

FACULTY OF ENGINEERING

ER-Force: Building the 5th generation Theresa Engelhardt, Tobias Heineken, Valentin Hopf, Jeldrik Lindner, Mike Schmidt, Michael Stadler, Johanna Weßels

Abstract This poster presents improvements and design considerations of our mechanical and electronical design. We also share our experience on how to keep a team alive.

The human factor

Electronical design

Building robots is not trivial. Ensure continuity in the team to avoid reinventing the wheel.

- **Continuous recruitment:** Replacing one member per year is a much more feasible task than replacing your whole mechanics department once every 5 years.
- **Solving real problems:** Solving artifical problems is none of the main goals of an SSL-Team. We want new member to work on real problems as soon as possible.

Caution	Solution
Whenever new members are	-Start with a relatively simple
working on the actual project it-	and not time-critical task: it
self, there is always an increased	is not about the solution, it is
risk. They could just not solve	about learning.
the task to expectations, violate	-Try to review the work before
established conventions, or even	it goes into effect. (This is al-
damage robots or equipment on	ways useful.)
accident.	

• **Regular development meetings:** These are the primary source of knowledge transfer. Encourage asking questions whenever a problem *should* already have a solution.

Prepare for changes The more possibilities for adjustments your board has, the better. Hence we chose DRV8320S, a fully SPIprogrammable gate driver. Protect what's yours #1 You should always use overvoltage protection You should always use overvoltage protection Unit a head Always be prepared for future developments. Consider margins during board design to satisfy future but yet unknown goals. Unit a head Unit a

- Inexperienced members at the Robocup: They will pick up a lot of valuable information about your system on the event itself.
- Do not hesitate to **ask a former member** of the team whenever questions arise.

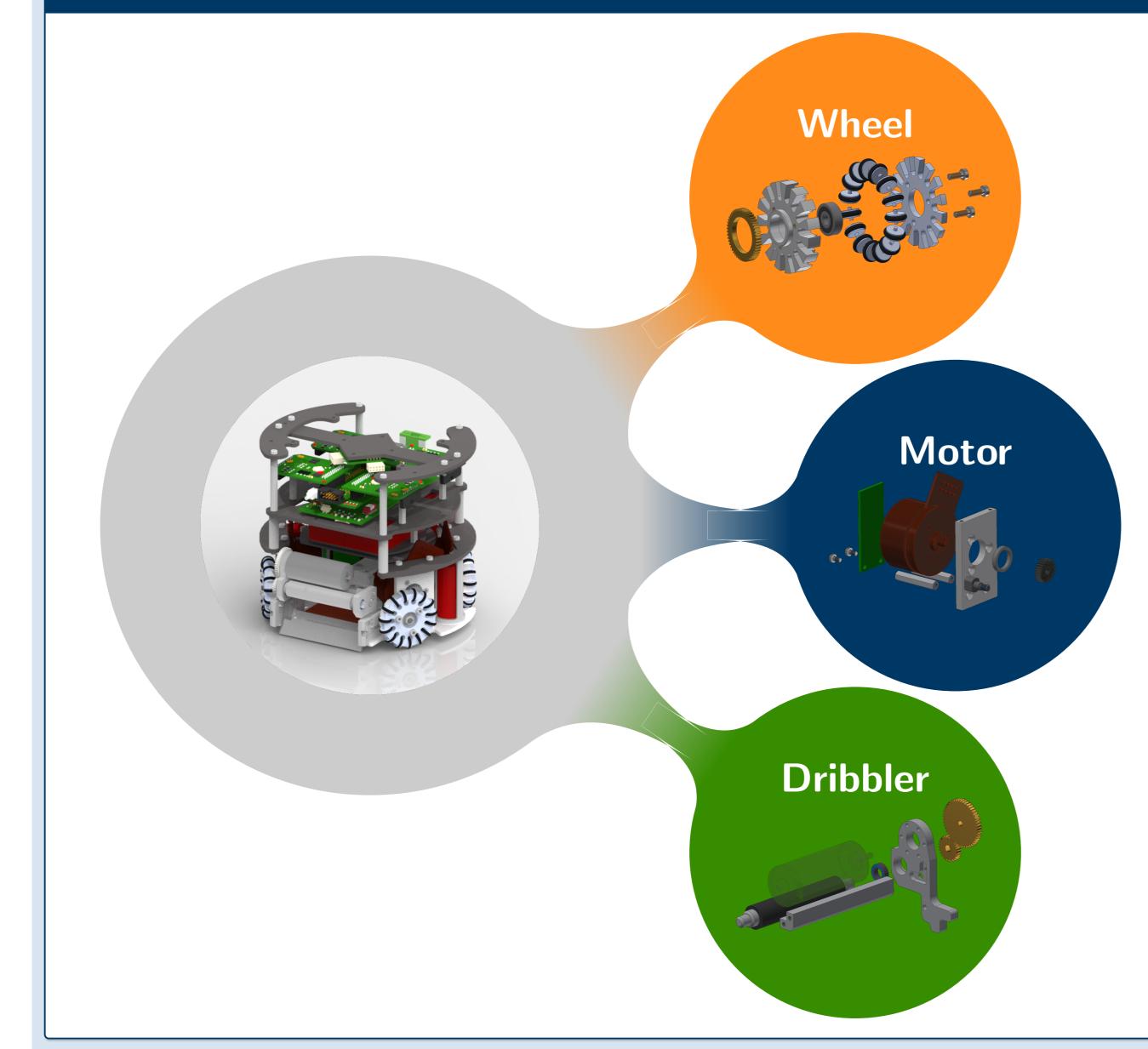
Modular system

Modularization enables hotswapping of defective boards. It reduces time for maintenance and financial losses.

Protect what's yours #2

ESD and transient events will happen. Protect your boards with TVS diodes and other safety devices at exposed places.

Mechanical design



Wheel

Gear glued on shoulder \Rightarrow easy centering

Drive Module

- Improved acceleration:
- -new 70 W motors
- -gear ratio change from 1:3 to 1:1.79
- Improved design: encoders with two spacers directly on motor mount
 ⇒ precise alignment

Dribbler Module

 Better alignment of breakbeam: Slots for a L-shaped spacer in dribblerpanels and baseplate
 ⇒ no twisting between both panels

• Improved dribbling: Higher point of contact between ball and dribbler roll \rightarrow decrease of forces which push the ball out of the dribbler \Rightarrow better ball control



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