

Team Description Paper 2025 - Bembelbots

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1 Team Information

The RoboCup Standard Platform League team *Bembelbots* was founded in 2009 and is affiliated with the Department of Computer Science at Goethe University Frankfurt (Main), Germany. One of team’s main goals is to provide students of computer science with an opportunity to practice hands-on programming skills in the field of robotics. Currently, eight students and alumni of computer science at Goethe University Frankfurt work on the implementation of our framework for playing soccer.

The group is fully organized by students, and the team leader is Jens Siegl. The team’s website can be found at bembelbots.de, and you can reach the team per mail via contact@bembelbots.de

2 Code Usage

Most of our framework was written from scratch by members of the team *Bembelbots*. Nevertheless, we use some code from other teams.

We use the vision and walk modules of the team *HTWK Robots*.¹ The vision module has been enhanced with the detection of corners, as well as our own object classifiers for the ball, penalty marks, and robot feet (for further details see [1]). The walk published by *HTWK Robots* has been integrated into our own modular motion engine as a submodule.

Our behavior is implemented using CABSL, the standalone C-implementation of XABSL published by B-Human.² The behavior is implemented as a module in our framework that communicates with our framework through a message-passing system.

3 Own Contribution

The team *Bembelbots* has developed their framework from scratch. The current framework features a modular motion engine, that schedules and executes motions. The CABSL behavior can be compiled independently and tested using a 2D simulator.

¹ <https://htwk-robots.de/>

² <https://github.com/bhuman/cabsl>

Our current framework is based on a modular architecture with a message-passing system. Modules only declare their inputs and outputs. Dependencies are resolved based on these descriptions and modules can run in parallel based on the dependency graph without any further effort required by the module author. This approach also guarantees that modules can be run standalone. This will allow us to cover entire modules with automated tests.

Over the course of the past year, we have extended our framework to include logging capabilities. All messages passed between modules can now be logged, as long as a serialization for each message type is defined. In combination with newly developed tools, we aim to achieve full replay capabilities and better analysis.

Additionally we have continued to work on our vision pipeline. Our previously developed robot detection has been integrated into our framework, with current efforts directed at using its results more effectively, for example, in path planning. Future work on our vision pipeline will aim to improve our ball detection and include the detection of other objects, such as penalty marks and goalposts.

4 Unpublished Results

All game results from 2020 onward are already published on the SPL website.

Prior to RoboCup 2025, the team plans to take part in the RoboCup German Open 2025 in Nuremberg.

5 Impact

The team *Bembelbots* contributes to the SPL with their own framework. Apart from that, our latest contribution has been a Webots controller that implements the LoLa interface for Nao V6, which can be found on the team’s GitHub account.³

In the context of our university/community, one of the team’s main goals is to provide an opportunity for students of computer science to gain experience in programming and in the field of robotics. All members, especially new ones, are encouraged to contribute to the team’s software and are supported by more senior team members. Also, several members of the *Bembelbots* have written degree theses related to the team’s work.⁴ Team members also acquire important soft skills, such as teamwork, project and time management, as well as organizational skills.

The team organizes informational events for prospective new members at the start of each semester (April and October). The team also regularly shares information about their activities, and thus about the RoboCup initiative, in lectures, the learning center of the Department of Computer Science, and via a mailing list reaching all students of the department.

³ <https://github.com/Bembelbots>

⁴ A list of degree theses written in the context of the activities of the *Bembelbots* can be found at <https://bembelbots.de/publications/>

At the “Night of Science”, a yearly event at Goethe University Frankfurt, the team has previously organized the BembelCup, a small tournament of four competing SPL teams. The *Bembelbots* also regularly contribute to events of Goethe University by presenting their activities at a booth, for example at events meant to encourage high school students to study computer science.

References

1. Bembelbots. 2020. “Bembelbots Team Research Report for RoboCup 2019.” Accessed February 06, 2023. <https://bembelbots.de/publications/>.
2. Hess, T., Mundt, M., Weis, T., Ramesh, V.: Large-scale stochastic scene generation and semantic annotation for deep convolutional neural network training in RoboCup SPL. In: Akiyama, H., Obst, O., Sammut, C., Tonidandel, F. (eds.) ROBOCUP 2017, Robot World Cup XXI, pp. 33–44. Springer, Cham (2018).