

RoboCup Junior Rescue Robot Team AVR 1

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I. **ABSTRACT**— WE WOULD LIKE TO PRESENT OUR FIRST ROBOCUP SECONDARY RESCUE ROBOT BASED ON AN ATMEL AVR 32 MICROCONTROLLER.

TEAM AVR 1

The Robocup Junior team Team AVR was founded in summer 2006, with the aim to qualify for the RoboCup 2007 competition in Atlanta, Georgia. We are two students, called Helge Schrader and Rasmus Rothe, both at the age of 18. We were awarded with several prizes the major ones being world champion, vice world champion, third place at the Worldcup, Brazil Open champion, champion on national level.



Figure 1: Team AVR 1 in Atlanta 2007

CONSTRUCTION PHASE

The base chassis is made from FOREX. Forex is a lightweight polystyrene. It's often used for trade fair constructions. As wheels we used Lego wheels with a diameter from around 50mm. These wheels are very smooth and they have good grip on the surface. Depending on our experience on several competitions and championships we made lots of modifications on this robot platform.

The first construction was without ramp detection. With this construction we won the world championship in Atlanta 2007.

For the BrazilOpen in 2007 we made some modification for a ramp and a better obstacle detection.

BUILDING AND SOFTWARE DEVELOPMENT PHASE

Depending on our programming language experience we wrote the whole software in BASCOM-Basic.

At first we tried to use color sensitive sensors to detect victims, but unfortunately we had no good experience with this type of sensors. After testing several IR-Sensors we got the best measurements with SFH309 sensors and red LEDs.

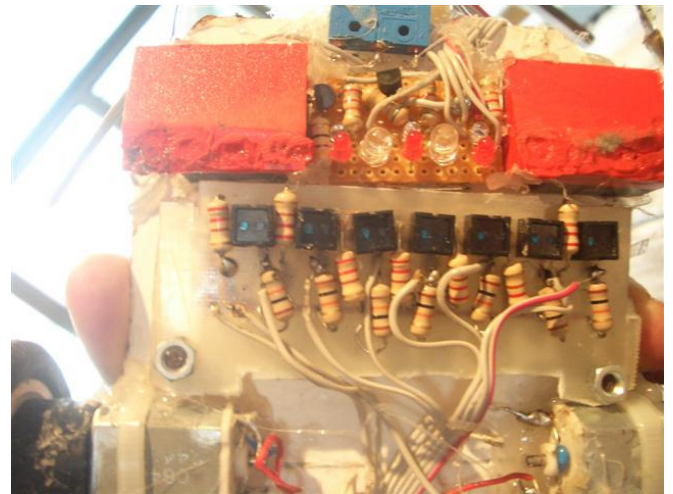


Figure 2: sensor phalanx with line and victim detection

As line detection we decided to use the popular CNY70 IR-Sensor. To get a smooth line following we used seven CNY70 sensors and wrote a PID controller.

Major problems during software developing was to write algorithms for line following (PID-Controller) and the RedZone algorithm.



Figure 3: in action during a competition

During the competitions we had to modify the “hardware” and software several times

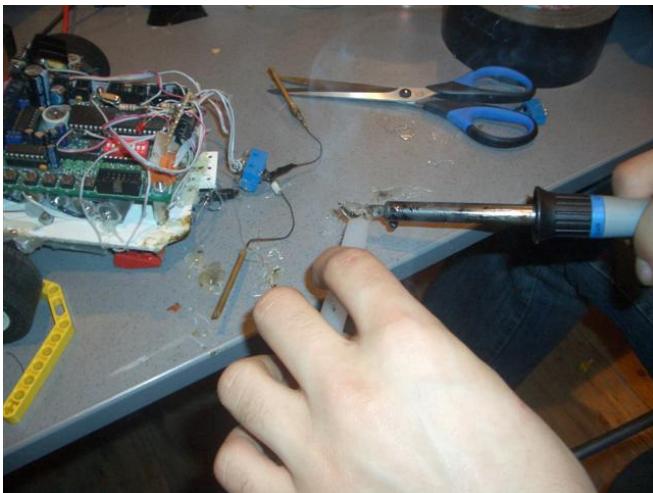


Figure 4: reassemble switches after a crash

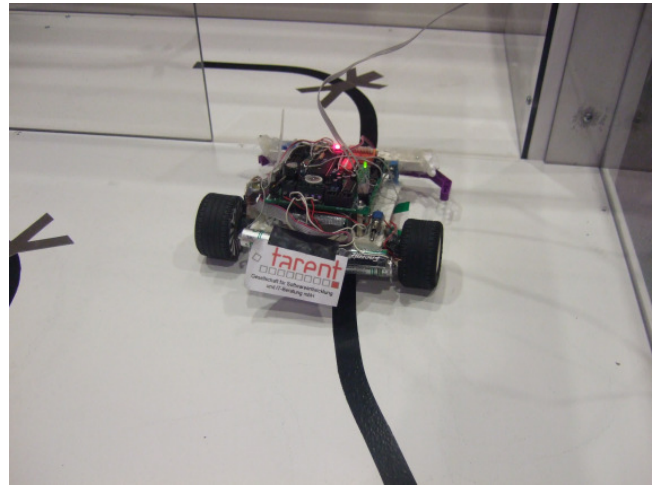


Figure 5: Final competition in Atlanta 2007

ELEKTRONIC

As described earlier we used seven CNY70 sensors for line detection and three SFH309 sensors for victim detection. The mainboard is based on an ATMEL AVR 32 microcontroller. The connection between line and victim-sensors and mainboard is over an I2C-Interface and a self built interface board.

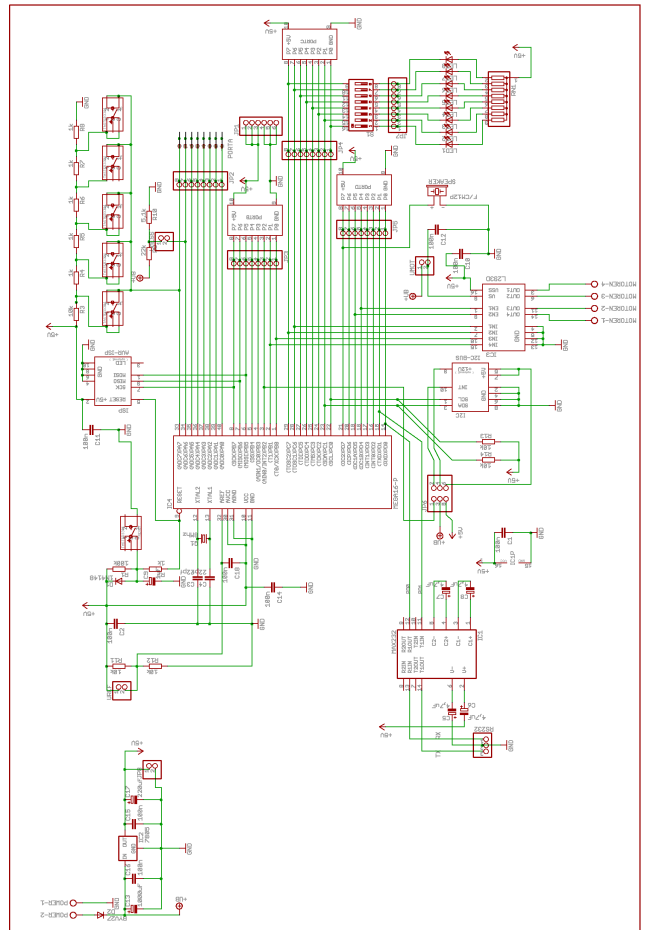


Figure 6 : Schematic