



Yothinburana School

Bkk, THAILAND

Abstract

Greetings, we are team "Rainforest" from Yothinburana School, Bangkok, Thailand. We are so excited about the chance that we can participate in Robocub International Round 2022. We started this project back on 15 June. Furthermore, we don't have much time left to do, but we have a determination that no matter what, we need to get this project done, and since then we have accomplished much.

During that time, we aimed to develop our robot from the previous competition to defeat our opponent at the world championship. We could challenge various developments because we make this robot from the beginning until it's very powerful and reliable.

We have 2 robots. Each of them has different tasks; attack and defense.

Each robot has Arduino MEGA 2560 as the main processor, the Omni wheel to make become smoother when it runs on the carpet, and sensors to get the situation of the robot. Our motor and the driver for it are highly controllable.

The attack and defense robots have the same mechanical part in case some of them get damaged, so another one can go and play their role. Therefore, our robots can be expected to get high points.



RoboCup
BANGKOK
THAILAND 2022



Phakin Boonchanachai Grade 12 – Team Captain, Programmer
Sadawich Chantarat Grade 12 – Poster Design, Mechanic

Our goal in this competition

We have 2 goals in this competition. First is the experience because this is our first time, and we want to know how other countries make this robot. Second, we want to win to encourage ourselves. Although we didn't win this competition, there's still another prize that we can get too. We put so much effort into this project, so we hope we can get some prize.

Robot Design

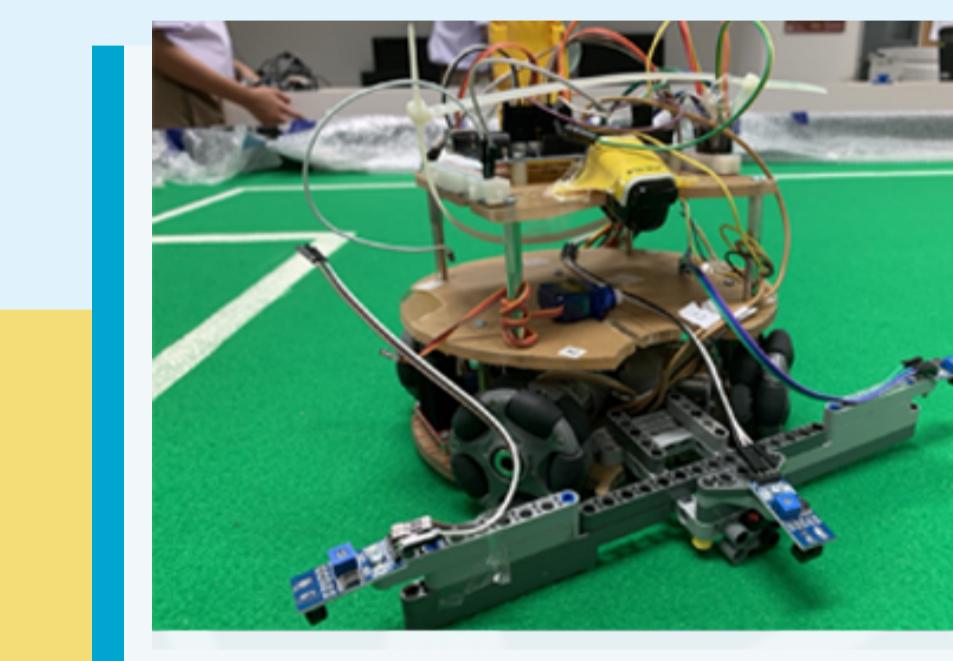
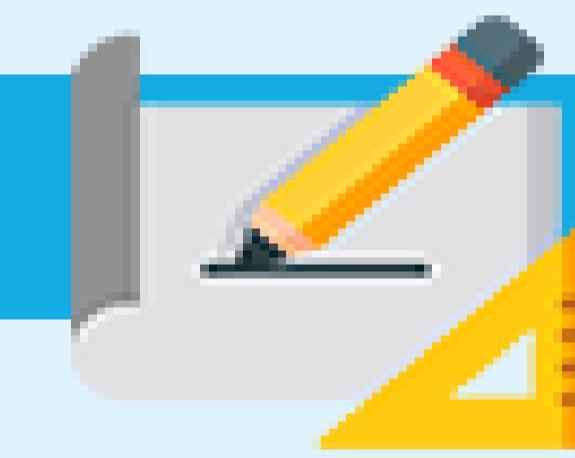
We have 3 drafts of our robot design.



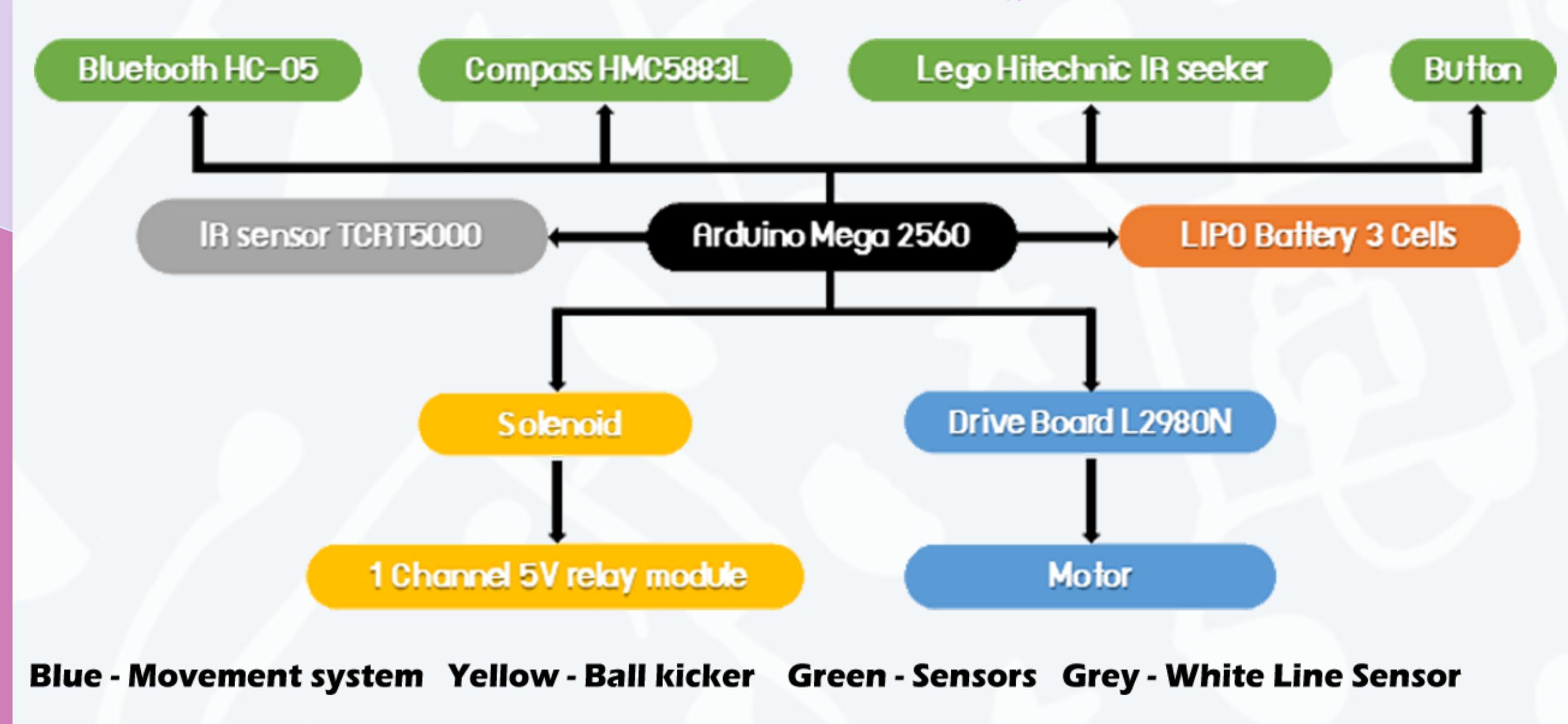
First is the "Lego draft". We used this robot in our national competition and got first place. The reason that we can't use it in the international round is that we want to challenge ourselves to another step of making robots more complex and more functional.

The second is the "Big boy draft". When we got a quota to participate in world championship, we decided to rebuild the robot, but we can't use it in this round is it has too much weight and not have a proper function such as kicker part.

So, we come to the last draft which is "Miracle draft". This time we used SolidWorks to design our robot look and to calculate our robot weight. The circuits were designed on Fritzing, and then we got our latest and greatest version of our robot.



Robot Overview (Miracle)



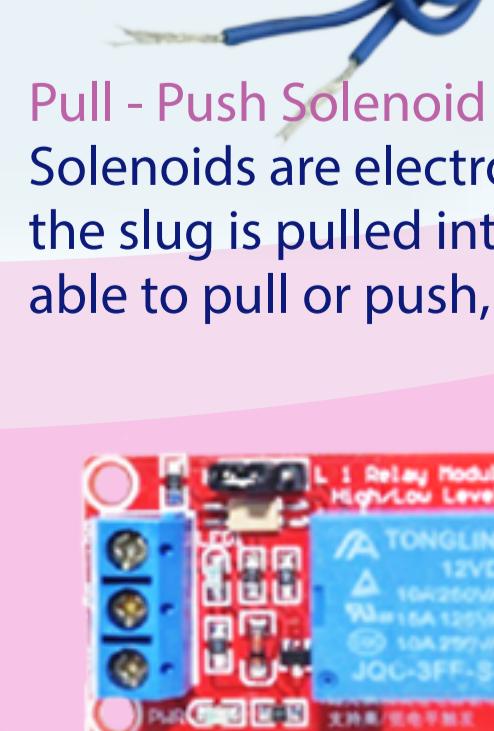
Robot Part



Arduino Mega 2560
With a large number of pins, this board can meet our needs since we have many sensors and motors to use.



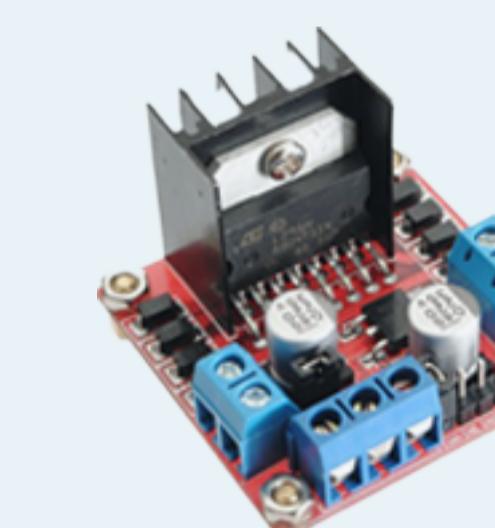
LIPO Battery 3 Cells
This 11.1v battery has a capacity of 1300 mAh. We have calculated the total current and voltage, and found that this is the most proper battery.



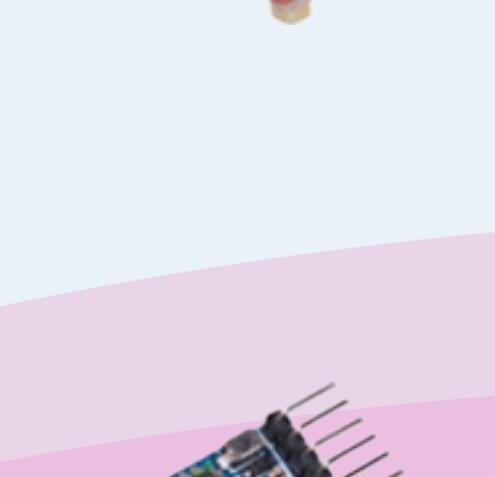
IR Sensor TCRT5000
This sensor shoot and receive infrared light. Therefore, it can be used to detect white line on the field.



1 Channel 5V Relay
Relays are used to control high voltage circuits with the help of low voltage signals. We use this module and connect to the relay to prevent any accident.



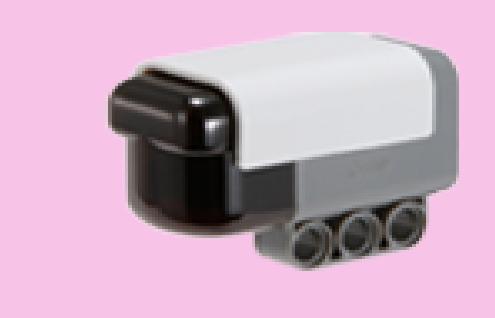
Drive Board L2980N
This board can control the speed and direction of 2 DC motors. We have 4 motors, so we use 2 drive board per robot.



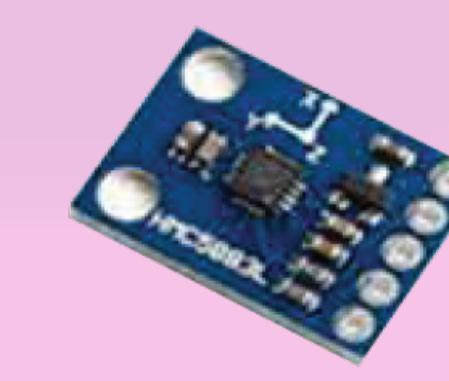
Motor 12V
With the appropriate torque and RPM, the motor can reach the perfect speed and don't get push by opponent.



Bluetooth HC-05
With the perfect range of communication, we use this sensor to make the robot know its role as attacker or defender.



Compass HMC5883L
We use the compass to detect the robot's position. We measure the azimuth angle and combine it with our movement formula to make it run perfectly.



Lego Hitechnic IR Seeker
The IR sensor gets readings from the IR ball, and can give you information on where and how far away the ball is.



Rainforest



Attacker

This robot can detect the IR-ball and get the ball. Then, we use our specific formula to make the robot know its position because we don't have the camera. When the robot get a ball, it can find the angle to kick the ball and score.

Defender

This robot will read the direction value from IR and can go in that direction in order to block the path of the ball that comes to our goal.



Communication

Our robots will not only play as attack or defender. They can perform both functions. If one of the robots is removed from the field, the other will go to do that instead.

Whiteline

There are white lines on the field to indicate the playing field. We have sensors at the bottom of the robot to indicate white line and make sure that our robot will not go out of bounds

How to find the ball

We use a Lego Hitechnic IR seeker as our sensor to find the ball. It can read the ball's direction to indicate where the ball is and the ball's strength to indicate how far the ball is. When these 2 values combine with our seeker formula, it makes the robot move to the ball pretty smoothly without any problems.

How to stay in the field

We have 8 TCRT5000 IR Sensor Module at the bottom arranging in form of plus sign to avoid being out of bounds.

Further Development

We want to make the robot know its position on the field, so we want to put the camera into it whether it is a pixy camera or a huskylens. With the help of a camera, we will be able to locate the goal in the field, the opponent robot's position, and calculate the chance to make a goal. Also, we want to improve the communication system to be better. We want to use the Zigbee module, but it's out of our afford. So, we hope that we'll have another chance in RoboCup international round to develop our robot.

