

WF Wolves – Humanoid KidSize Team Description Paper for RoboCup 2023

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Abstract. In this team description paper the team WF Wolves, their robots and the current research status are introduced. A short overview of problems and learned lessons is given. Further Major Changes and the current state of implementation is portrayed. Hereby WF Wolves apply for participation at the RoboCup 2023 for **Team Competition** in Bordeaux, France.

1 Introduction

The team WF Wolves is from Wolfenbuettel, Germany and is supported by the Ostfalia University of Applied Sciences. We are a interdisciplinary student working group, where Bachelor, Master and Ph.D. students work together from different disciplines e.g. Computer Science, Electrical Engineering and Mechanical Engineering. Since 2014 we are working with our adapted version of the Nimbro-OP based platform [1] successfully. Due to close connections with Hamburg Bit-Bots (HBB) we participated as a joint Team in 2018 & 2019 to evaluate different software approaches on a similar hardware. Due to the aftermath of corona, there were organizational difficulties in planning the excursion to Thailand, thereby we weren't able to participate in RoboCup 2022. However we learned from this situation and are certain to participate in this year's robocup competition, furthermore with France being a member of the European Union and even a neighboring country of Germany.

In this paper we want to give an overview of our challenges in RoboCup and how we are trying to overcome them. Thereby we intend to participate at the RoboCup 2023 for Humanoid League, KidSize.

2 Lessons Learned and Problems

Due to the shutdown of TeenSize League, we as a joint team, decided to participate as each team on its own as we wanted to increase playing experience. As a downside we are not able to exchange robots between our teams anymore. We closed the gap and built more robots. We tried to maintain information sharing with the HBB but focus on different approaches. Nonetheless we try to keep a

related ROS architecture [2], however this is not possible all the time. Since we weren't able to participate in last years competition at least the yearly pressure of performing was lifted and we finally dared to make fundamental improvements. Since locomotion is one of the essential tasks of RoboCup, we implemented a new walking algorithm (see System Description). However, most of our work has focused on the walking algorithm and otherwise only minor changes were made. Although our vision is quite sufficient, adaptability to real light scenarios, could be improved. Further evaluation of different CNNs have to be evaluated and profound integration testing has to be done.

3 Major Changes and Status of Implementation

As already introduced, major changes were implemented regarding servo controls, walking algorithms and motion servers. To further utilize simulation and improve maintainability as well as interchangeability new motor controllers were implemented according to ROS standard. Since the old legacy code has been rewritten essential routines of the robot have been implemented, but have to be tested thoroughly in a playing scenario, where simulations might lead to a false sense of security. Nonetheless new walking algorithms have been tested on the robot itself and look promising. Motion editors and servers are implemented but work is still needed for a sophisticated solution. Further we implemented most of our Behavior in FlexBe (see System Description), however, we mainly focus the new walker and integration of these new parts since most other parts are reliant on a adequate walking robot. Besides we are building and upgrading our robots mechanically and have currently four available for playing and a fifth one close to be ready (only NUC and Jetson are missing). This provides us a full team as well as the option to have one robot with small experimental hardware changes.

References

1. University of Bonn, Computer Science VI, Autonomous Intelligent Systems. <https://www.nimbro.net/OP/>
2. Bestmann, M.: Towards Using ROS in the RoboCup Humanoid Soccer League. . Introduction p. 38 (2017)