RoboCup RMRC 2020

Team Description Materials

SADR ROBOTICS

Logistical Information:

TEAM NAME: SADR
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Introduction:

In the present age, the world is plagued by viruses, diseases, and natural disasters.
Rescue robots can play a very useful role in helping people.
These robots, in addition to the ability to travel in bad environmental conditions, must be able to process the environment using audio and video data.
Our team is working to take an effective step to achieve the mentioned goals with its experience and resources to make effective progress in the field of robotics.

Abstract:

Our goal is to build a robot that can be quickly reproduced.
It must be able to travel in unbearable environmental conditions, deliver emergency packages to the victim, and receive environmental video and audio information using a camera and a microphone, then send it to the operator. It also has a CO_2 sensor. For a better point of view, a robot manipulator will be designed to control the camera position.

System Description:

Software:

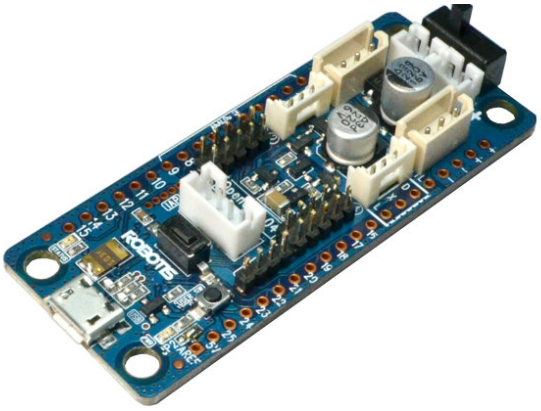
For this matter, we used different programming languages across different platforms we have. We used Python and CPP for our Raspberry Pi which installed on the robot in order of controlling the servo motors through the OpenCM board and its installed firmware and also it has the role of a bridge to play in between our sensor and the operating console. Also, for our operating console which is a laptop, we used python, CPP and Bash Script to sending the right commands to the robot and also monitoring all the sensors easily on the screen.

Hardware:

According to investigations on other teams and previous competitions and technical advice on the RMRC website, Raspberry Pi 4 is being used as the main core of robot. and also Dynamixel M series has been used because of its sufficient torque for the mass and weight of the robot.
and also OpenCm Board is used due to make connection between the Raspberry pi and motors and for the vision system, USB camera 3 is used which contains a microphone by itself.
Co2, speaker and LED modules and sensors we are using as well.
Also Li-Po 12v battery is used.

Hardware Visualization:

Raspberry Pi 4



Open Cm for motors and RaspBerry communication

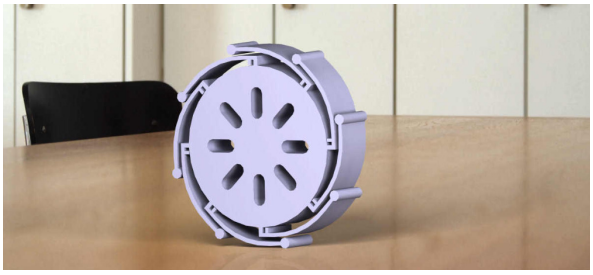
Dynamixel XM430

Usb Cam with microphone

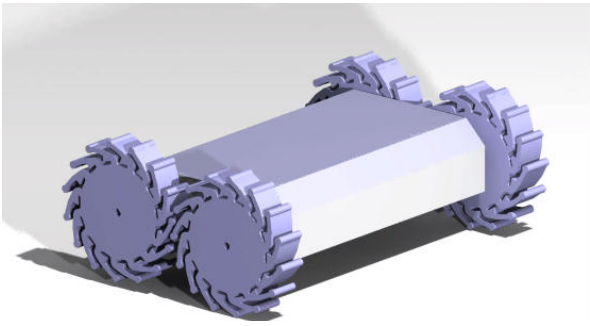
Unique mechanisms:

All of our efforts to design the right wheel and arm for the robot have resulted in some basic designs underneath their photos, and we've put a lot of time into designing them to get the best performance possible.

First Try



Second Try



Last Try

Communication:

As described above, our relationship between the operator and the server is established that.
After encryption, our data is transmitted to the internal server and then decrypted on the server.

Application:

Setup and peak up:

A technical file containing the description and how to assemble the robot along with the code and the fine parts used in the robot is being prepared which will certainly be completed by the time of the tournament and will be shared for all teams and technical committees.

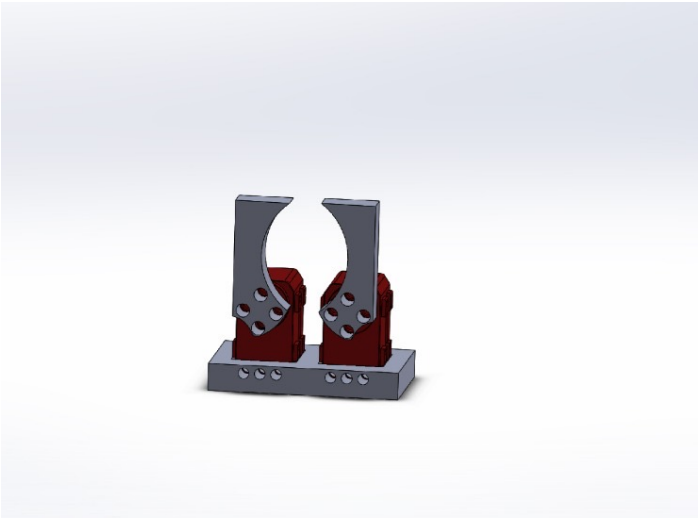
Mission Strategy:

Our robot has a straightforward design and can be constructed quickly with a 3D printer. It was in the mind of using solid material at an affordable price to gain the most efficiency with the least amount of cost for a rescue operation.

Experiments:

Following, we show the test field and the first sample of the robot gripper, which we test the robot.
We are now in the state of prototyping of our robot and the mechanical segments such as out custom made wheels, and our chassis are testing in the field. There are some pros and cons in this design which we will modify them as soon as possible in order of getting the best results in the competition.

Below you may find the improved version of robot gripper.



Conclusion and Summary:

We tried to enforce our knowledge by learning mechanical, electrical, and programming methods also we had a look at past robots to build the best robot possible for this competition.
This year is our first time participating in a RoboCup RMRC competition; we hope to show a satisfying level for the league.
Although this year is our first year in the league, we are excited to showcase our best in this competition despite our young age.

Appendix:

Raspberry Pi 4	$70	1	70
USB 3 camera mega	$5	2	10
Dynamixel XL 320	$45	2	90
Dynamixel XM 430	$240	4	960
OpenCm	$30	1	30
3 cell Li-Po battery	$10	1	10
Mono Enclosed Speaker	$5	1	5
5ghz WiFi dongle	$5	1	5
Total			1180

Reference to other work that you made use of:

We imitated other teams in many ways from last year especially Bluestorm and Redknights ,then we corrected them.