# WF Wolves – Humanoid KidSize Team Description for RoboCup 2020

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**Abstract.** In this team description paper the team WF Wolves, their robots and the current research status are introduced. The robot hardware is specified in detail, separating out the mechanical platforms from the electrical systems. Additionally the fields of research, the developed software and future work are illustrated. Hereby WF Wolves apply for participation at the RoboCup 2020 for **Team Competition** in Bordeaux, France.

## 1 Introduction

WF Wolves want to participate in the RoboCup 2020 in KidSize Humanoid league. The team is from Wolfenbuettel, Germany and is supported by the Ostfalia University of Applied Sciences, located at the Faculty of Computer Science. It is an independent student working group, where Bachelor, Master and Ph.D. Students work together from very different disciplines such as Computer Science, Electrical Engineering and Mechanical Engineering. Since 2014 the team is working with Nimbro-OP based platform [1] for their humanoid robots and we already could win some prices. In Hefei (KidSize/TeenSize) and in Leipzig (TeenSize) we made the second place in the category Technical Challenge. In 2017 they won the third prize at the German Open, Magdeburg and the second prize in the new category Drop-In Challenge at the RoboCup World Championship in Nagoya, Japan. Together with the Hamburg Bitbots we made the fifth place in TeenSize at the Iran Open in 2017. In this paper we want to give an overview of our challenges in RoboCup and how we are trying to overcome them. Thereby we apply for the participation at the RoboCup 2020 for Humanoid League, KidSize.

## 2 Lessons Learned and Problems

Last year we participated as a joint team with the Bit-Bots. Last years offered the opportunity to participate both in Kid- and TeenSize league. While the Bit-Bots core team focused mostly on KidSize league, we focused on TeenSize League still being able to exchange robots between leagues comfortably. With

the shutdown of the TeenSize League, we as a joint team decided, to participate as each team on its own as we wanted to increase playing experience. Downsides are that we are not able to exchange robots between our teams anymore. Hence our team needs to close the gap between the numbers of players in the abandoned TeenSize and the KidSize League. Certainly one of our goals is to maintain the information sharing and help we have in between our teams. But since there are small differences, where we agreed on trying out different approaches for evaluation we have to keep and even improve the usage of specified interfaces even more using a common ROS based framework [2].

## 3 Major Changes and Status of Implementation

With the introduction of artificial grass, the walking became a huge challenge. Besides mounted studs [3], one of the robot already has the weight cells mounted under the foot plates and another robot has installed a series knee , which is a modified knee with two Dynamixel MX-106 servos in a row. Both options shall improve a stable walking.

Another change affects the camera. The Logitech C920 HD Pro Webcam used so far will be replaced by the Blackfly S USB3 by Flir which provides 55 FPS and 3.2 MP in color to improve visual aspects and going along with that robot behavior. Within our behavior we are using a state machine. For more flexibility we started evaluating FlexBE, a Framework able to design complex robot workflows also used in DARPA or ARGOS challenges. Thus we are able to build and analyze our robot behaviour more easily. Going along with that, tensorflow and neural networks are used to detect balls, field lines and goal posts [4]. In this field, especially in cooperation with the Hamburg Bitbots we want to expand our skills. For classification, the Bitbots Imagetagger is used [5].

## 4 Conclusion

Our changes in robot hardware and software provide improvements in comparison to the previous years. A better robustness for the motions and upgrades for vision and localization show promise results. WF Wolves is looking forward to participate in the RoboCup 2020 for the **Team Competition in KidSize** in France, Bordeaux.

## References

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