RoboFEI Humanoid League Team 2020

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Abstract. The Competition held in Sydney (Australia) helped the team
to test the new Teen robot, Mirzam. Along the year the team has been
working on improvements in order to prepare robots fully capable of
playing soccer competitively, to achieve the best results in the merge
between these two categories, KidSize and TeenSize. In the next com-
petition which is going to take place in Bordeaux (France), the team
intend to design new robots with similar features as the last ones but
more optimized and with better conditions to participate.

Keywords: Humanoid Robots. · Extended Abstract. · KidSize League.

1 Lessons learned

Something that the team noticed is that the motors weren't capable to endure
the way the robot were physically dimensioned, so the alternative is to design
new robots with less height and optimize the mechanic. Another one was that
during the competition, some computers were damaged. In order to solve this
problem, the group is going to change the power connection.

2 Major Problems

One of the robots problems is that they vibrate repeatedly, because the control
algorithm sets specific values of PID to obtain maximum torque. The robots
do not have a specific independent walking algorithm control which is based on
ZPM (Zero Point Moment) and can give it a more stable walking. [2] A major
problem in the electrical department is the flexibility and durability of the cables
associated with the low resistance of the connectors. Due to the implantation
of a second battery one problem caused was the change of the center of mass
location, which influences the robot's movement parameters.

3 Work in Progress

3.1 Hardware

The team developed some teen robots in the past years and had some mechani-
cal progress but it was decided to decrease the robot's height and a new robot is

being designed from what was learned with the last prototypes. This new robot will be 65 cm tall, the main idea is to optimize it to achieve a better dynamic between the movements and get the most from the motors without require unnecessary effort.[4] The team proposes the use of two different batteries, one for the NUC and another for the motors. The main idea is to separate the circuits reducing the chances of shorting out important components, this decision was made due to previous experience faced by the team which showed that some servos return current to NUC, damaging it. In the previous competitions the team has been using three different boards, one for the power supply and two others for communication. Next year the team decided to integrate these three boards into one which results in weight reduction.

3.2   Vision and Software

The robot is going to have an improved orientation based on its vision to localize ball, goal and landmarks. To develop this, more classes will be added to the Convolutional Neural Network already used to ball detection. [1] [3] To improve the dynamic in the game a new decision for the goalkeeper is being developed using deep reinforcement learning. The team also intend to rewrite all code in the ROS platform, but at this moment, this is not a priority.

4   Status

In the current moment the neural network already had the classes added and was trained for localize goal, landmarks and ball at the same time. The mechanical parts of the 65 cm tall robot are being manufactured. Furthermore, the electrical board for the new power supply are done and being used in robot which participated in RoboCup 2019.

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