Survey response 12

Software

Team Name
Barelang FC

Is your software fully or partially OpenSource. If so, where can it be found:
Our software is partially open source; some of the robot software was published in our Git repo at https://github.com/BarelangFC.

Do you have a kinematic or dynamic model of your robot(s)? If so, how did you create it (e.g. measure physical robot, export from CAD model)?
Yes, a kinematics model was implemented for the real robot, but we only used the dynamics model in the URDF simulation model. We used the kinematics and dynamics parameters from the exported CAD model. However, for the weight parameter of each link, we directly measure from the actual robot.

Are you using Inverse Kinematics? If so what solution (analytic, (pseudo)inverse jabcobian, etc...) are you using?
Yes, we used the analytical method for the leg, but we are not using inverse kinematics for the arms.

Are you simulating your robot? If so what are you using simulation for?
We used a simulation model for research, including testing kinematics, localization, etc.

What approach are you using to generate the robot walking motion?
We used the ZMP analytical controller, adopting the source code from Team UPennalizers at https://github.com/UPenn-RoboCup/UPennalizers.

What approach are you using to generate motions for standing up?
We used prerecorded motion for standing-up motion.

What approach are you using to generate kicking motions?
We used prerecorded motion to generate kick motions.

Do you use any other motions than the previously mentioned? If so, what approaches are you using to generate them?
We do not use any other motions.

Which datasets are you using in your research? If you are using your own datasets, are they public?
We collected the dataset ourselves, but it is not public yet.

What approaches are you using in your robot's visual perception?
We used YOLOv7 implemented on Jetson Xavier NX. Moreover, we used Midas for monocular depth estimation.

Are you planning with objects in Cartesian or image space? If you are using Cartesian space, how do you transform between the image space and cartesian space?
We only used image space without transforming object position to cartesian space.

How is your robot localizing?
Currently, we used Direct Linear Transform (DLT) from known visual landmarks in the field.

Is your robot planning a path for navigation? Is it avoiding obstacles? How is the plan executed by the robot (e.g. dynamic window approach)?
We do not use path planning, but trying to implement obstacle avoidance from the Midas depth result.

How is the behavior of your robot's structured (e.g. Behavior Trees)? What additional approaches are you using?
Currently, we have moved from the State Machine to the Behaviour Tree.

Do you have some form of active vision (i.e. moving the robots camera based on information known about the world)?
Yes, we have an active vision.

Do you apply some form of filtering on the detected objects (e. g. Kalman filter for ball position)?
Currently, we just processed data from the YOLOv7 object detection result.

Is your team performing team communication? Are you using the standard RoboCup Humanoid League protocol? If not, why (e.g. it is missing something you need)?
Yes, our team used team communication. However, we used ROS2 multiple-machine communication (message, service, action, etc.) instead of the RoboCup Humanoid League Protocol. From our perspective, debugging and monitoring the data is easy if we use ROS2 communication.

Please list contributions your team has made to RoboCup
We have some published code from our research in the Team Git Repo: https://github.com/BarelangFC.

Please list the scientific publications your team has made since the last application to RoboCup (or if not applicable in the last 2 years).
Silitonga, R., Arif, J., Analia, R., Jamzuri, E. R., & Pamungkas, D. S. (2023). Tiny-YOLO distance measurement and object detection coordination system for the BarelangFC robot. International Journal of Electrical & Computer Engineering (2088-8708), 13(6).
Winarti, W., Susanto, S., Analia, R., & Jamzuri, E. (2023, June). Improving The Stereo Distance Measurement Accuracy on The Barelang-FC Humanoid Robot. In Proceedings of the 5th International Conference on Applied Engineering, ICAE 2022, 5 October 2022, Batam, Indonesia.
Susanto, S., Pratama, T.T. and Analia, R., 2022. Real-time Coordinate Estimation for Self-Localization of the Humanoid Robot Soccer BarelangFC. Jurnal Integrasi, 14(2), pp.81-91.

Please list the approaches, hardware designs, or code your team is using which were developed by other teams.
Our kinematics and gait planning is adopted from Team Upenalizers source code at https://github.com/UPenn-RoboCup/UPennalizers.

What operating system is running on your robot and which middleware are you using (for example Ubuntu 22.04 and ROS2 Galactic)?
Ubuntu 20.04 with ROS2 Foxy

Is there anything else you would like to share that did not fit to the previous questions?
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