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 most talkative person in our team. He helped in the writing of the TDM.

Marcell Csabai: He is the team leader. He is our driver, and he helped in the camera, QR code recognition, and object recognition.

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 lots of parts for the robot, and he is responsible for managing the finances.

System Description

Our robot’s body is made out of plexiglass. Our robot’s brain is a Raspberry Pi 5 8GB. It has four DC motors with two tracks. We use a drill battery from a power drill. We also use two L298N motor controllers. It has two Pi cameras and one USB camera for video output.

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

Setup and packing of our robot and operator station

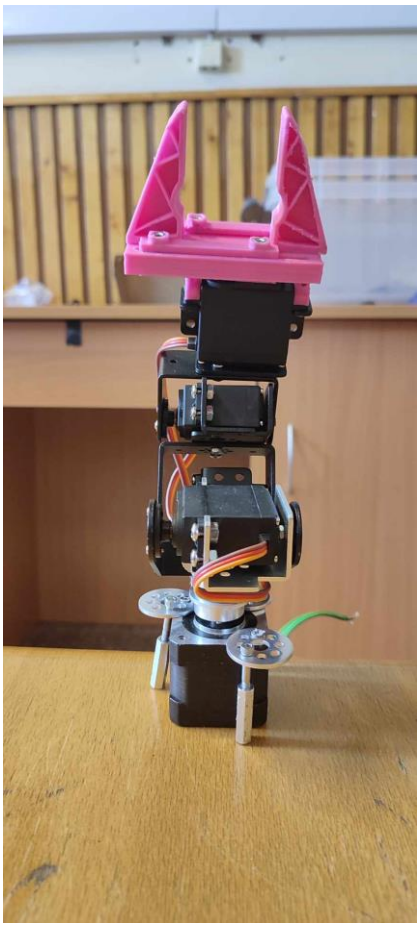
To set up the robot, all we need to do is to charge up the batteries.

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

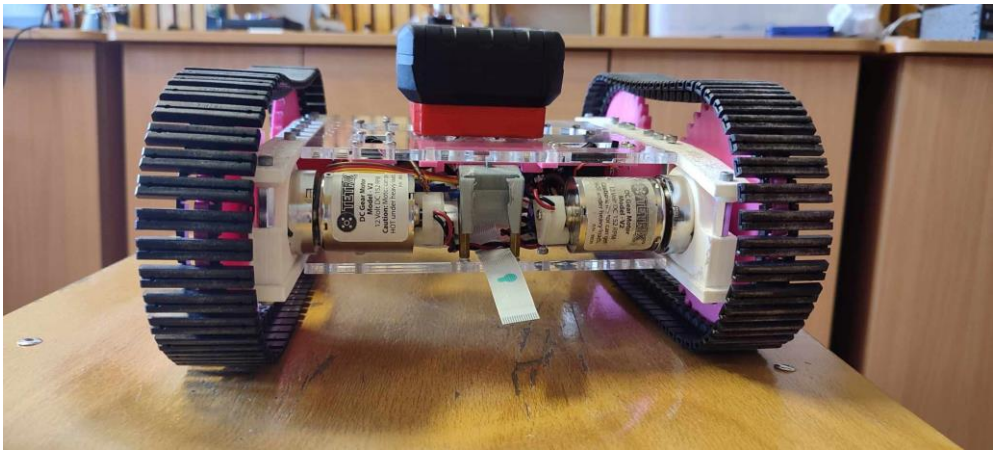
Changes

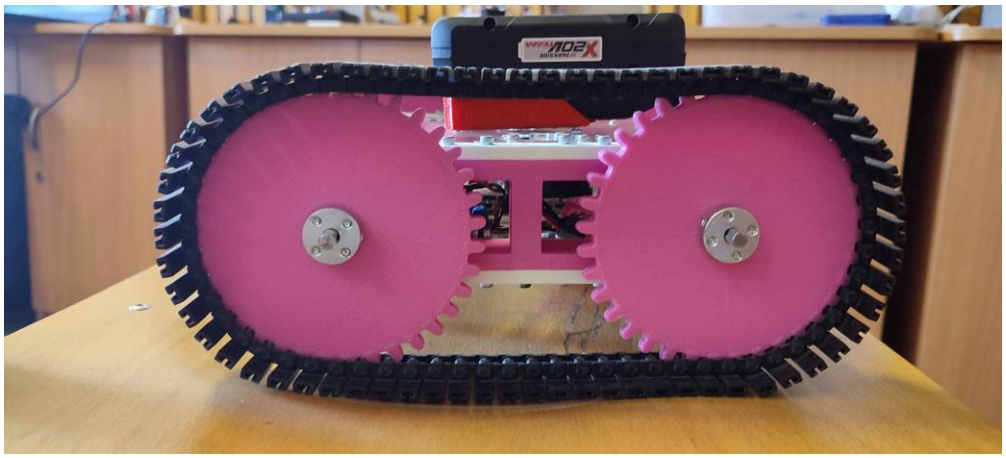
Thanks to the experience gained in last year's competition, our strategy has improved a lot. First of all, we replaced the robot's wheels with tracks so that it can stand on the ground better. We also managed to replace the motors and the structure of the robot itself, with better components. Now it 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:



The robot:





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

Most of our team members are focused more on programming 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 are 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 has 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, 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 concepts of programming that we have started to understand.

Previous experience in robotic competitions

We are 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
4x TETRIX MAX DC MOTOR 39530	120
TETRIX MAX Tank Tread Kit	150
L298N 2x	10
Parkside perfomance 4AH smart battery	46
Raspberry Pi camera V2.1 x2	70
4x Mg995r	25,26
Pca9685	4
Stepper motor	21,72
USB camera	9

Overall cost: 572,25€

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/