

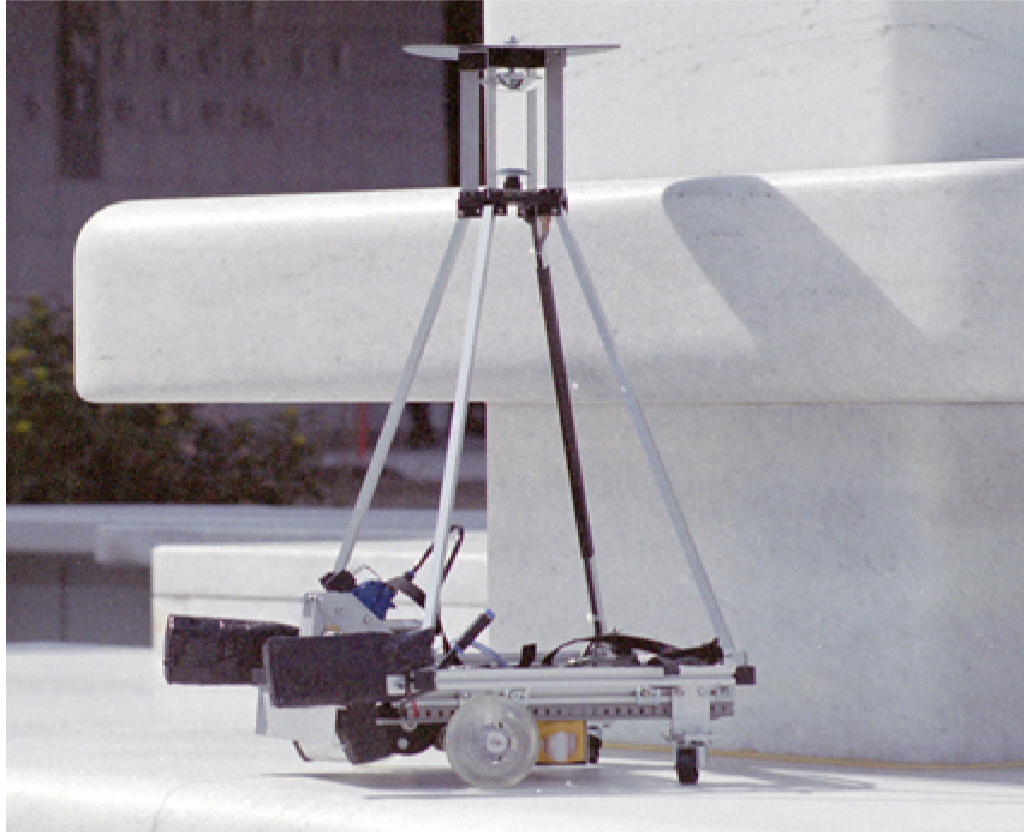
VolksBot Soccer



Fraunhofer Institut
Autonome Intelligente
Systeme

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Modular Robot



The VolksBot is a modular lightweight robot and can be easily adapted for specific needs, in this case RoboCup.

The modularity makes the VolksBot suitable for different experimental setups.

The modules we use include different types of cameras, different drives (linear and omni-directional) and different behaviors.

Due to its simplicity and robustness the VolksBot is the ideal robot for groups with little hardware support.

Team management

The team consists of an international group of students.

Problems arising in this context include

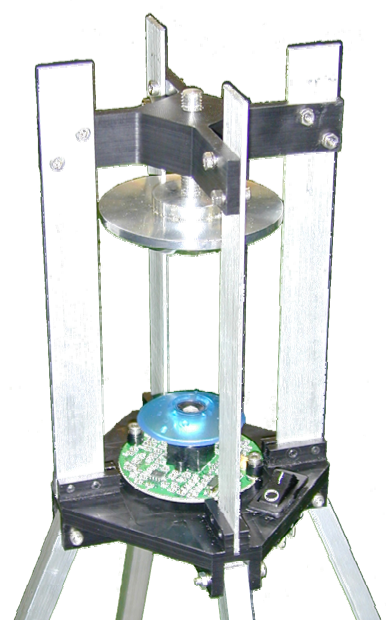
- Changing team members (mostly students)
- Unstructured software development
- How to train students and produce quality software
- Software / hardware integration
- Short and long term planning
- Motivation

Because of this we take great considerations in structuring our way of working. Some of the following techniques are taken from eXtreme Programming.

- Short release periods
- Simple design
- Testing
- Continuous integration
- On-site expert
- Coding standards
- Coaching
- Round-trip engineering
- Standardized hard- and software
- The modularized scientist

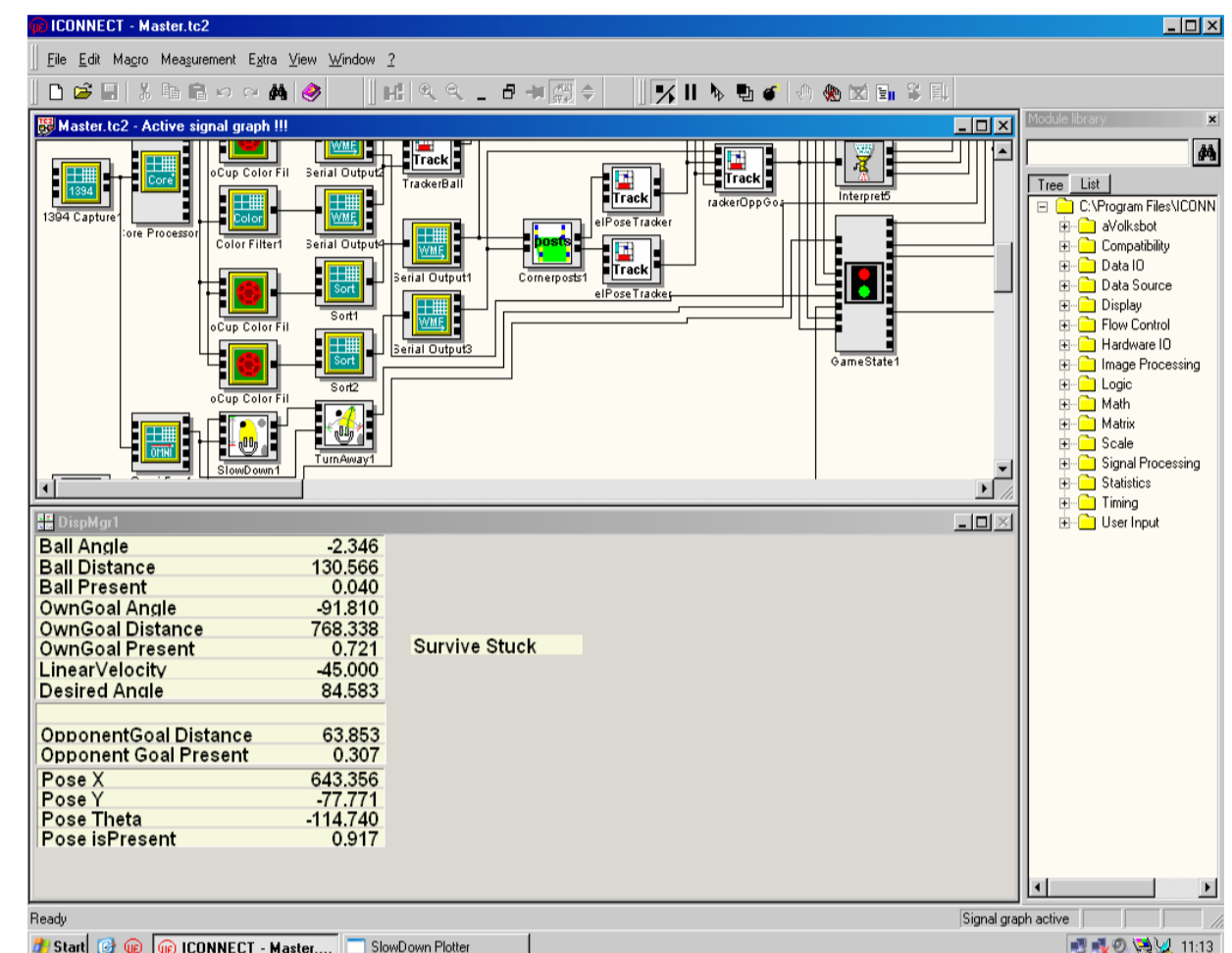
AIS vision

AISVision is a cost-effective omnidirectional camera system which consists of a hyperbolic mirror and a CCD camera. The mirror is mounted on the camera by way of a torsion-proof and almost vibrationless frame construction so that, in contrast to conventional glass cylinder solutions, problems due to light scatter and reflections are eliminated. AISVision uses a compact FireWire camera. The software component of AISVision is based on an image processing library which is particularly suitable for mobile autonomous robotic applications. It follows the basic principle that certain areas of an image are more relevant than other areas. This software component devotes particular care to the relevant areas of the image.



ICONNECT

ICONNECT is a real-time environment running under Windows. Its graphical user interface speeds up the development process and forces a modular and reusable approach. The architecture can be changed on-the-fly so experiments are easily set up. The modules are programmed in C++.



TMC200 triple motor controller

The TMC200 is a flexible motor controller for a maximum of three DC motors with continuous power 200 Watt each. Combined with shaft encoders, the TMC200 enables speed control to an excellent level precision, especially adapted to the requirements found in mobile robotics. The crucial part of the largely parameterizable TMC200 is a high-performance 16 bit micro controller.

The following driving features can be realized by way of this motor controller:

- Speed control for tasks requiring a highly synchronous speed and little torque variations by way of PID control
- Operation as torque controller by adjustable current limiting
- Odometric positioning system
- Thermal motor protection by way of current limiting
- 10 spare digital I/O ports
- Operating voltage monitoring

The TMC200 has two alternative communication interfaces: one CAN bus interface and a RS232. All parameters, such as controller constants, motor parameters and modes of operation can be set via the respective communication interfaces.

Master in Autonomous Systems

The RoboCup project is part of the Master in Autonomous Systems at the University of Applied Sciences Bonn-Rhein-Sieg in Germany. The project is being run by students. Experts from the AIS group of the Fraunhofer Institute aid in the project by monitoring the progress and explaining technologies.

By actually working three days a week in a running project students not only learn what it is like to do scientific/industrial project, but they get the opportunity to actually use the knowledge they learn during the courses.

The Master's program is offered by the Bonn-Aachen International Center for Information Technology b-it. It is based on a cooperation between the Institute for Autonomous Intelligent Systems (AIS) of the Fraunhofer Gesellschaft in Sankt Augustin and the Department of Applied Computer Science of the Bonn-Rhein-Sieg University of Applied Sciences.

The goal of this Master's program is to provide those students who have already attained a qualifying academic degree with further in-depth, scientific concepts, methods and techniques. The problems and principles of the design of distributed, interacting autonomous systems are central to this course of study.

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