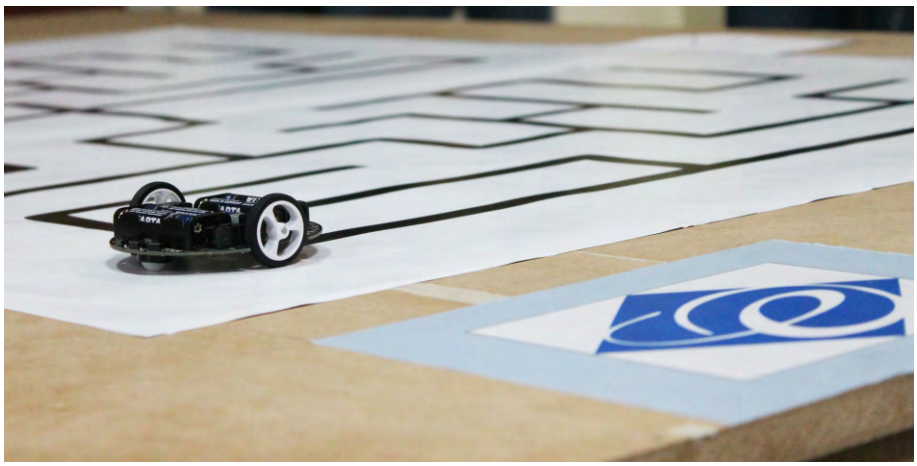
CATEGORY:
MAZE

For this category, contestants use the well-known Pololu-3pi, based on the user-programmable AVR microcontroller. Program the robot with an algorithm that will solve the maze in record time. The challenge will consist of three maze levels required to pass.

Each level, the slowest team will not continue. No soldering or assembly is required.

Difficulty: Intermediate
Team size: 2 participants
Programming: C/C++



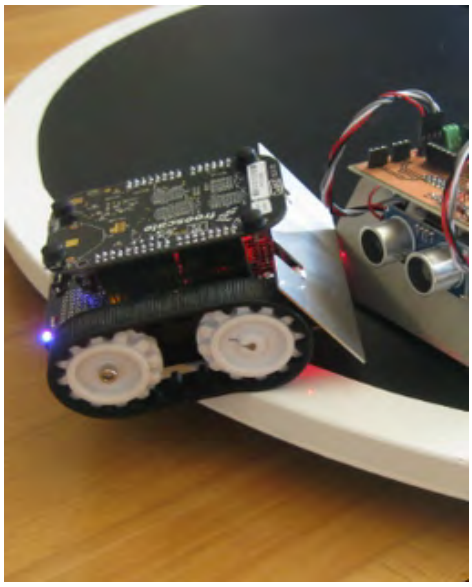


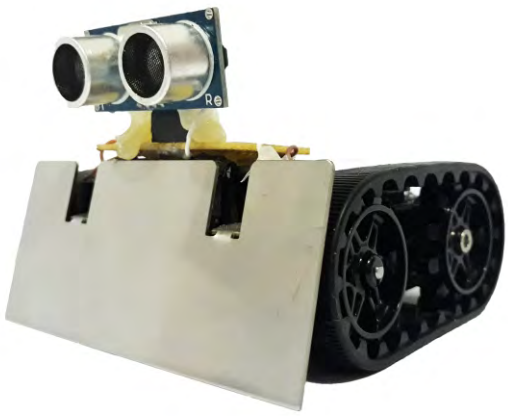
CATEGORY:
SUMO

The Pololu Zumo robot is an Arduino-controllable tracked robot platform. Two robots compete in a head-to-head match following the basic system of traditional human sumo matches. The sole purpose is a pushing match between the two robots to force the other from the arena. This competition is purely autonomous based, so robots must be programmed to function autonomously without any human intervention during the game. The best 3 rounds will determine the winner per match.

No soldering or assembly is required.

Difficulty: Intermediate
Team size: 2 participants
Programming: Arduino





CATEGORY:
SPHERO

This year's "Sphero" category is made to be fun and challenging. The competitors will have to apply digital image processing in python and use their programming skills in order to make their robot (Sphero) read the picture from the camera above the field so it can navigate through an obstacle course. The obstacle course will be full of sticks in different colour, which the robot will have to take it down. The team with highest score in the shortest time possible will be the winner of this year's "Sphero" category.

It is required for the participants to bring their own laptops.

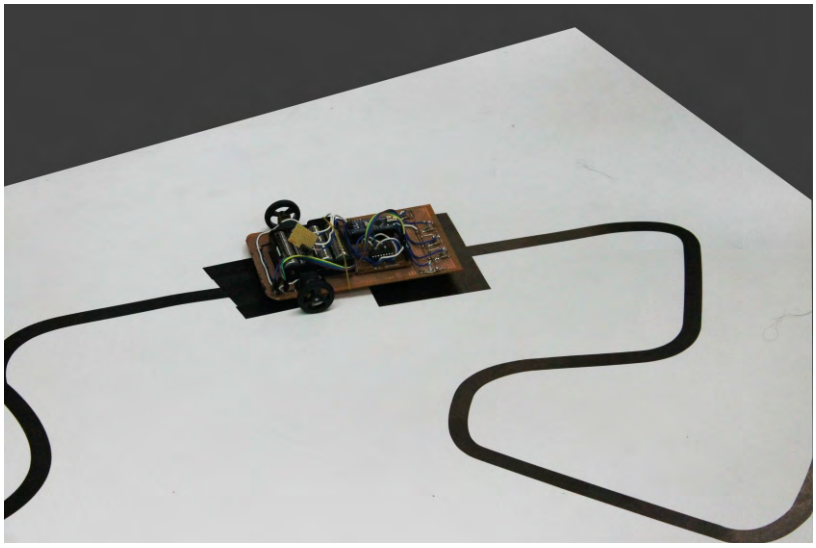
Difficulty: Advanced
Team size: 2 participants
Programming: Python

CATEGORY:
LINE FOLLOWER

This category is aimed towards hardware enthusiasts. The car will be completely assembled from scratch and then programmed to follow a black line on a white background as quickly as possible using an Arduino. All parts and sensors will be provided and contestants will have freedom on the car's design.

Full assembly, including soldering.

Difficulty: Advanced
Team size: 2 participants
Programming: Arduino



CATEGORY:
MACHINE LEARNING

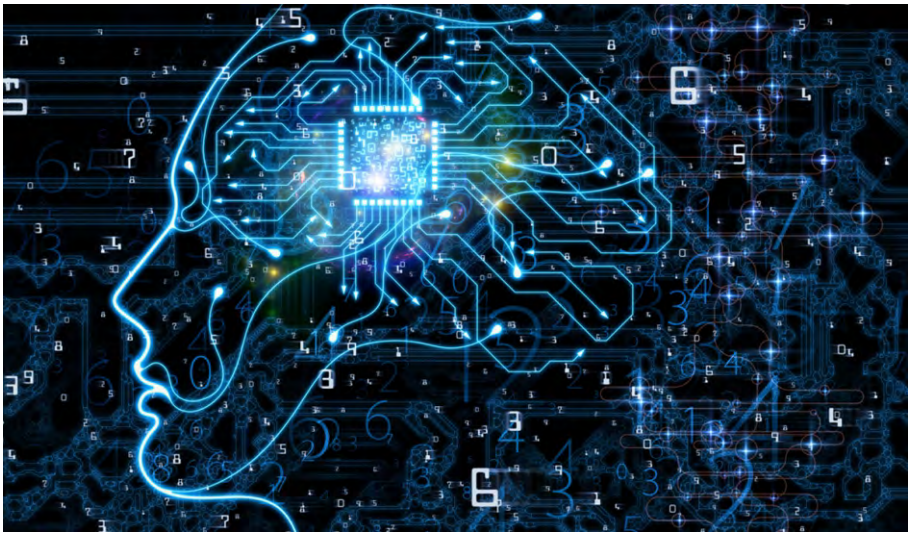
The competitors will receive a dataset for a given task. Their job will be to analyze the data, to develop ML pipeline, that will produce an ML model (classification or regression).

Once developed, the model should process the test data, and produce predictions. The predictions should be submitted for evaluation, and appropriate performance score will be provided. The final ranking is defined based on the performance for each team.
The final evaluation might be done in an interactive setting during the final event (the predictions and the scores are provided on a big screen and the ranking is computed in real time).

Students from 3rd and 4th year are more suitable for this competition.

Software and tools that can be used: Python libraries, ScikitLearn, Jupyter Notebook, Spyder, WEKA, Java ML libraries, R libraries for ML.

Difficulty: Advanced
Team size: 2 participants
Programming: Python/ Matlab/ Java

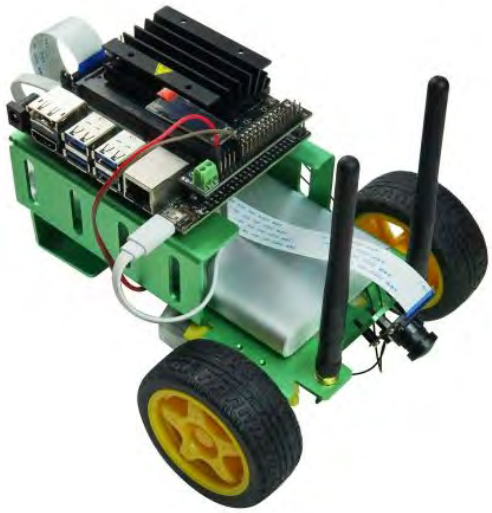


NEW CATEGORY:
SELF RACING CARS

This is the plain and simple car racing competition, but this year it comes with elevated complexity. Your race cars will be brand new Nvidia Jetbots and you will have to implement an AI stack in order to win this competition. Your primary sensor is wide-angle camera and you have powerful embedded GPU unit to crunch your data into steering wheel action. The Jetson Nano board runs Ubuntu Linux with ROS and TensorFlow already installed.

No soldering or assembly is required.

Difficulty: Advanced+
Team size: 2 participants
Programming: Python



Contact

Official **e-mail** of **RoboMac 2020:**
info@robomac.mk

Sanja Cvetkovikj
cvetkovic@ieee.org