

**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.

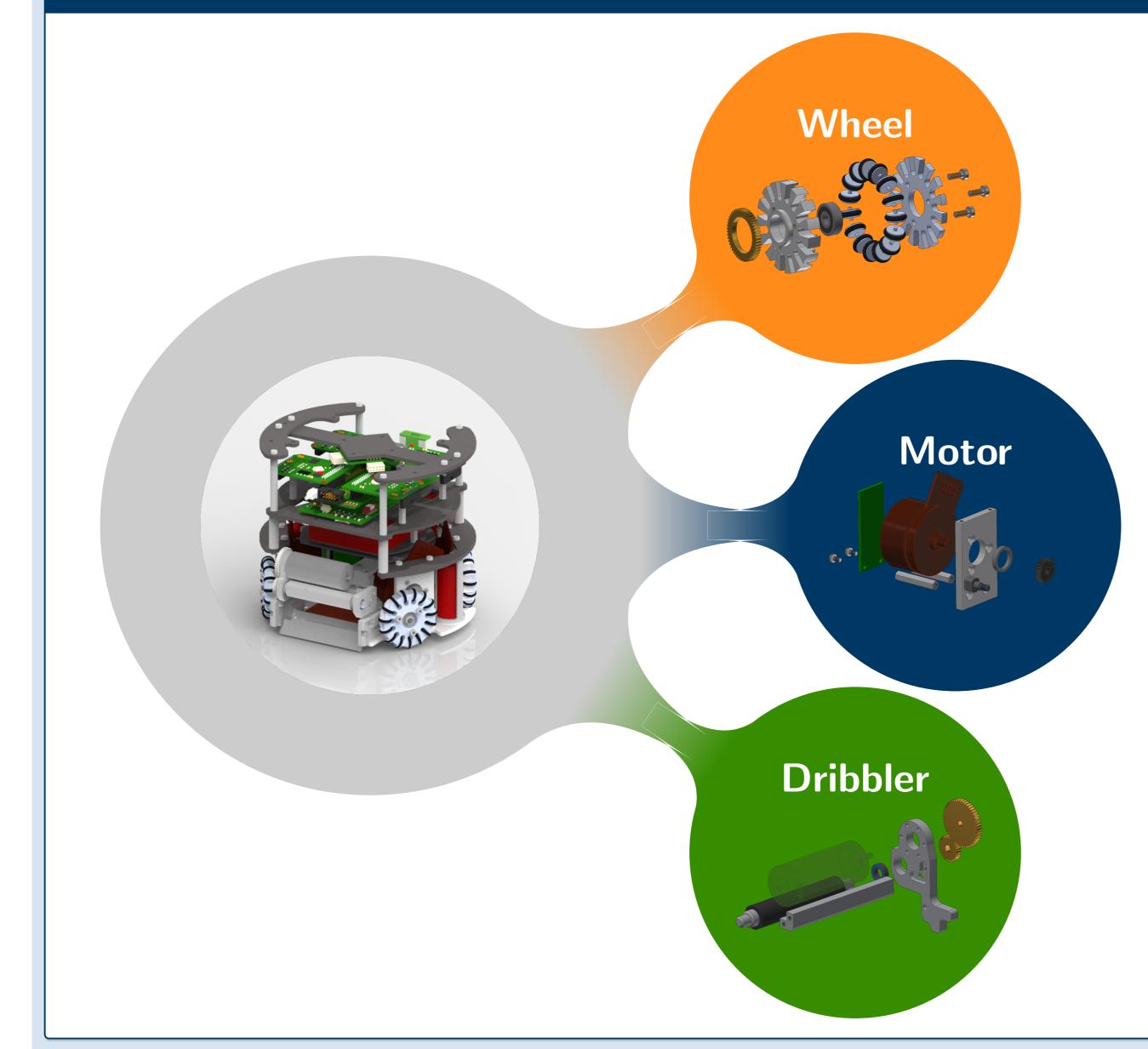
#### Modular system

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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