



l**uh**bots  
s o c c e r

Leibniz Universität Hannover

# Who are we?

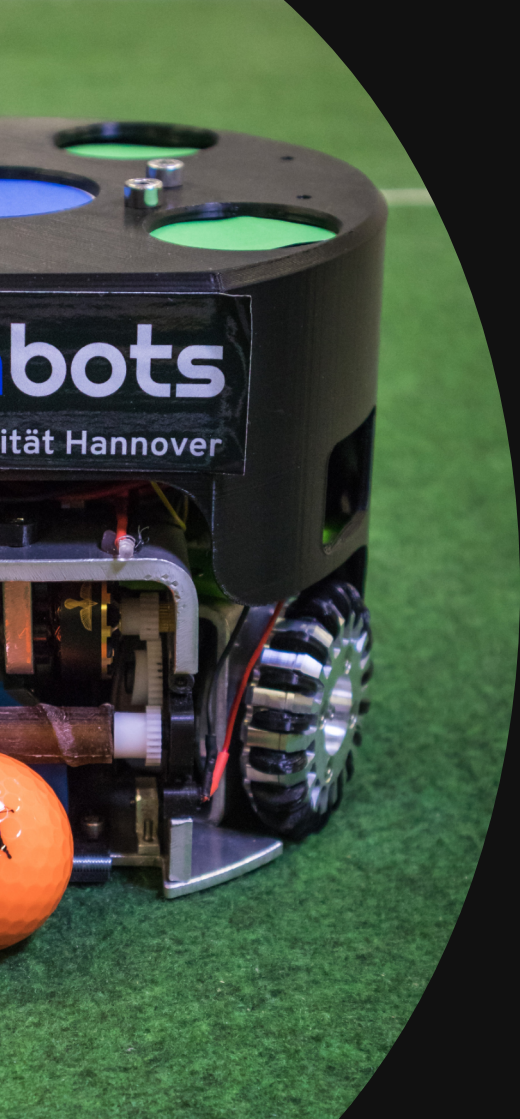
We are the college robotics team of the Leibniz University Hanover called luhbots and have been founded in 2012. We develop fully autonomous robots to participate in the international robotics world championships - RoboCup. Since 2019, our new branch luhbots soccer is designing a team of soccer robots.

We combine theoretical studies with practical experience by developing and manufacturing independently components and our robot design. To do this, we meet several times a week outside the regular curriculum. We are always eager to learn more.

Our team consists of a total of 25 students from several, mainly technical fields. The development of our autonomous robot systems is immensely extensive and complex. Our broad spectrum of experience, as well as our diverse courses of study and interests and expertise of each individual team member, makes us a competent team. We come up with innovative solutions and are a competitively team.







# The Competition

In the Soccer Small Size League (SSL) fully autonomous robots play soccer in a “6 vs 6 match” with a golf ball. The rules are very similar to regular soccer games. The playing field is six by nine metres big. Additionally, several technical specifications of the league must be considered. Cameras mounted above the field track the robots in real time. Both teams receive the same information on position and orientation of all robots and the ball.

The challenge is to develop robust and high-performing hardware and electronics while upholding a performant and strategically superior software.

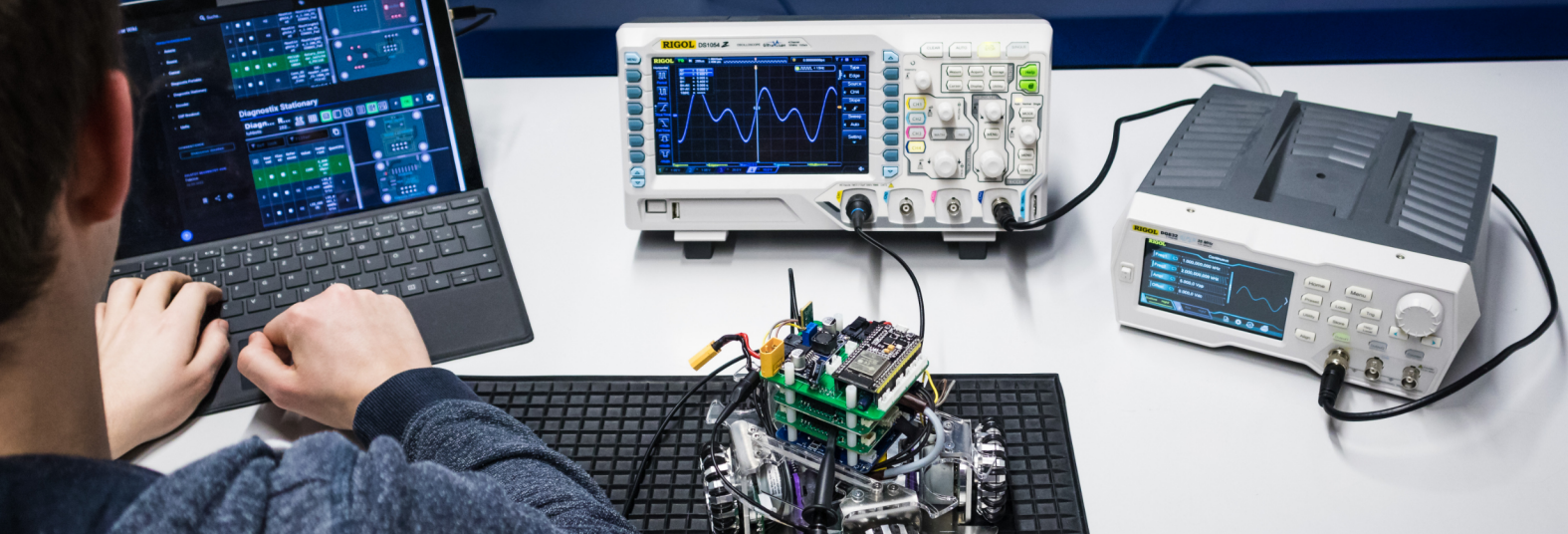
The luhbots soccer team placed third in the SSL at the annual RoboCup World Cup in 2022. We were able to hold our ground in the group stage and win several knock-out matches. We are very proud to have achieved this success participating in our first tournament. However, more important than the placement of our team are the experience and contacts we were able to win at this competition.

# Our Goal

Besides a successful participation in the RoboCup and other competitions, the aim of the luhbots soccer team is above all to prepare the members for their professional career. In combination with the occasionally quite theoretical studies, the members gain practical experience in all areas of modern robotics. Membership of the luhbots is complementary to their studies and can only be credited to them to a minor extent. Thus, motivation and independent work are basic requirements.

Since we develop all parts of the robot ourselves and manufacture a large part manually, our expertise is very diversified. We improve this continuously by training our soft skills such as project management, presentation, networking, and many others. Cooperating with industrial partners is essential for this.

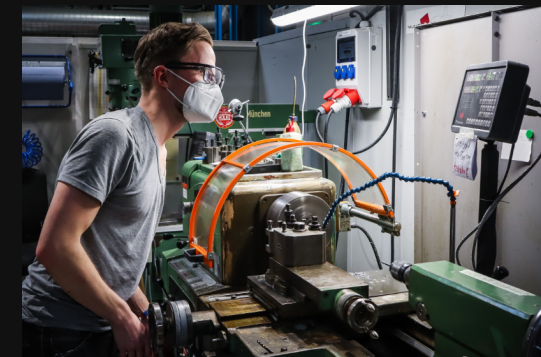




# What do we do?

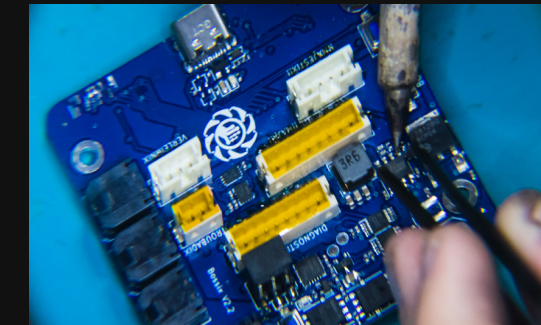
In accordance with the complexity of robotics and engineering, our team is divided into the subsections Hardware, Software and Electronics. Additionally, every team member is involved in organisational tasks. Furthermore, marketing and public relations are represented by a separate branch.

This makes it possible for us to guarantee professional development and efficient production. In the process we aim to satisfy industrial standards.



# Electronics

The main challenges in developing the motor controllers and "kicker" are the limited assembly space and high safety requirements. Our members learn hands-on what is important when assemble electronic components and how to professionally design circuit boards.



# Hardware

We develop all parts of our robots' hardware ourselves and manufacture a large amount manually. In addition to learning the usage of CAD applications, our members also learn 3D printing, milling, turning, laser- and water jet cutting, as well as other machining steps required for the construction of our robots.

# Software

Of course, we also develop the software for the robots ourselves. In addition to the firmware on the robots themselves, we implemented a strategical software which makes complex decisions independently and coordinates the entire team. For this purpose, we develop our software in the programming language C++.



# How you can support the luhbots

You can support us in many ways in the development and construction of our robots. Each robot generation should consist of at least ten functioning robots. After each world championship, a new generation is developed, which bases on the previous one. Our goal is to identify the previous weaknesses of the system and improve them through innovations and new solutions. New features and functions should be additionally implemented. To make this possible you can support us in the following ways:

- Supply of mechanical and electronic components
- Providing software for simulation or organisation
- Equipping with tools and machines or donating consumer goods
- Offering workshops or services and advice
- Paying for travel expenses to competitions
- Other donations and financial contributions

# Why both sides benefit from a cooperation

The luhbots soccer team consists of highly motivated and committed students from the fields of mechanical engineering, mechatronics & robotics, (technical) computer science, electrical engineering, industrial engineering and business & economics. Early on in our academic career, many of us seek contact with companies for internships, final theses or student trainee positions. With this cooperation connections can be built between qualified students and your company. This is advantageous for both sides. We offer an excellent contact quality to students at Leibniz Universität Hannover and target group-oriented marketing for your company. Our team is present throughout the entire university and in many technical degree programs. We position ourselves at fairs, university rallies and active membership recruitment on campus.

In addition, we also offer the reach of our social media channels and website for advertising and image transfer. Depending on the value of the donation, we also offer advertising space on our team wear or on the robots themselves. You will then benefit from public presentations at international and national events. We are also happy to issue donation receipts and/ or to make us and our robots available as attractions for your company events.

We look forward to a successful cooperation and hope to have you and your company as a reliable partner at our side soon!



# Contact

On behalf of the luhbots soccer team, I would like to thank you very much for your attention. We hope to have aroused your interest and would be pleased to hear from you.

Below you will find, among other things, the link to our website. There you will find further information on our team and project. Additionally, I would be more than happy to act as your personal contact if you have any further questions or want to arrange appointments. I look forward to a mutually successful and successful relationship.

*Leon Koch*



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