

# SOCCER LIGHTWEIGHT

## TMR 2024 MÉXICO



### TEAM members



MARIA LUISA RAMOS  
Programming



GUSTAVO HIDALGO  
Electronics



LEONARDO ANDRADE  
Mechanics

## ABSTRACT

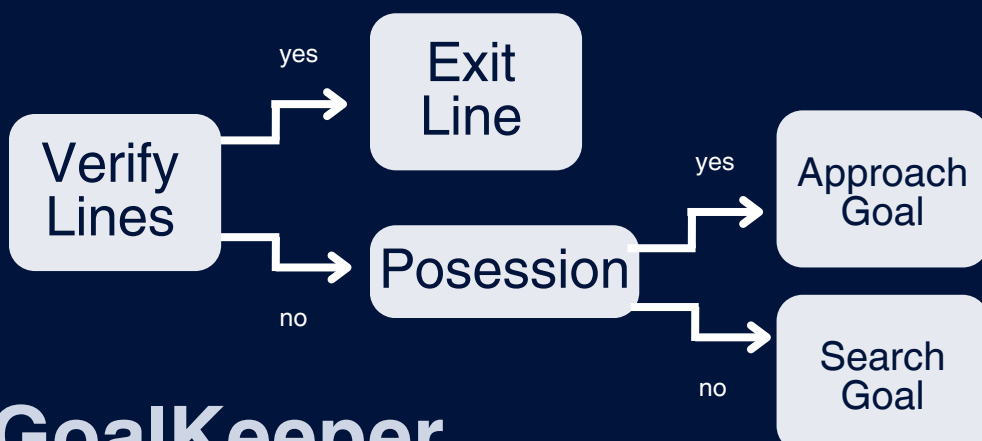
We are three students from Tecnológico de Monterrey, members of RoBorregos. Our robot blends robotics and sports. With advanced motion algorithms and sensory integration, it navigates the field with agility, recognizing the ball and goals in real-time.

## PROGRAMMING

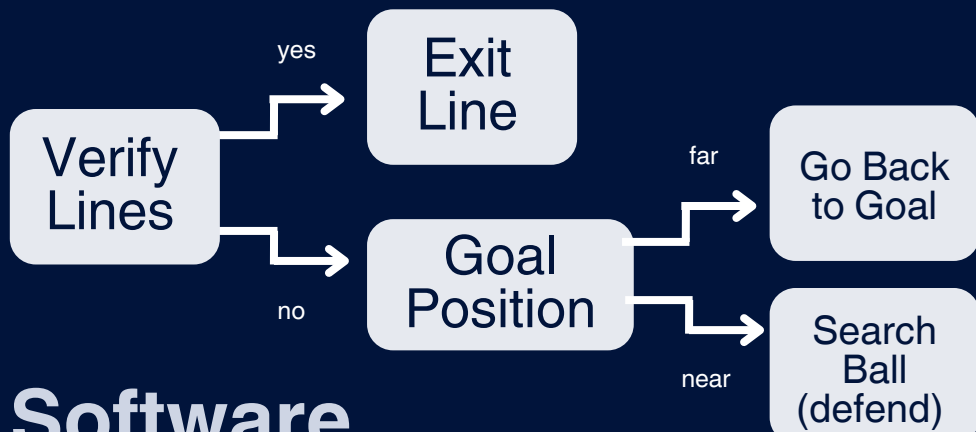


C++ in VS code  
and Arduino

### Striker



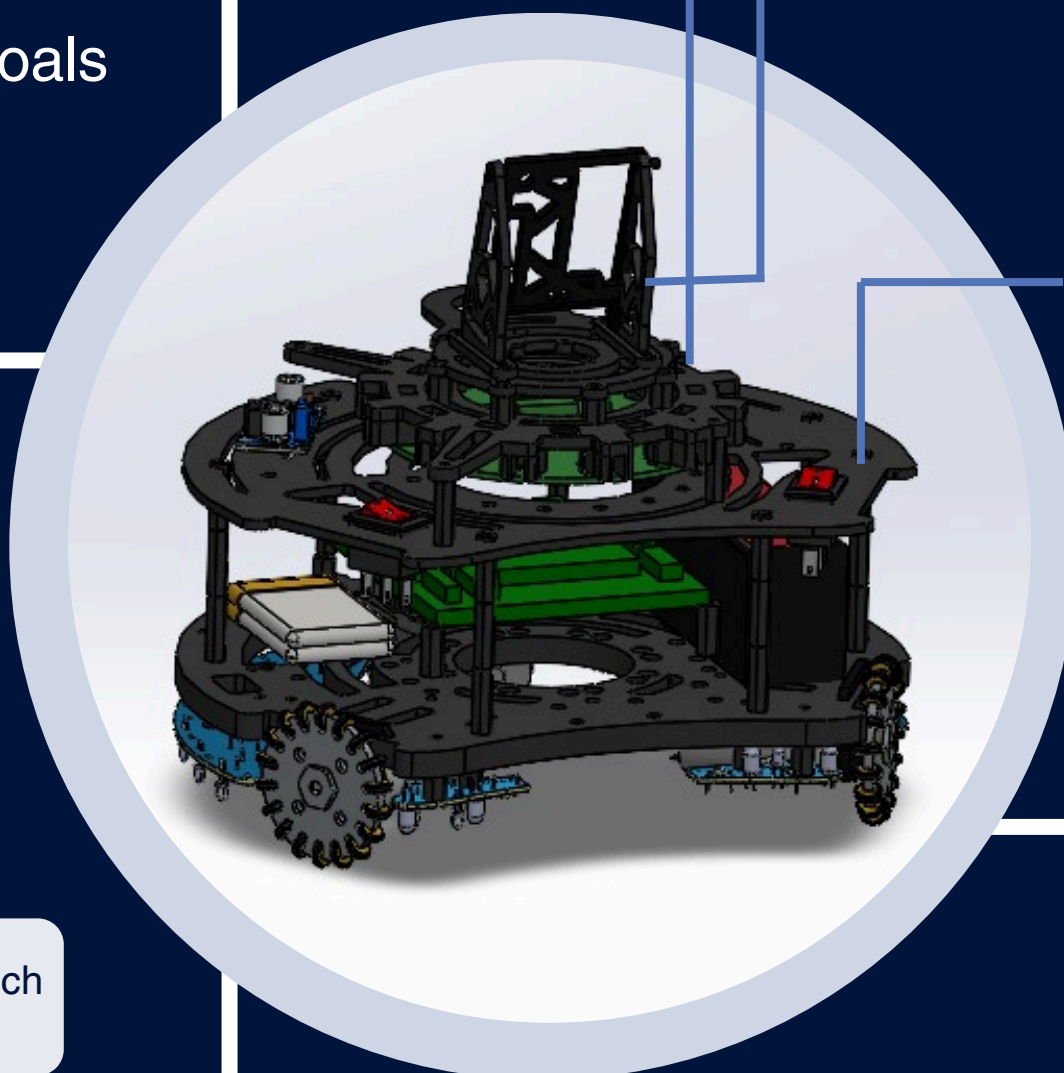
### GoalKeeper



### Software

Kinematic Equations holonomic movement  
PID controller for smooth movements  
Pixy2 for vision and identifying goals  
Line Detection trough phototransistors  
IR Detection with an IR Ring (TSP-58038)

## MECHANICS



### IR ring

The design of the ring is printed in 3d, it allows to filter the received signals making the calculation of angles more precise for programming.

### Adjustable camera

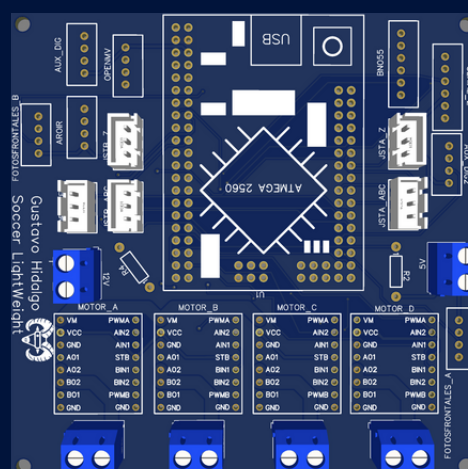
The adjustable camera of the robot allows to adjust the vision of the robot, allowing to change the angle of the same and due to the position of the screws, even able to rotate the camera in 180 degrees for the implementation of a goalkeeper

### Carbon fiber PETG Base

In the mechanical area the choice of materials for the robot was decisive, a base of 21.5 cm x 18 made of a carbon fiber alloy material and PETG that gives strength and lightness for an extra agility for the front robot, without removing the rigidity of itself.

## ELECTRONICS

In electronics, we decided to make our own PCBs (Printed Circuit Boards). The main board contains the Arduino Mega Pro, which connects to all the other components. For line detection, we use TEPT5700 phototransistors and white LEDs.



Additionally, for ball detection, we created a circular PCB with TSSP58038 IR sensors. For gyroscopic sensing, we use the BNO055 for the striker and MPU6050 for the goalkeeper position. Finally, we use Pixy 2 for vision processing.

