

Mission to Mars

Develop an autonomous robot for a Mars mission. This is based on the Mars-Rover from NASA's Pathfinder mission and should have the following abilities:

- Collision detection
- Predictive obstacle detection (at a distance of a few centimeters)
- Target recognition (at a distance of a few meters)

The robot should react proper to collisions and obstacles and otherwise react according to the type of the target. The following sensors are available for implementing the robot behavior:

- Mirco switches
- IR distance sensors
- Remote control receiver

As actuators, you use an omnidirectional platform with three motors. The mechanical construction has to be supplemented with Lego technology kits on this platform.

The internship takes place in teams of two, whereby you may choose your internship partner yourself.



Homework:

- *read up*

As a preparation, you have already read the DoRoBo32 API ([library-doc/html/index.html](#) | [refman.pdf](#)) and the instructions for creating a project ([template/src/main.c](#)). Make familiar with FreeRTOS functions like `xTaskCreate`, `vTaskDelay` and `vTaskStartScheduler`.

Week 1 + 2:

- *First steps with the DoRoBo32*

Take the DoRoBo32 into operation and realize a first simple program. „Play“ with the sensor and actors to learn about them (Read the data sheet for the IR distance sensor).

If the motors are not equally powerful, adjust the straight run. Write functions to control the motors, which limit the acceleration so that a changeover from "full force ahead" to "full force back" takes at least 0.5 s. The deceleration to zero is instantaneous, then increase the speed linearly.

To print the sensor data or to debug you can use PuTTY. You have to open PuTTY and create a new telnet session. The adress of the device is 172.22.218.100. Additional you have to add the number written on the wlan module (*RN-XV*). The port is 2000.

- *mechanical construction*

Construct the Mars-Rover mechanically on the basis of the chassis and the Lego Technik kits.

Week 2 + 3 + 4:

- Behavioral integration

Program the robots behavior.

Week 5:

- Final competition and presentation

On the final date, your robots will compete against each other in a competition. You will be able to present your system concept and the software architecture of your robot in a short presentation.

