Szechenyi Robotics

Team Description Materials

Logistical info:

- **Team name**: Szechenyi Robotics
- **Organization**: Szechenyi Robotics
- **Country**: Hungary
- **Contact person**: András Bakti
- **Email**: mail@robottep.hu

The team

We are a team from Hungary. We are the students of Nyíregyházi SZC Széchenyi István Technikum and Kollégium, and there are five of us. Our mentor is Mr. András Bakti.

Róbert Dávid Vass: Dávid is mostly focused on programming, but he also likes building and engineering. He has helped in coding the servo's and the DC motor's codes.

Krisztofer Kevin Máté: He is the team leader and the most talkative person in our team. He helped in the writing of the TDM.

Szabolcs Joó: He worked with the robot movement, the servo arm, and the camera.

József Juhász: József is the person who built and designed the hardware. He didn't take part in programming of the robot.

Mr. András Bakti Mr. András Bakti is the team's mentor. He provided lot's of parts for the robot, and he is responsible for managing the finances.

System Description

Our robot's body is made out of plexiglass and 3D printed parts. Our robot's brain is a Raspberry Pi 5 8GB. It has four DC motors with two tracks with rubber inserts. We use a drill battery from a power drill. We also use two L293D motor controllers and 1 spare one. It has 2 USB camera for video and 1 which we use occasionally.

We use a laptop to control it the via an ethernet cabel.

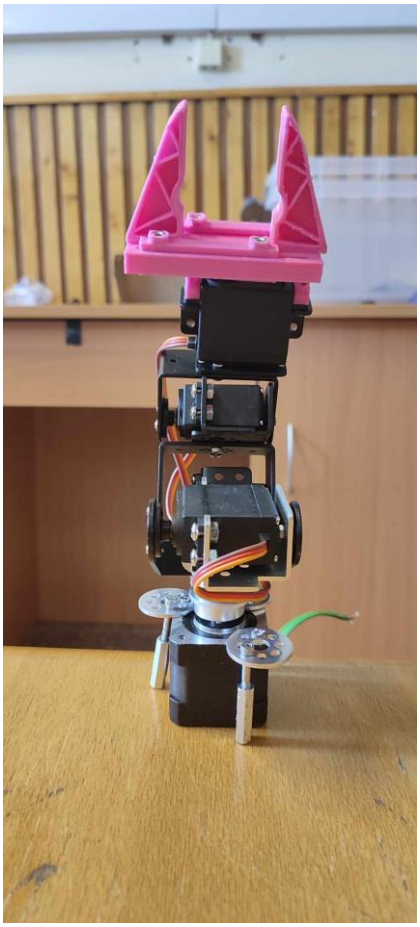
Setup and packing of our robot and operator station

To control the robot, we use our laptop’s keyboard because that’s more easier to control with than anything else we tried before. Previously we used a gaming controller, but we realised that using a keyboard is much better to control the robot.

Changes

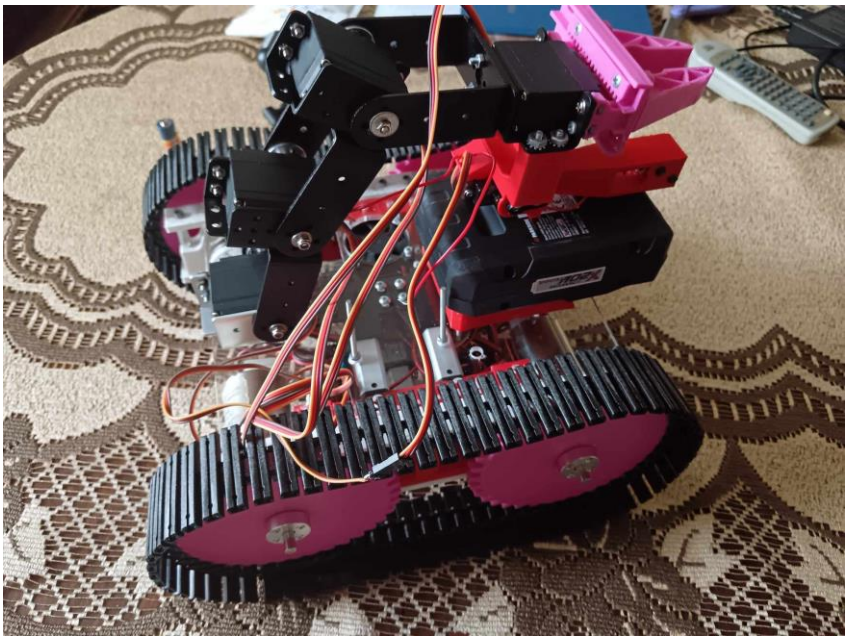
Thanks to the experience gained in last year's competition, our strategy has improved a lot. First of all, we replaced the robot's wheels with tracks to improve the adhesion. We also managed to replace the plastic geared hobby DC motors to much more stronger metal geared TETRIX 12V motors and the structure of the robot itself, with better components. Now it is much more protected from impacts. We have also made changes in the software, for example the robot can be controlled more easily and the camera angle is much more favorable.

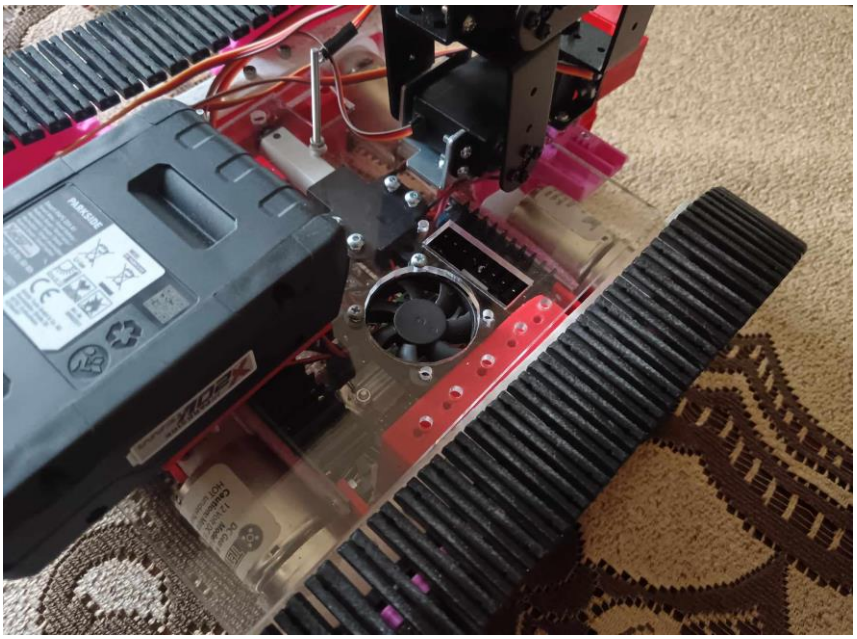
The robot’s arm:



(Since the photo was taken we don’t use stepper motor anymore)

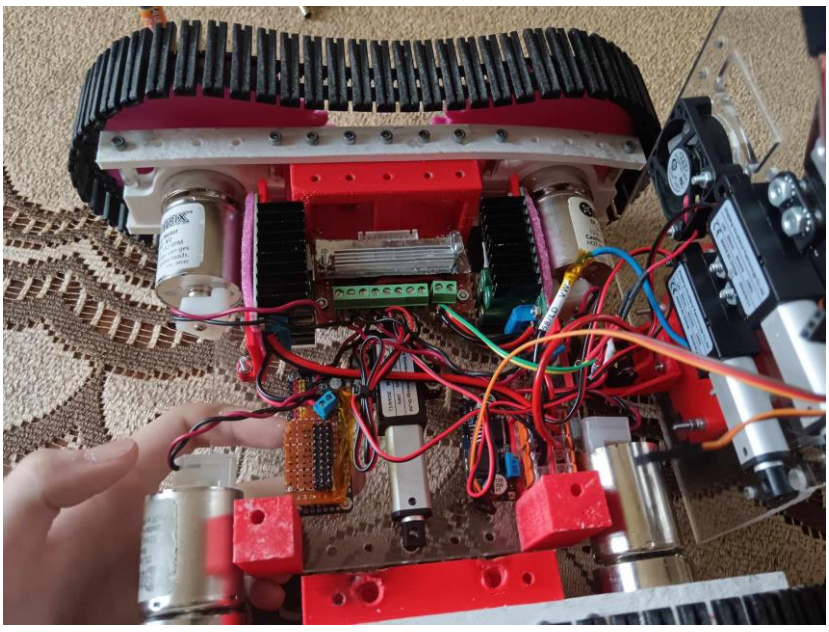
The robot:



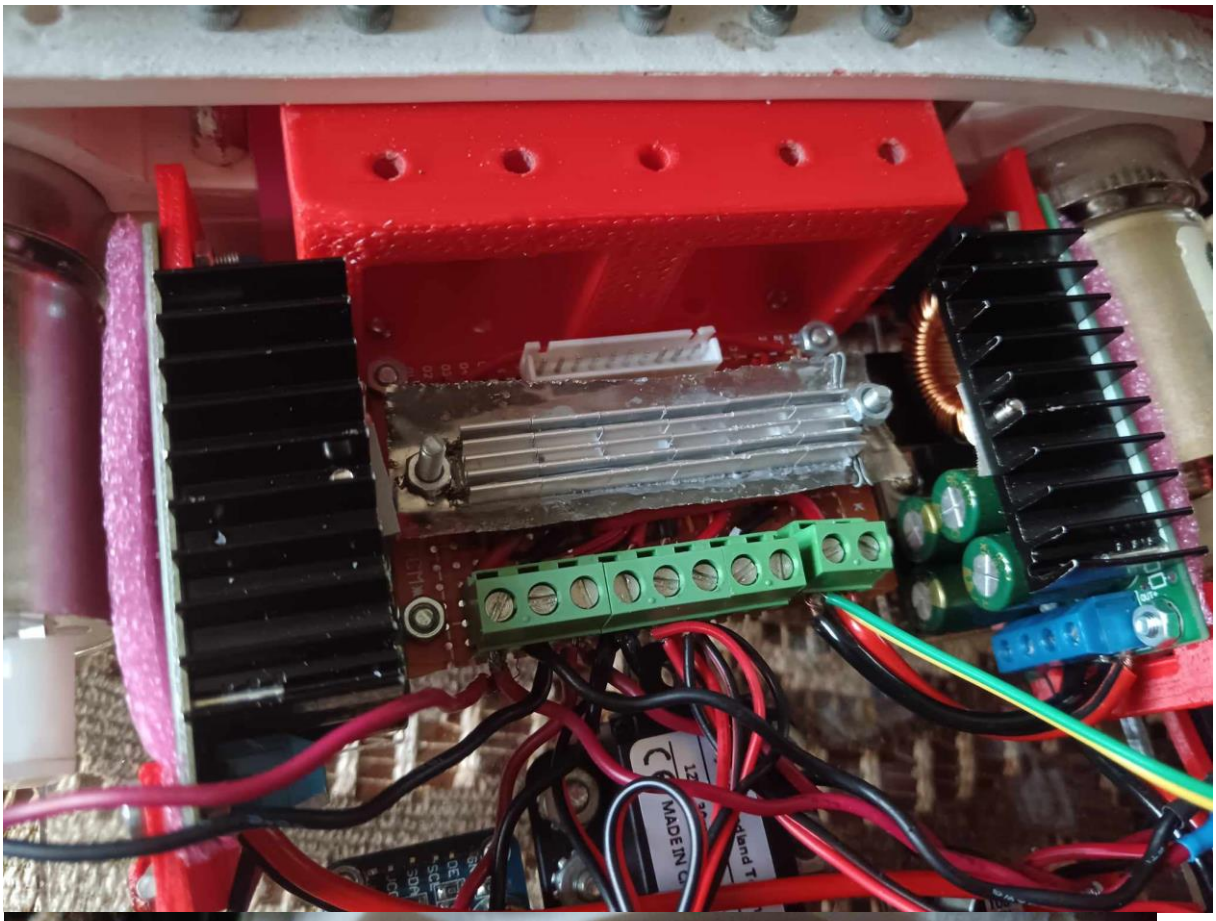


(On these photos the raspberrypi, the rubber inserts and the final cable managment are not yet visible)

The inside of the robot:



The custom DC motor controller and the model of the DC motor:



How the particular strengths of our team is relevant to applications in the field

Most of our team members are focused more on programming the robot and József is focused more on the engineering and hardware side of the robot. But that

doesn’t mean that the rest of the team is not interested or haven’t started learning the basics of assembling the robot, soldering, etc. We hope we can help in any area of robotics. We worked pretty hard on our robot, and we did learn a lot about making the robot’s software and hardver. We never had a problem that we couldn’t solve and we hope that this will stay this way.

What our team have learned so far

Since we started making our first robot, a year has passed. We learned a lot about the Python programming language, about the GPIO pins, the importance of cable managment, soldering and overall how a robot works. We learned how to work together as a team and how to solve problems that seemed impossible at first. There are so many programming concepts that we learned while programming the robot.

Previous experiences in robotic competitions

We were really happy with our robot’s perfomance in the hungarian competition, where we got 3rd place. Last year we have finished at 5th place in Bordeaux Robocup 2023 world championship RMRC league.

Costs:

List of the components	Cost of the components (€)
Raspberry Pi 5 8GB with cooler kit	116,27
4 x TETRIX MAX DC MOTOR 39530	120
TETRIX MAX Tank Tread Kit	150
3 x L293D	8
Parkside perfomance 4AH smart battery	46
4 x Mg996r	17
Pca9685	4
3 x USB camera	27
2 x 8A Buck converter	9
3A Buck converter	3
Metal arm kit	20
9g micro servo	2

3 x linear actuator	49
linear solenoid	4
Aluminium heatsink	2
12V fan	3
2 x 8A switch	3

Overall cost: 583,27€

A list of software packages that we used or plan to use:

- OpenCV - https://opencv.org/
- GPIO zero - https://gpiozero.readthedocs.io/en/stable/
- Raspbian OS - https://www.raspberrypi.com/software/operating-systems/
- python 3.11.2 - https://www.python.org/
- AdafruitPCA9685 -https://docs.circuitpython.org/projects/pca9685/en/latest/

Codes for the robot:

- https://github.com/Denix660/Robocup2024RMRC_Szechenyi_Robotics

3D files and some printing instruction:

- https://www.thingiverse.com/thing:6681118