SASTA OLIPHANT SCIENCE AWARDS

Prize Winner

Programming, Apps & Robotics

Year 3-4

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St Peter's College

DJI Battle

By Eric wang, Michael wang

Cover Sheet

COVER SHEET

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Year Level: 3-4 Group Entry: Y Students: 2

Category: Programming, Apps & Robotics Keycode: LZ5UN8QT

Title: DJI Battle

Aim of entry and its scientific purpose

Our aim of the entry was to see how much the program can do, to see how much more the program can do than humans controlling the robot and how much difference there is between human control and program control.

How we got the idea

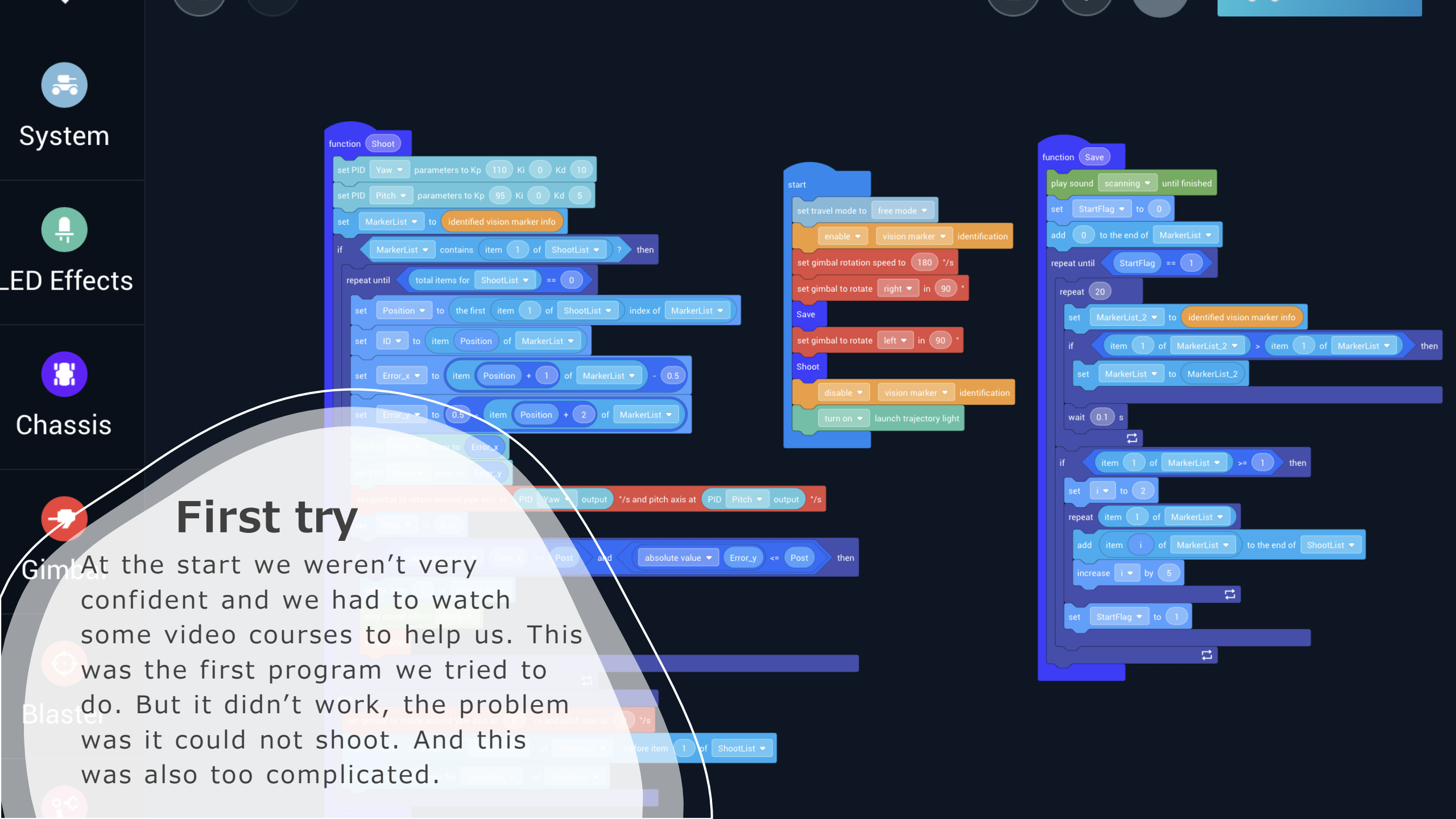
At the start we thought about using lego spike or EV3, but I wanted to use something new, so we then thought of things that we can do with the DJI S1. Our first ideas were doing a battle or shooting targets. We thought that doing a battle was more challenging so we chose to do that

Experiencing the program.

At first it looked familiar but it turned out to be harder level than spike and EV3.

Constructing the S1

We built the S1 with our mom, when constructing it was very exciting and it made us feel like an engineer. At the time we just played a lot of battles without program. It was very fun.



First try

At the start we weren't very confident and we had to watch some video courses to help us. This was the first program we tried to do. But it didn't work, the problem was it could not shoot. And this was also too complicated.

System

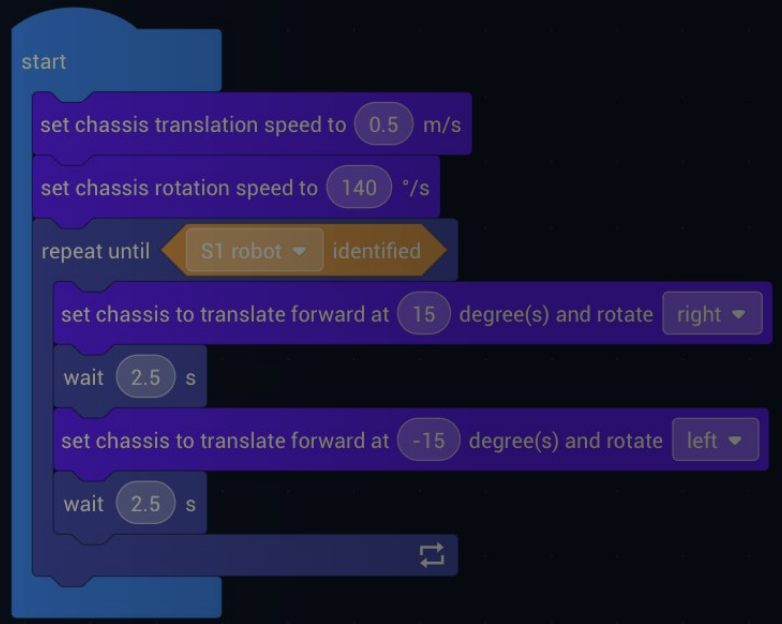
LED Effects

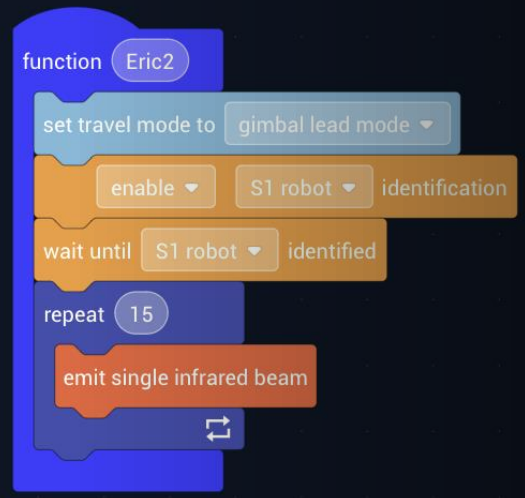
Chassis

Gimbal

Blaster

Extension



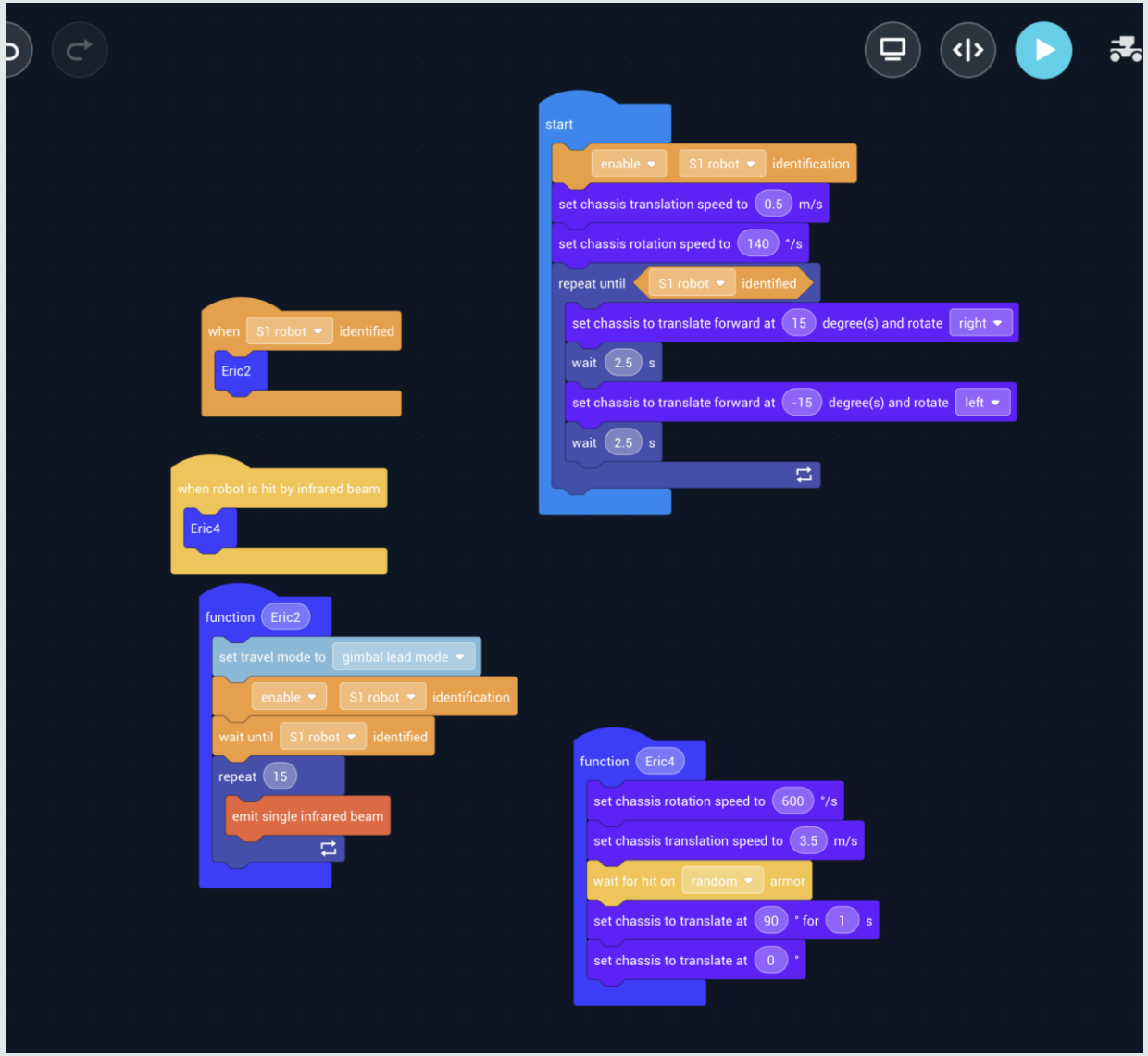


Second try

This time we went through all the blocks so we can get more familiar with all of the blocks and know what they all can do. Also we decided to go more simple. This time we found some important things like enable s1 robot identification so the robot can actually detect the other robot. This time we also made a new function which I called Eric 2. we also made the robot move around so it won't be easy for the other robot to detect it. There wasn't a problem with this program we just needed to add more things.

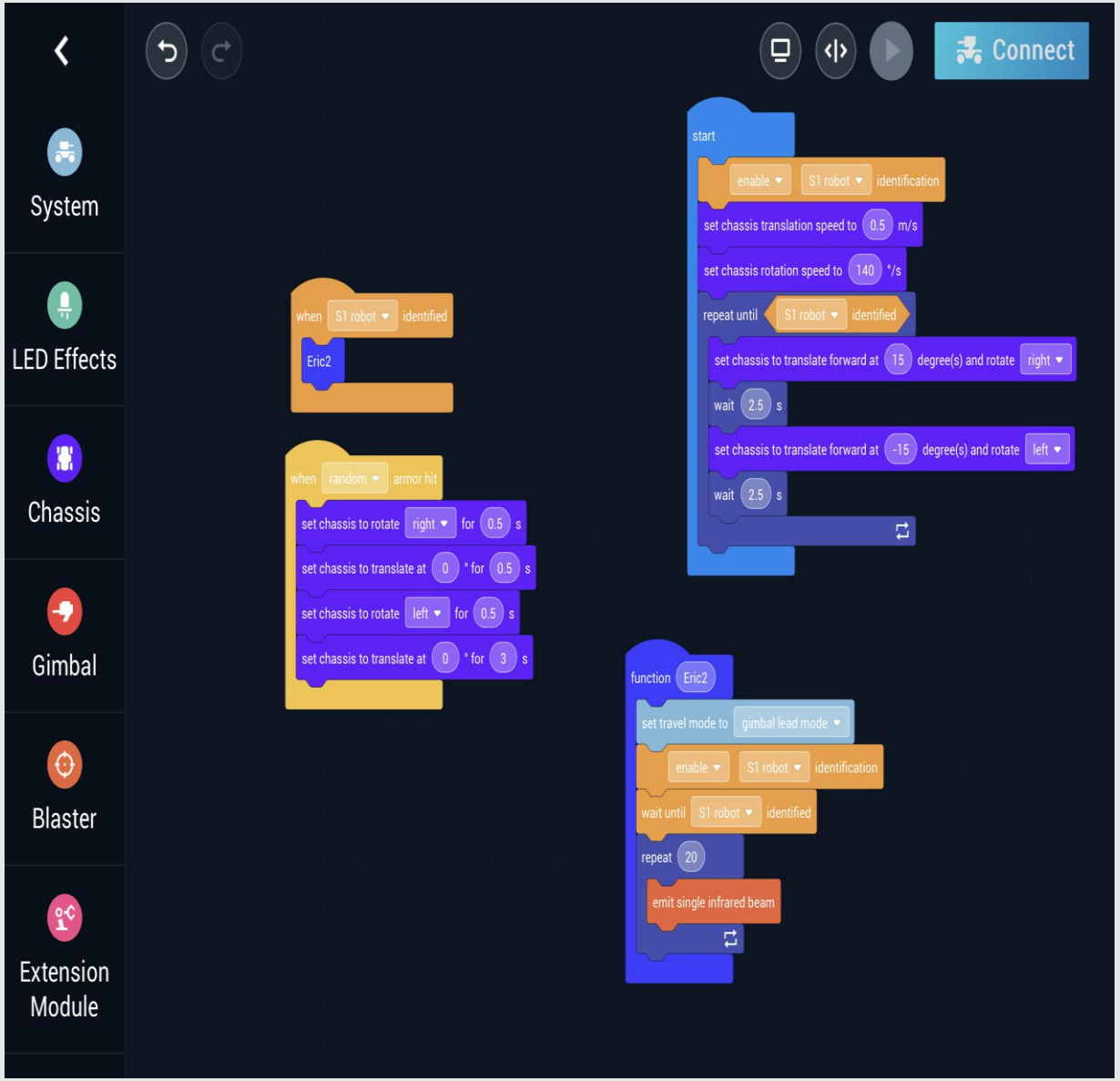
Third try

This time we added a new function that is called eric4 this function is for what to do after been shot. But when we looked at the outcome the robot didn’t react after been shot.



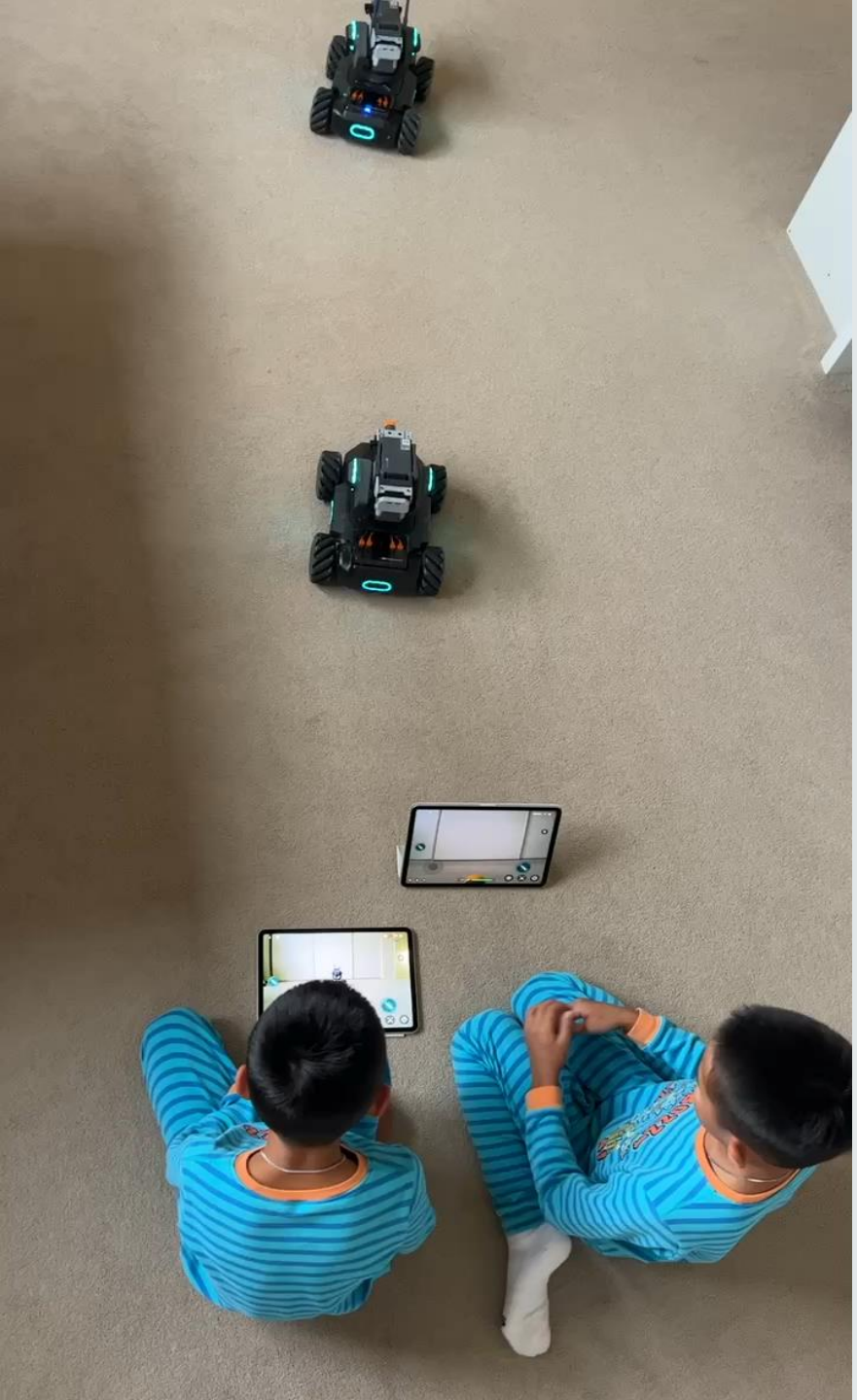
Fourth try

This time it worked, instead of making a function we just made “when random armor hit” then it will move away.



Video part 1

This what happens when the robot detects the other robot it will shoot.



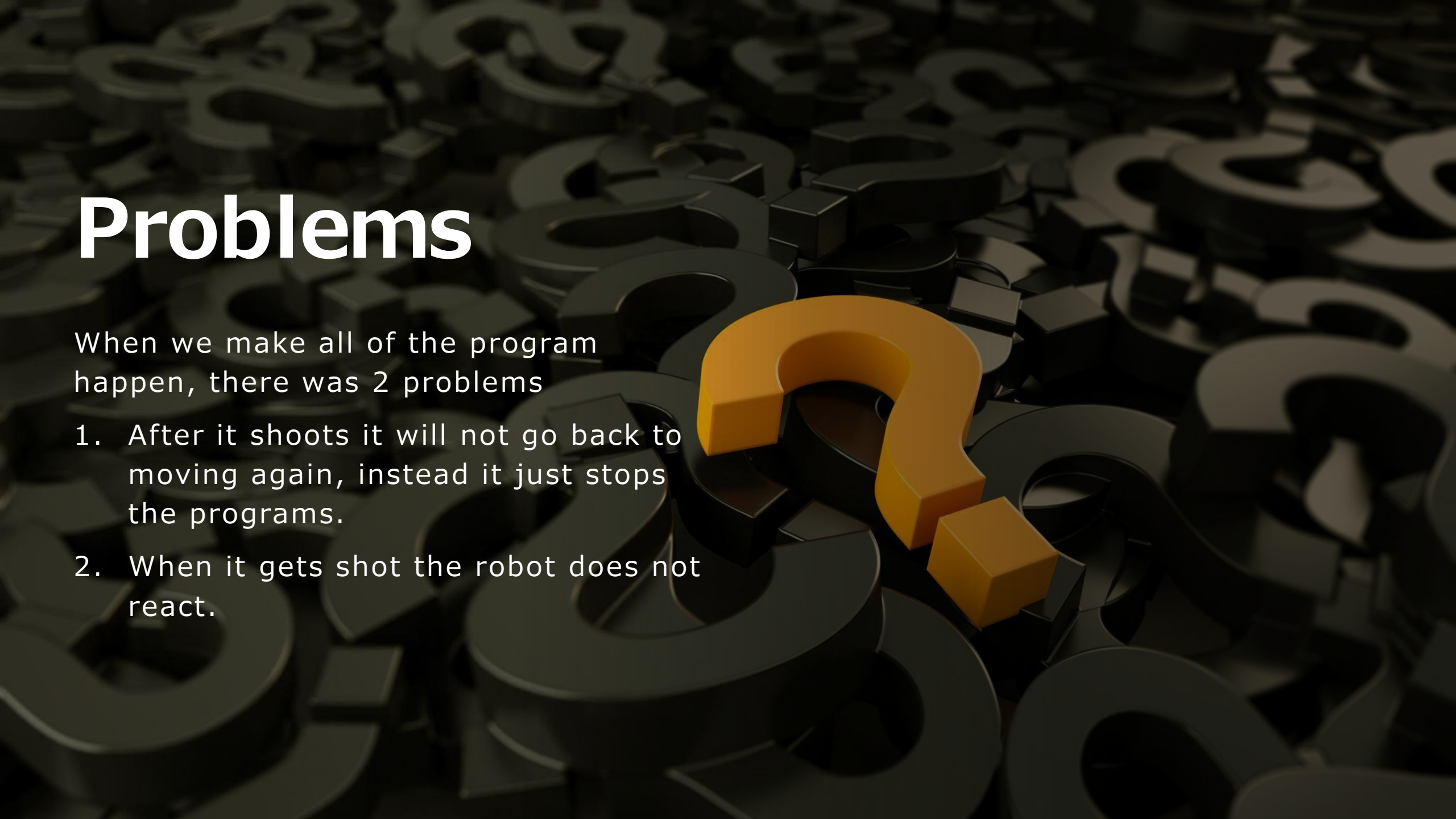
Video part 2

This what happens when the robot gets shot. The robot tries to dodge the beams.

Problems

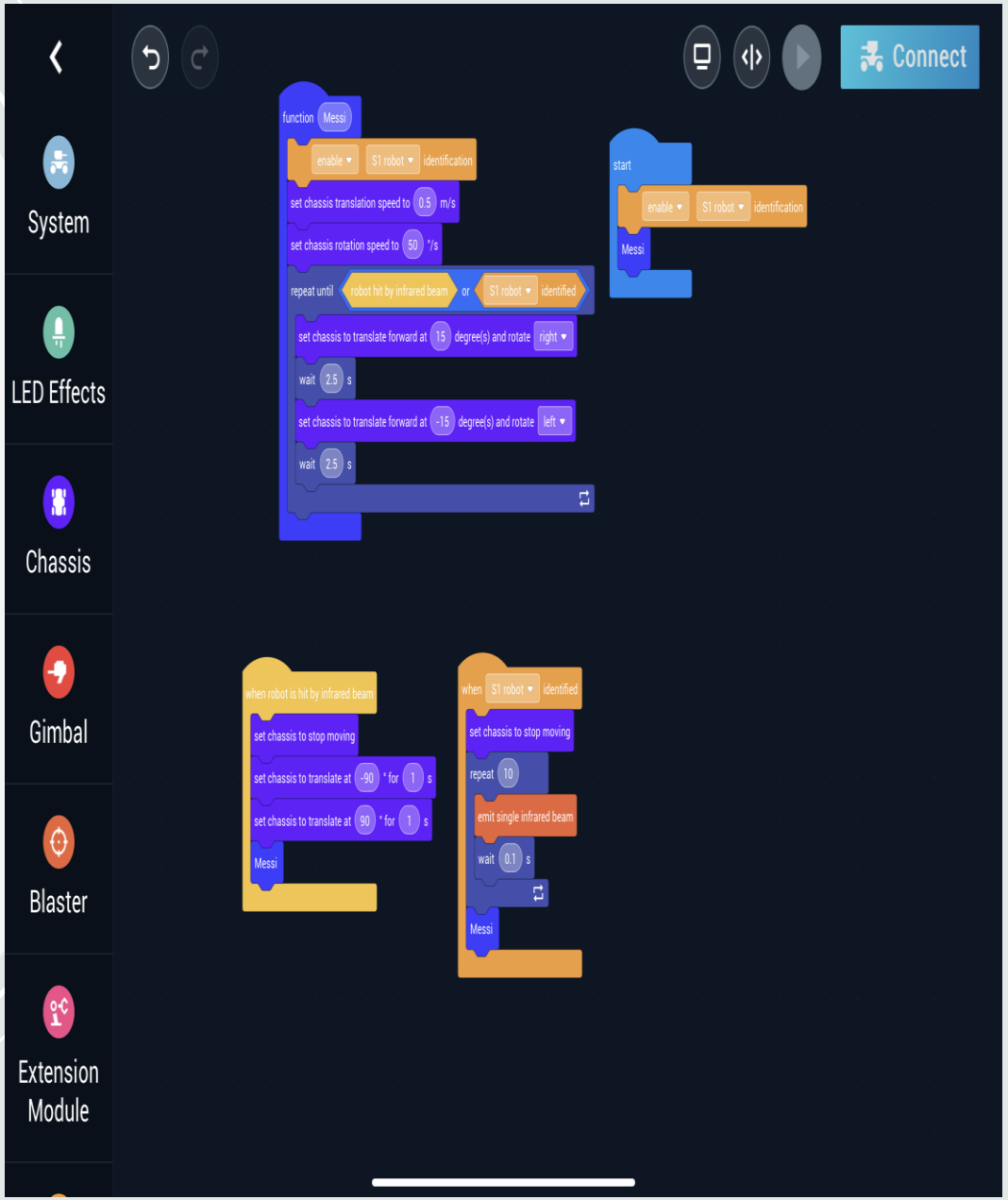
When we make all of the program happen, there was 2 problems

1. After it shoots it will not go back to moving again, instead it just stops the programs.
2. When it gets shot the robot does not react.



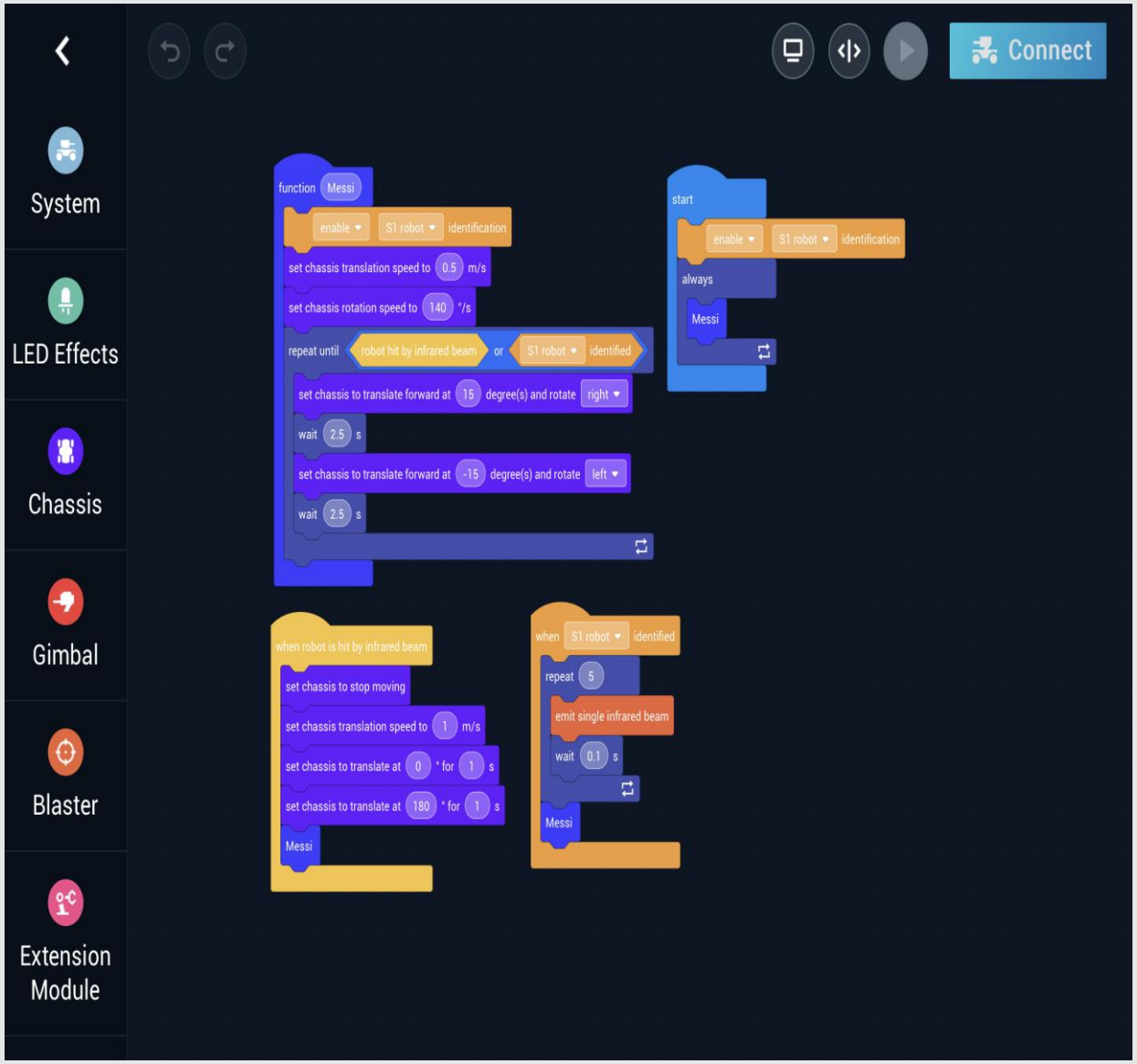
New Program/fifth try

My solution to both problems worked, so the solution for 1st problem was solved by adding a function which I called “Messi” I will add that to what happens after being shot or after s1 identified. The problem for the 2nd problem was solved when I noticed I put “when random armor hit” I remembered that I used infrared beams so I changed the block to “when robot hit by infrared beam”. (Eric)



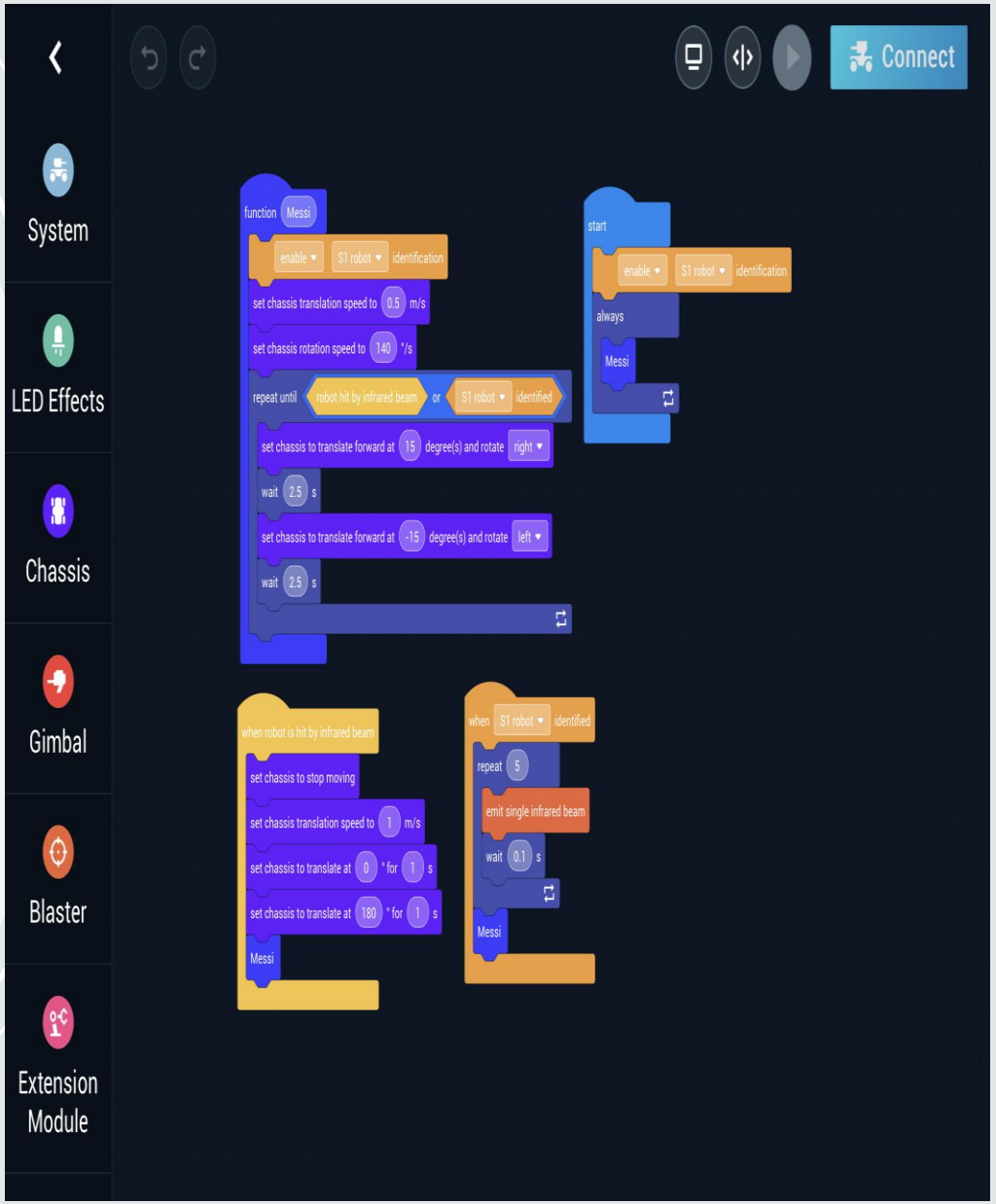
Another Problem

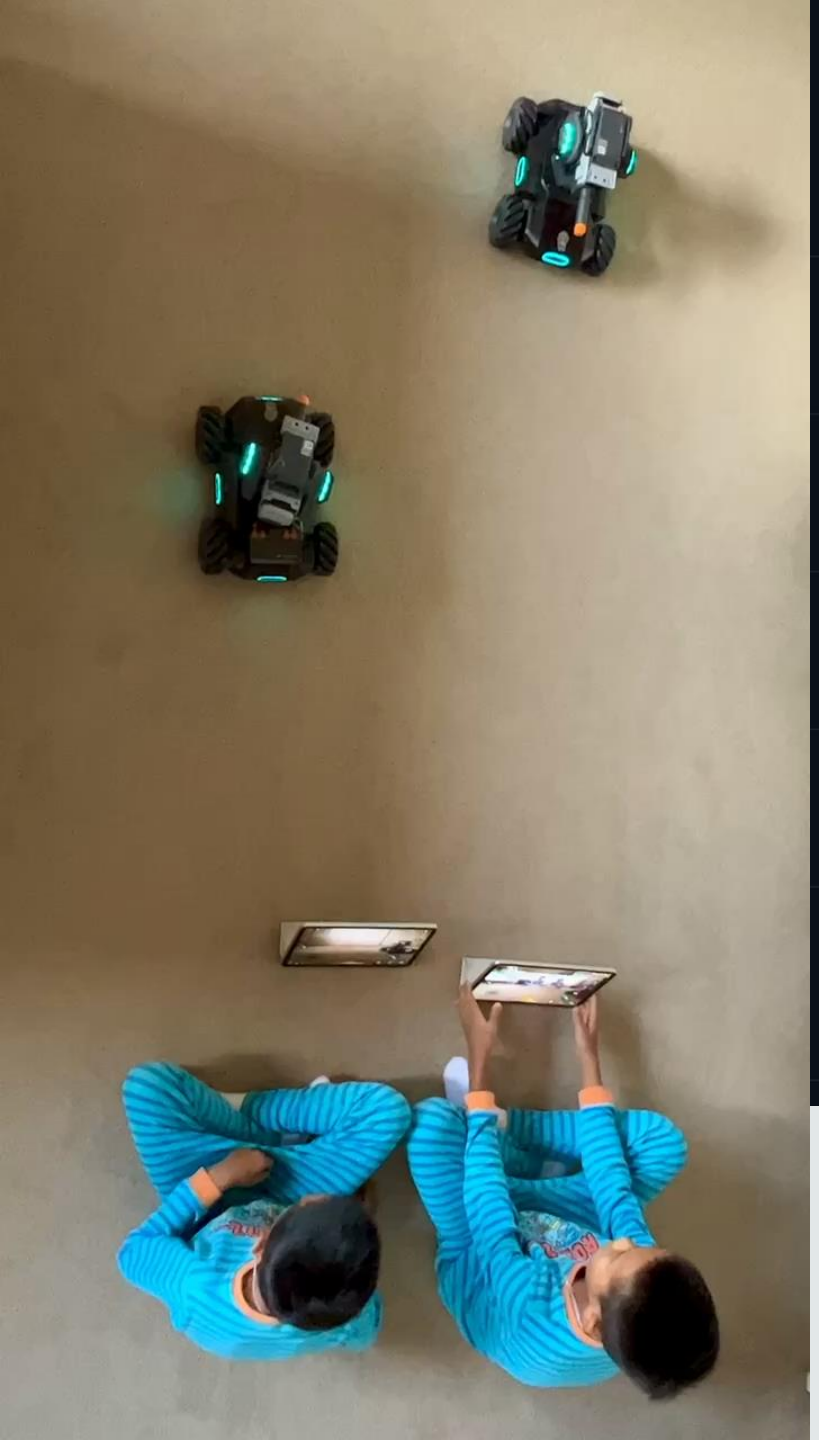
Another problem was after it attempts to shoot once and goes back to doing messi it can’t detect the other robot again, so we changed by adding an always block around “Messi” in the code at “start”

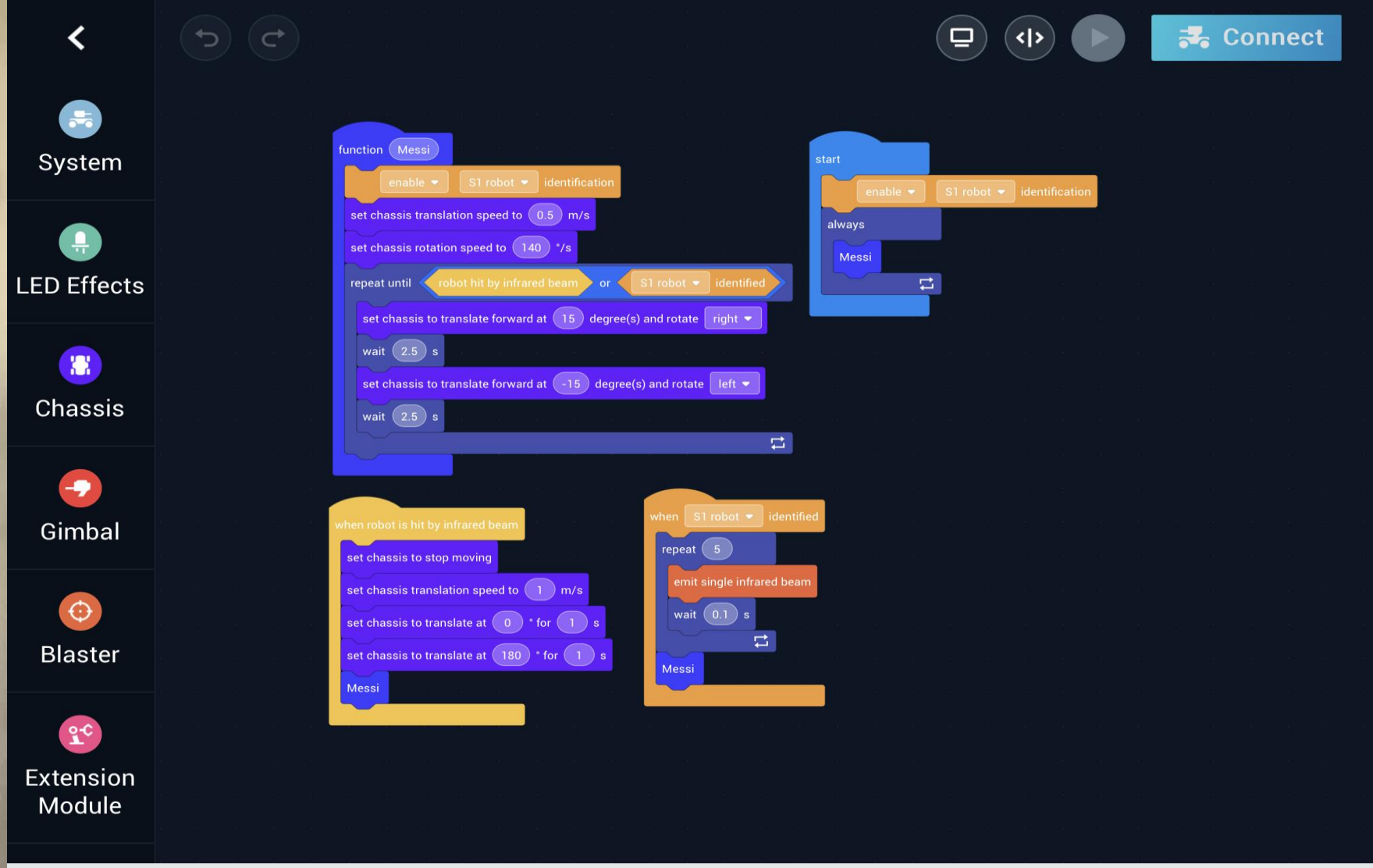


But…

But if my robot defeated the other robot mines will keep on shooting if it is in its sight. So I removed a block from when s1 robot identified, I removed the block set chassis to stop moving, so when my robot identifies the enemy robot it will keep moving so my robot will stop continuously defeating the enemy.(Eric)







Success

The final product was a success it worked.

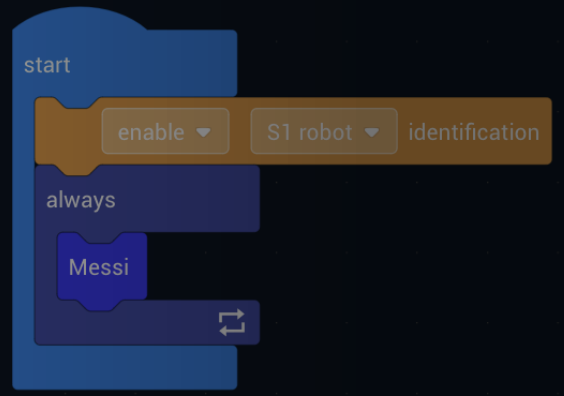
System

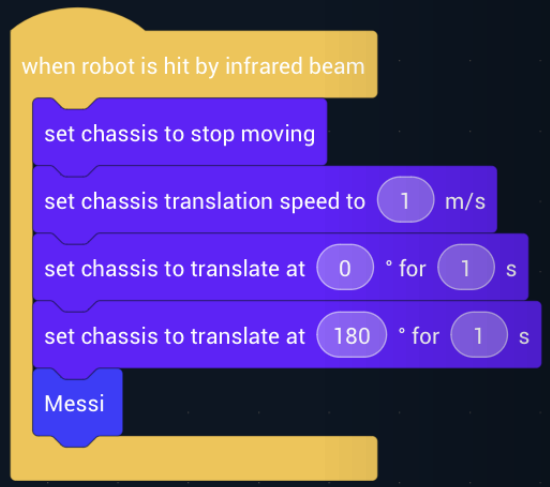
LED Effects

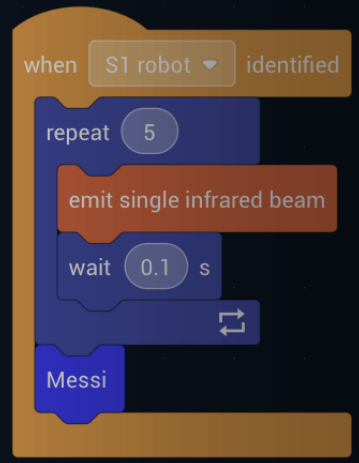
Chassis

Gimbal

Blaster





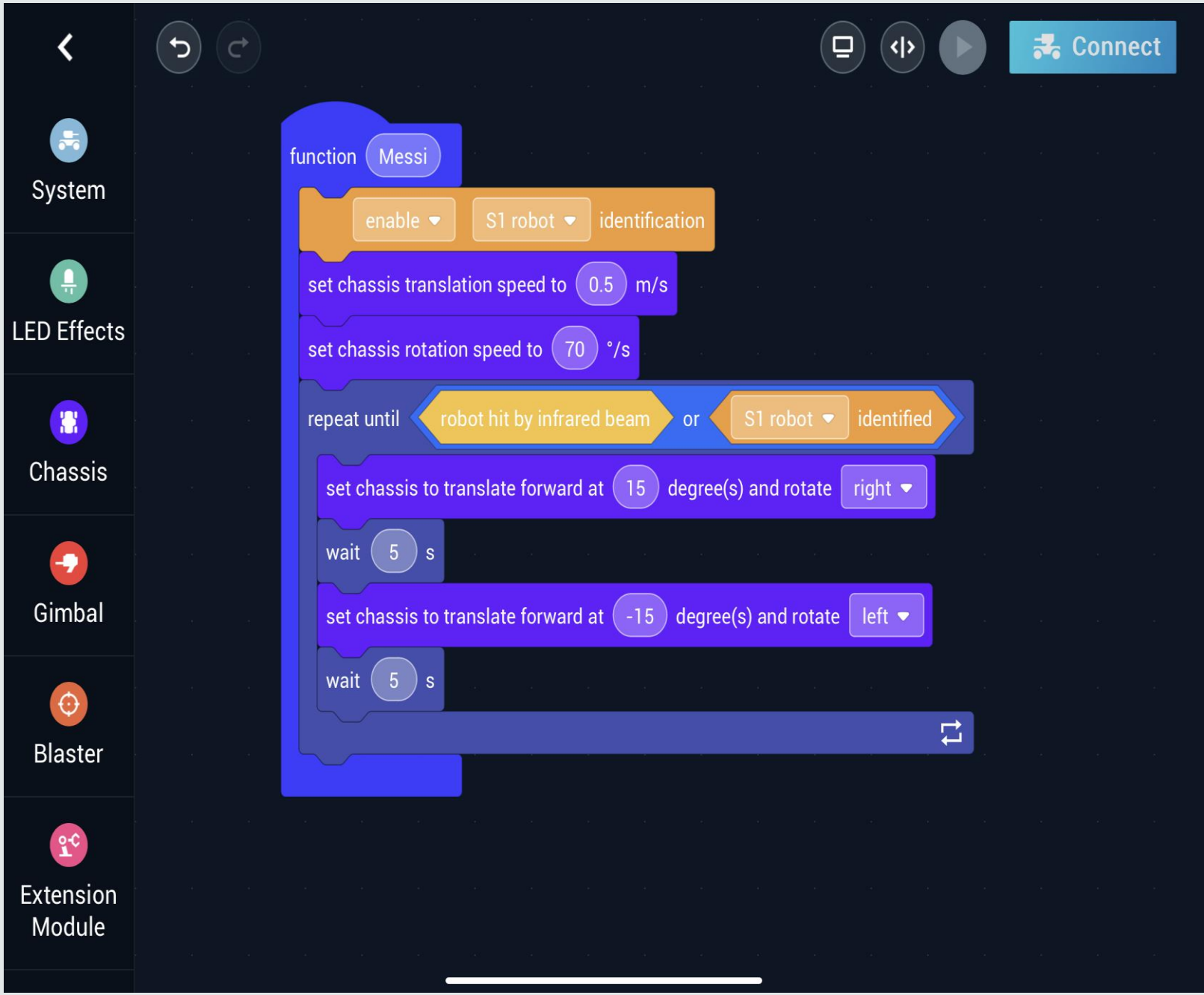


Program

There are 4 parts to our program.

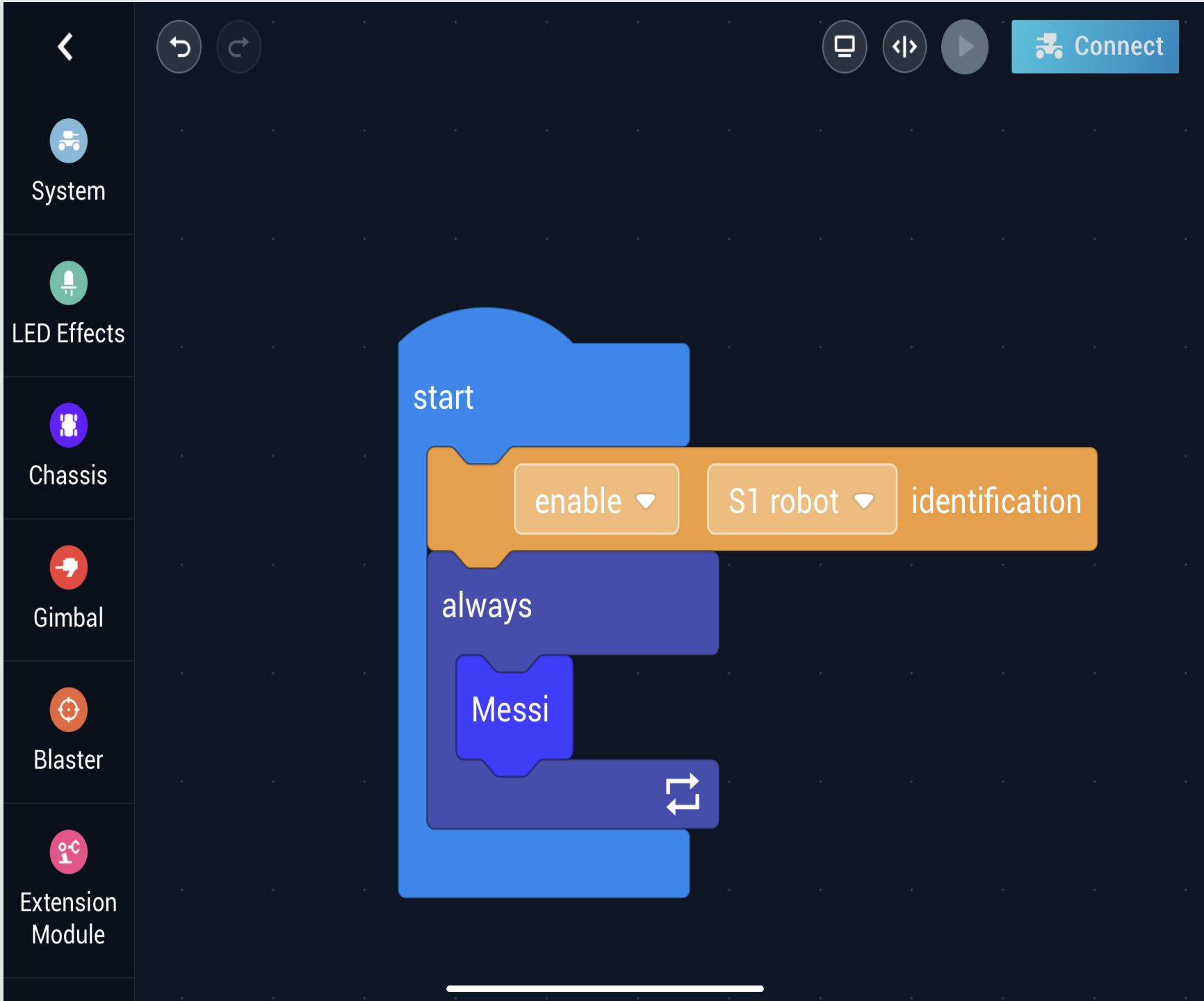
Part 1

This part of the program is a function called “messi”. This function controls how the robot moves. I have chosen to make the robot move in a figure 8. The first bit is “enable s1 robot identification” so the program allows the robot to identify the other s1. Then the next 2 blocks is controlling the speed translation speed is 0.5 m/s while the rotation speed is 70 degrees/s, next is when the robot actually moves. “ set chassis to translate forward at 15 degrees and rotate right” and “wait 5 s” will make the robot run half of the figure eight. The other half will run when I add “set chassis to translate forward at -15 degrees and rotate left” and “wait 5 s”. I’ve put this part of the program in a “ repeat until robot hit by infrared beam or s1 robot identified” so that this will repeat until hit by infrared beam or s1 robot identified.



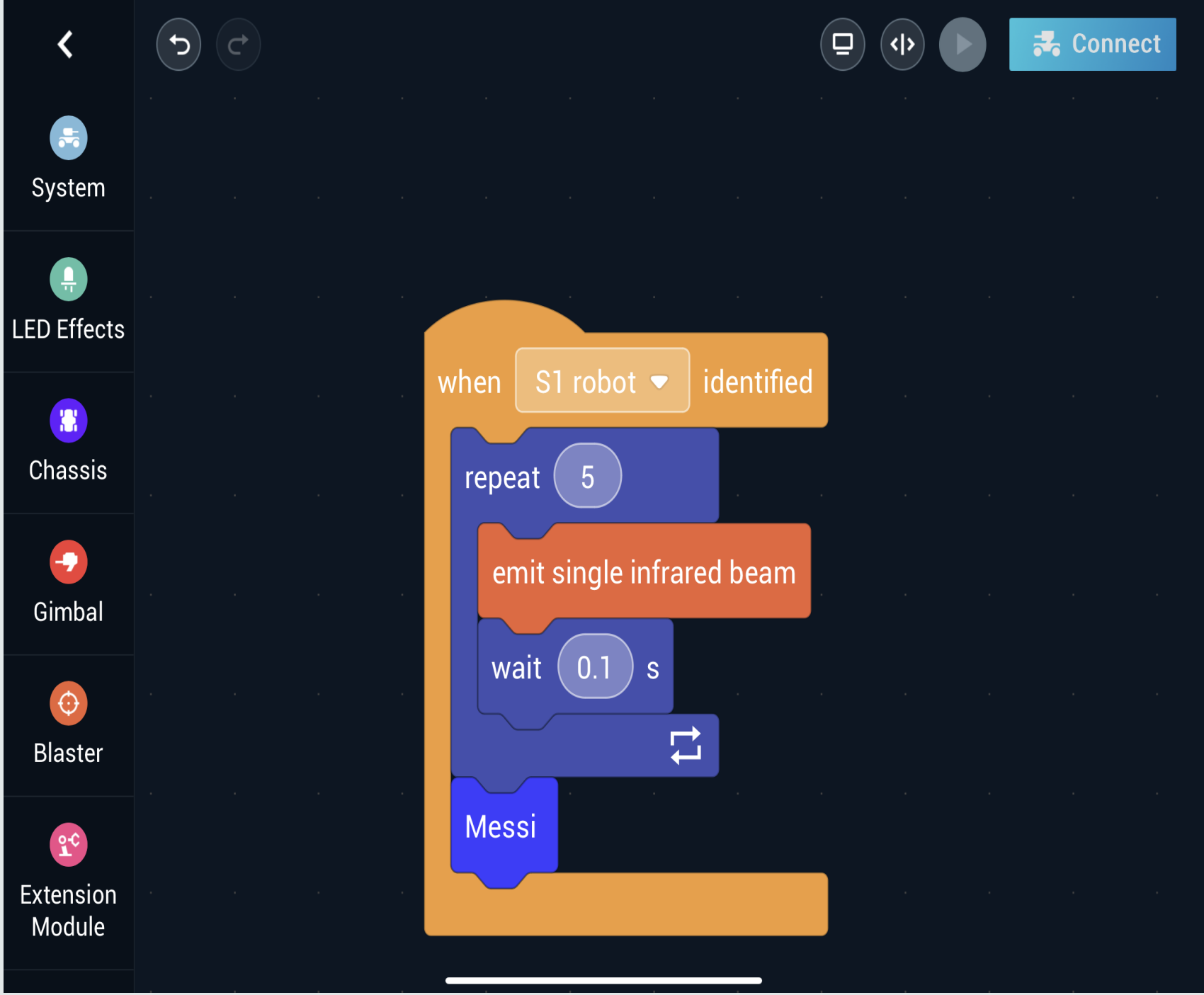
Part 2

In this part this what happens when the program starts, first it is “enable s1 robot identification” so the program allows the robot to identify the other robot. Then the program does the function “messi” (slide 17) the “messi” will be put in an always so the program won’t stop.



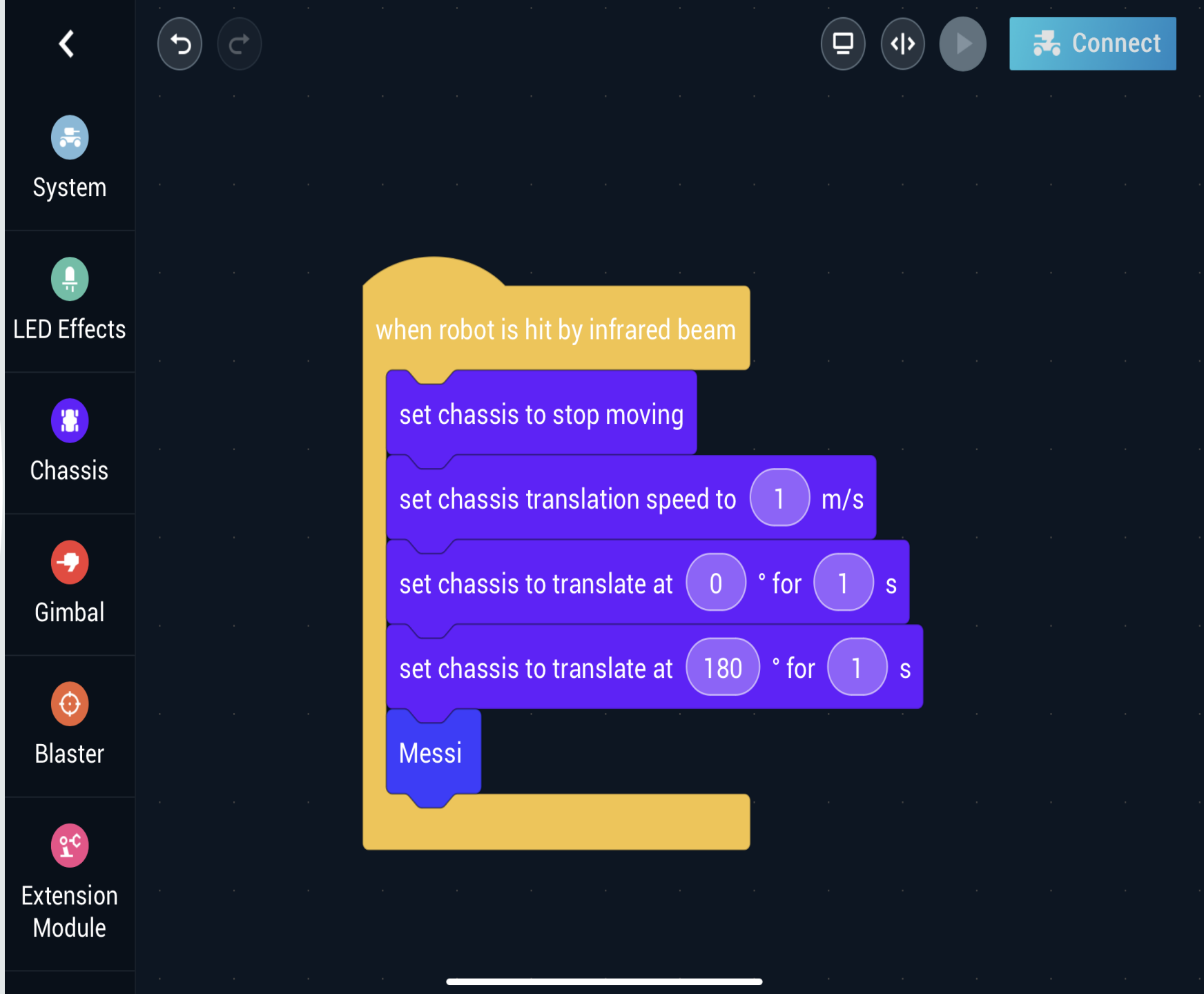
Part 3

In this part it controls what happens when the other robot is identified. So the first block is “when s1 robot identified” then “emit single infrared beam” and then “wait 0.1s” this is for shooting, this part will be put into a “repeat 5” then after all of that the program goes back to the function messi.



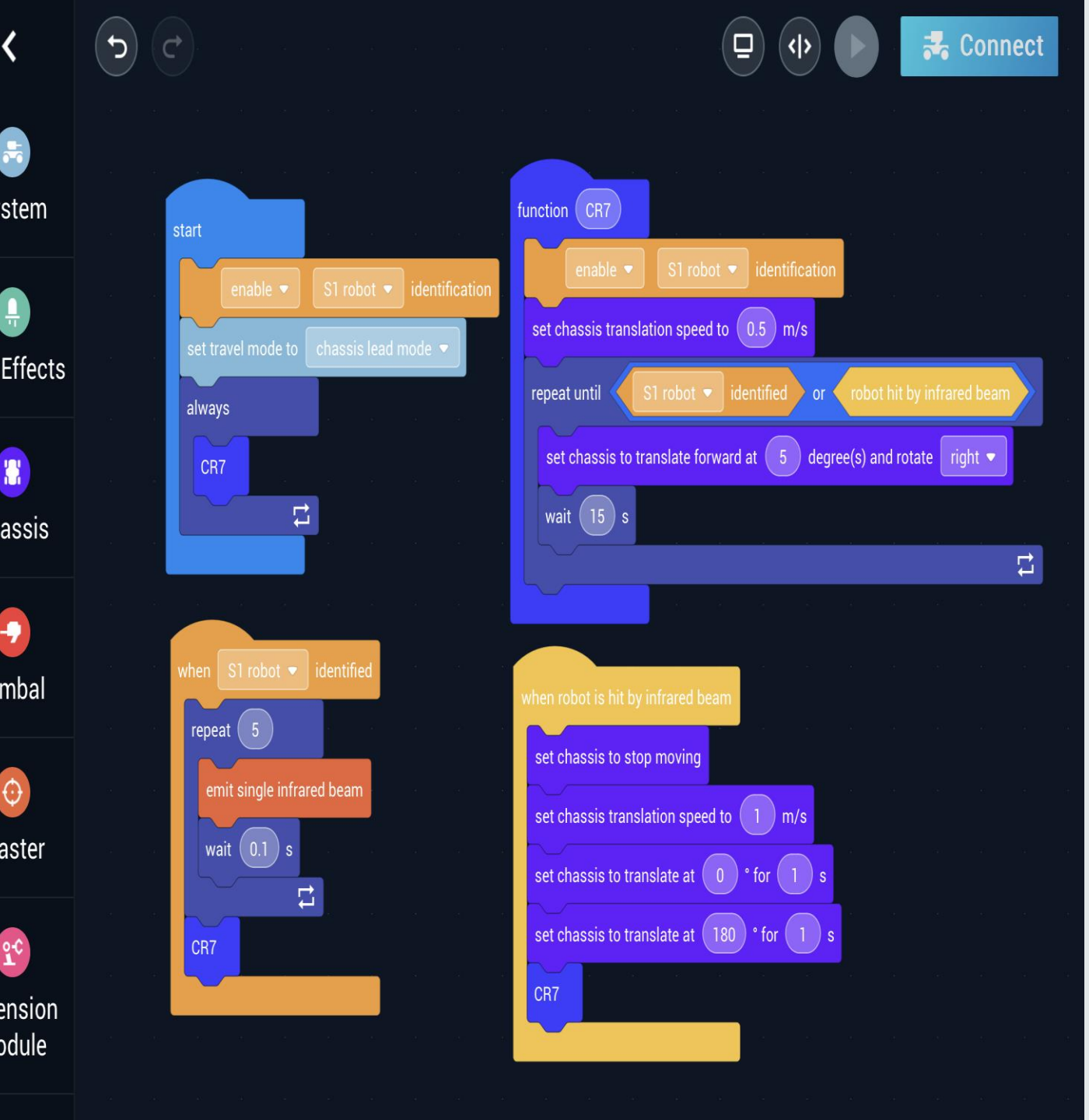
Part 4

This part of the program is to control what to do when been hit. The first block is “when robot is hit by infrared beam” then “set chassis to stop moving” so the robot could stop at were it is and prepare for the next part of the program. After stopping the next block will be “set chassis translation speed to 1 m/s” that will change the speed. Next block will be “ set chassis to translate at 0 degrees for 1s” this block is used for moving forward. So next we have “set chassis to translate at 180 degrees for 1s” so the robot can move back to its original position. After that it will go to “messi”.



The second robot

This is the robot competing against the robot that we just programmed.



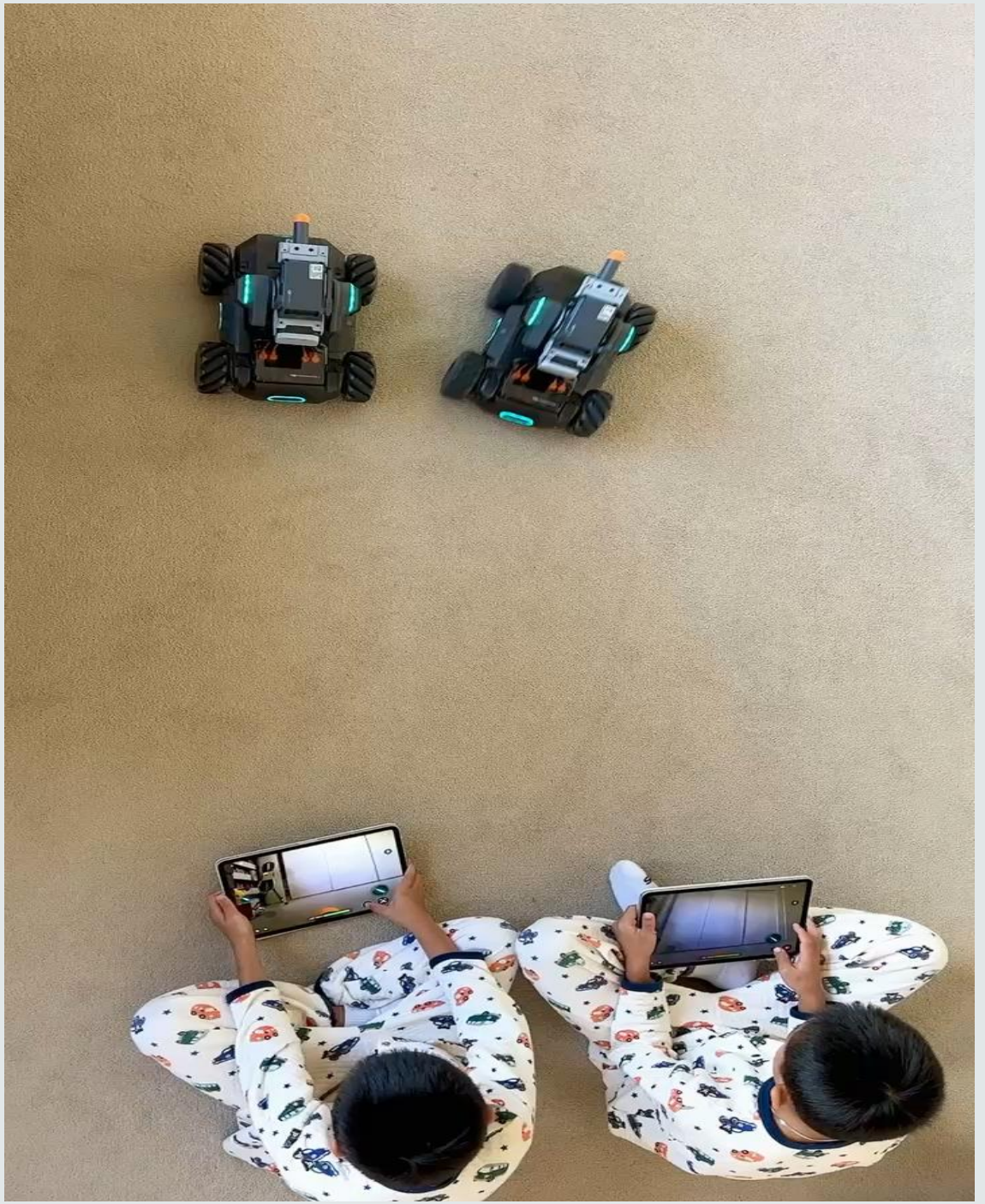
Second robot program.

In this program the only difference from the first robot is the movement.

Movement of second robot program.

First there will be a function called CR7 instead of the first robot's function name messi. Next block will be 'enable s1 robot identification' so the program allows the robot to identify the other robot. After that we add a block "set translation speed to o.5 m/s" so we can make the speed perfect. Next we add the block "set chassis to translate forward at 5 degrees and rotate right" and " wait 15 s" that part was for moving in a circle movement. That part of the program will be wrapped in a "repeat until s1 robot identified or robot hit by infrared beam.

The finishing battle video

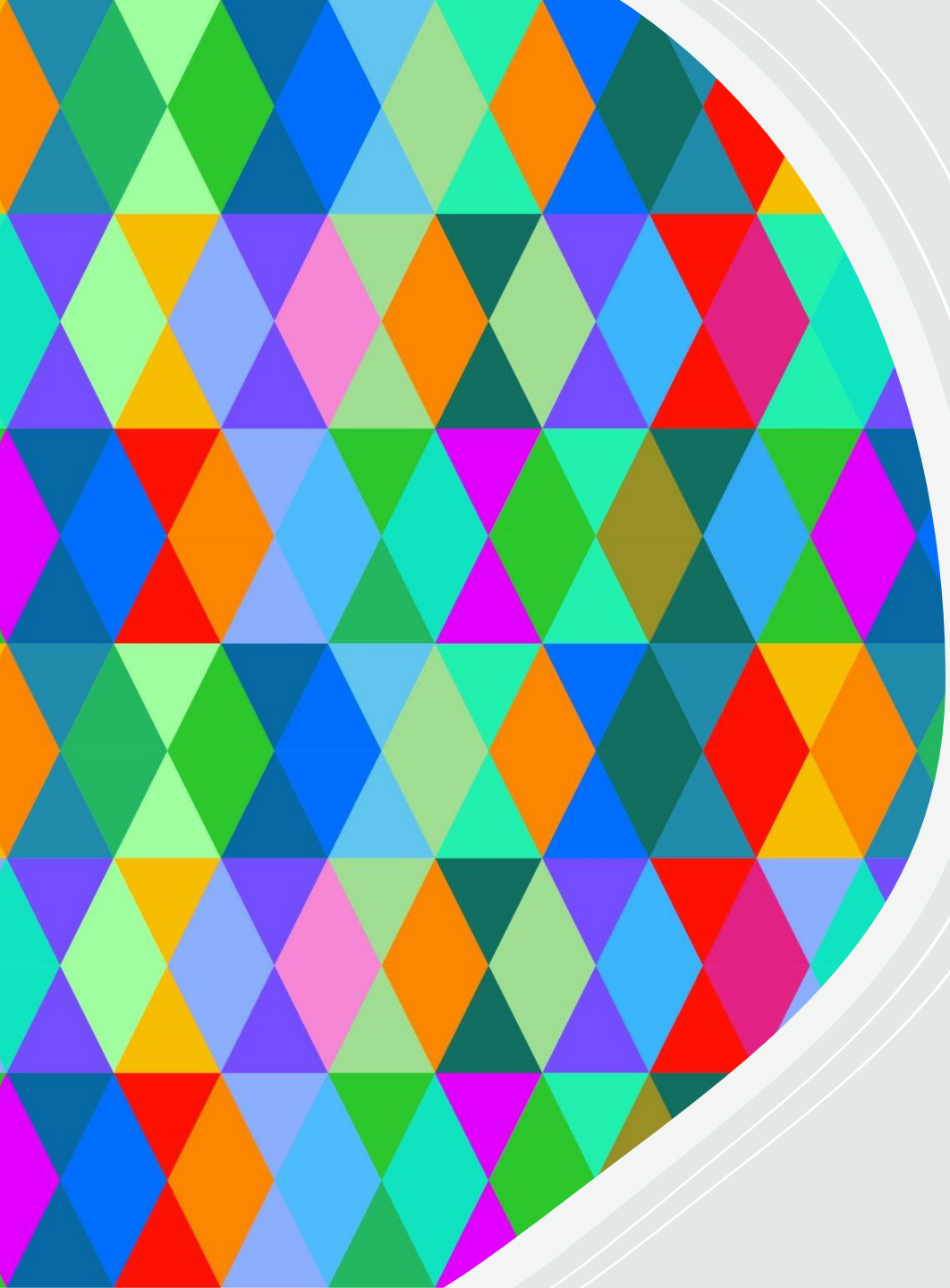


Human control

This is two robots fighting using human control.

Conclusion

1. How much the program can do: how much the program can do depends on how much creativity the human has.
2. How much more the program can do more than humans:we think sometimes one program can do more than one human, like our DJI robot if we have many then one program can make them all work at the same time while if it is human controlled then many robots will need many humans, and a program you can make it repeat almost forever by changing batteries, but humans can feel tired and needs to rest for a long time.
3. How much difference there is between program control and human control: the main difference is that the human would be influenced by their emotions, emotions and feelings can influence the human's decision, but the program does not have this problem, like the two videos before, we experimented in the same sized area, and when my robot hit my partner's robot he felt nervous and was not sure of what to do with his robot so his robot got defeated first, but in the program controlled video my partner's robot won! Interesting, in human controlled battles i usually win but when we use program controlled my partner wins.



Thank you