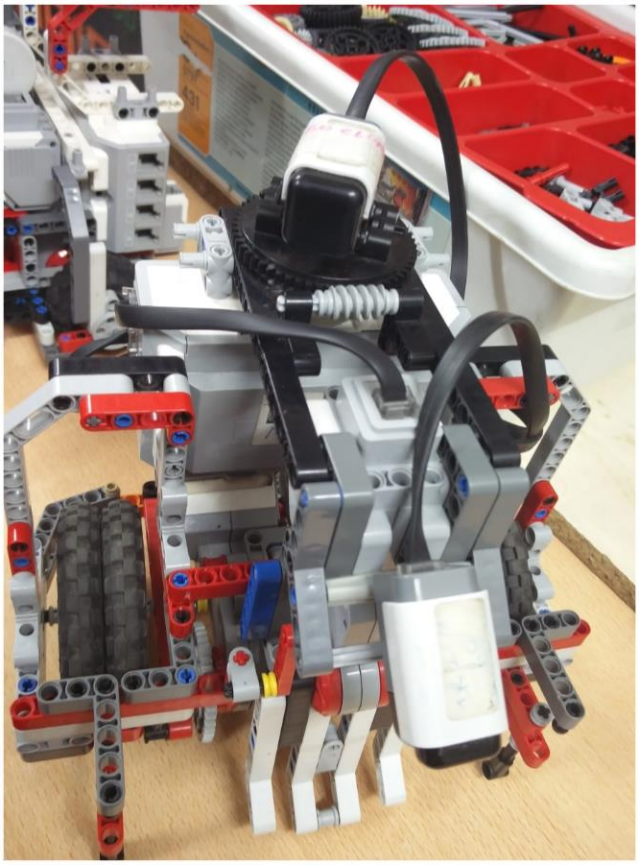
Autonomous Football Playing Robots



mihir.vardhan2002@gmail.com mihirvardhan.com 2015

OBJECTIVE

I built two autonomous football playing robots along with my teammates Advay and Nishka for the National and International Robot Olympiads.

In our first attempt in 2015, we ranked third nationally (Indian Robot Olympiad) and qualified to represent India in Doha, Qatar (World Robot Olympiad).

These competitions were my first exposure not only to robotics competitions but also to the LEGO EV3 and Mindstorms systems. Though people think these to be childish, I feel that the simplicity of the hardware allows the user to focus on the programming aspect of robotics without slaving away cutting a chassis out from wood. Again, the drag and drop programming system may seem childish but manage to teach extremely complex algorithms such as the ones we used to program our robots. The restriction of 4 sensors and 4 motors can, at times, seem annoying, but the challenge of building complex systems with just 4 motors makes the whole experience more fun and challenging.

COMPETITION SUMMARY

The rules of the competition go in depth as to what the robot can and cannot do but put simply, the robots must weigh less than 1 kilo and fit in a 22cm cylinder.

The field is divided into 5 coloured zones, providing the robots with a reference of their position on the field. The zones in front of the goals are black and the three zones across the field are different shades of green.

The ball is designed to emit IR light at a frequency of 1200Hz, pulsed.

ROBOT SUMMARY

An IR sensor on-board the robot can detect the direction in which the ball is and uses simple proportional control to point in the direction of the ball. A compass is used to provide the robot with a sense of direction toward the opponent teams goal. A colour sensor facing the mat detects the colour to locate its zone on the map. The goal-keeper robot also has a push button on its rear that hits the cross bar of the goal when reversing. This provides a constant re-calibration for the encoders in the motors.