Ichiro Team Extended Abstract for RoboCup 2022

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1 History and Overview

Team Ichiro is a robot team from the Sepuluh Nopember Institute of Technology Surabaya, Indonesia. We specifically conduct research in the development of humanoid robots and participate in various humanoid robot competitions. In 2019, we developed our robot by emphasizing the development of reliable mechanical designs and our vision algorithms, which allow the robots to localize themselves in the field using our vision and odometry systems. We keep evaluate several things that can be developed from the problems and shortcomings of our robot during the previous RoboCup competition.

2 Developments

2.1 Electrical Hardware Overview

The electrical hardware is closely related to the mechanical part and needs to be repaired to overcome the robot's stability. We've been focusing to bolster the board stability, and we are attempting to make the components of the robot more robust from vibration and other distractions. To do that, we're changing the type of the components such as MOSFET, board, and others that are more advanced and qualified. We're trying to adjust the robot's cables by doing cable management and changing the robot's body to make several things packed as effectively as possible. Besides that, we're improving by implementing load cells for power source and new controllers using Open CM.

2.2 Mechanical Design

From the 2019 RoboCup, we found several things that needed to be improved and developed from the shape of our kid-size robot. Our 65 cm robot is too small compared to other robots from other teams. In RoboCup 2019, our robot still uses servo dynamixel 28 and 64 so that the robot is less able to compete with other robots. Seeing this, we evaluated and improve the servos to servo dynamixel 106 for the legs of the robot and strengthening the posture of the robot so that the size of the Ichiro team's robot became larger. In addition, the Ichiro ITS team also tried to improve the shape of the hands of the robot. Improvements to the robot's hand will be adjusted to the shape of the body so that the robot can do throw-ins.

2.3 Computer Vision and Robot Behavior

Our robot's ability to maintain balance while walking is still insufficient. The walking stability covers the robot's ability to walk with or without interference. Furthermore, our robot's kick motion frequently failed during the 2019 RoboCup competition. This is due to our robot's lack of motion control, which causes it to fall when there is a disturbance right as the robot is ready to kick. In terms of path planning, our robot is quite slow in positioning to determine the direction of kicking the ball. Until now, we are still applying the pan tilt value of the servo at the robot's head as a determinant of the robot's path parameter value. Besides that, our robot finds it difficult with localization, or the ability to determine its position based on the environment it detects. Specifically, after the robot is picked up from the field and must be released at a random point. Until now, we are still trying to use the field feature as a reference for the robot's position.

We currently improving the robot's walk control. We implemented a new road control method with the aim that the robot can run more quickly and stably compared to the previous conditions during the 2022 RoboCup competition. To determine the robot's position more accurately we need to add a localization feature using vision.

References

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