

Project MARCH

06/02/2024

<https://www.youtube.com/watch?v=UiML66TdE9c>

WE ARE PROJECT MARCH

Who are we?



Developing an
exoskeleton



28 Students



(More than!)
One year



Build on previous' years'
experiences



Many different
backgrounds



Full-time



Dream Team
Dream Hall TU Delft



Several unique
departments

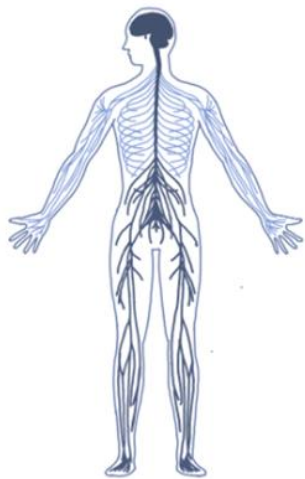


Pilot

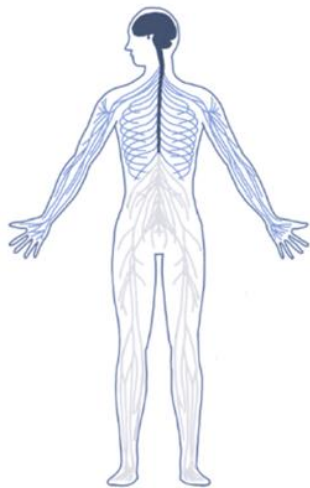


*Our vision is to improve the **quality of life** for people with paraplegia, by **pushing the boundaries** of exoskeleton technology*

Paraplegia (Spinal Cord Injury)



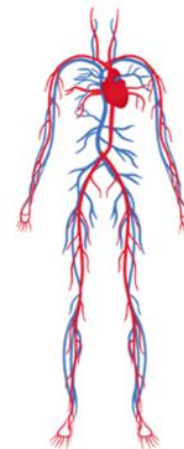
Nervous system



Paraplegia



Decline of muscle and bone tissue



Cardiovascular health risks



Risk of mental health issues

Previous years of Project MARCH



I

“Win the Cybathlon
October 2016”



II

“Win the Cybathlon Experience
October 2017”



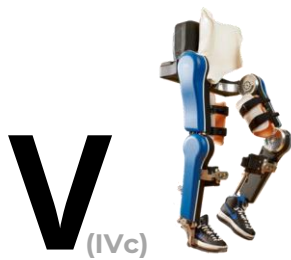
III

“Win the Cybathlon Experience
August 2018”



IV

“Win the Cybathlon Experience
September 2019”



V
(IVc)

“Win the Cybathlon
November 2020”



VI

“Walk a route through Delft”



VII

“Walk dynamically”

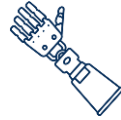


VIII

“Self-balance”



Cybathlon 2024

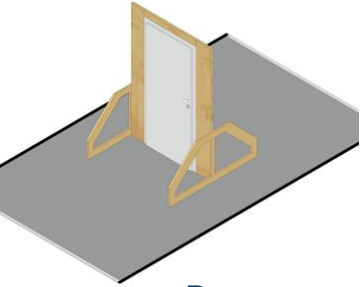


**Biggest bionic
competition in the
world; 10 obstacles**

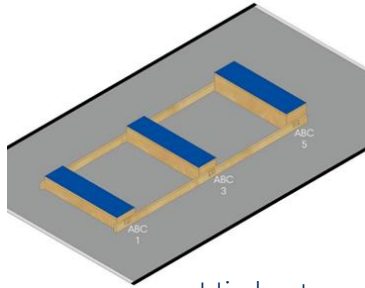


**Zürich, Switzerland
October, 2024**

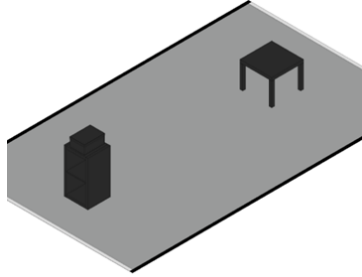
Ten obstacles



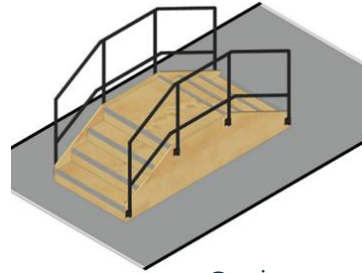
Door



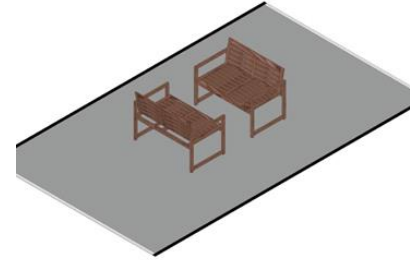
High steps



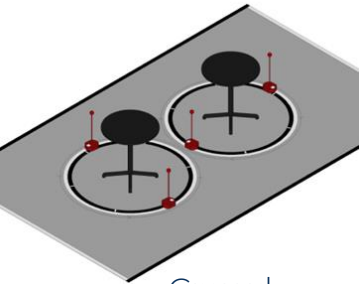
Moving parcel



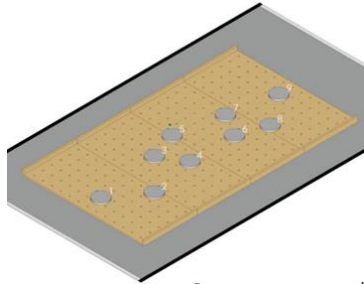
Stairs



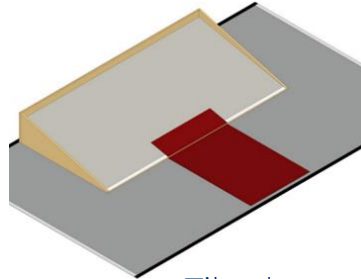
Train



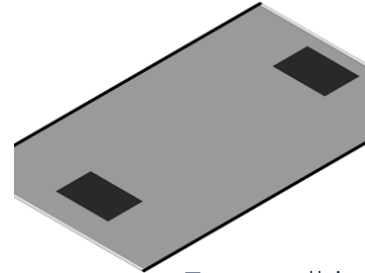
Crowd



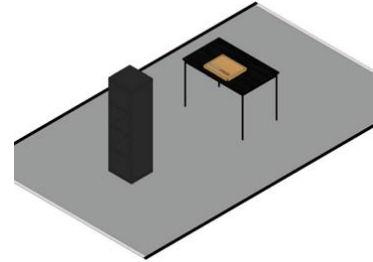
Stoney path



Tilted path

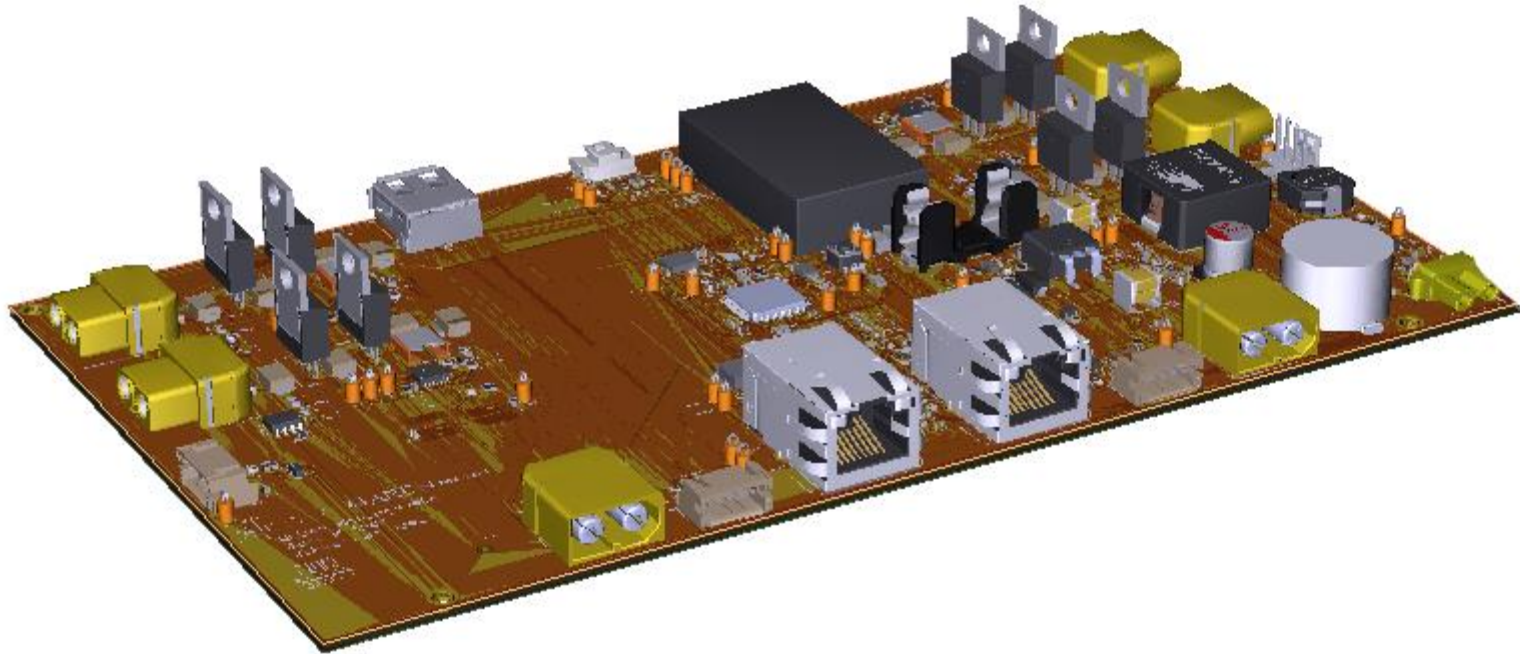


Free walking

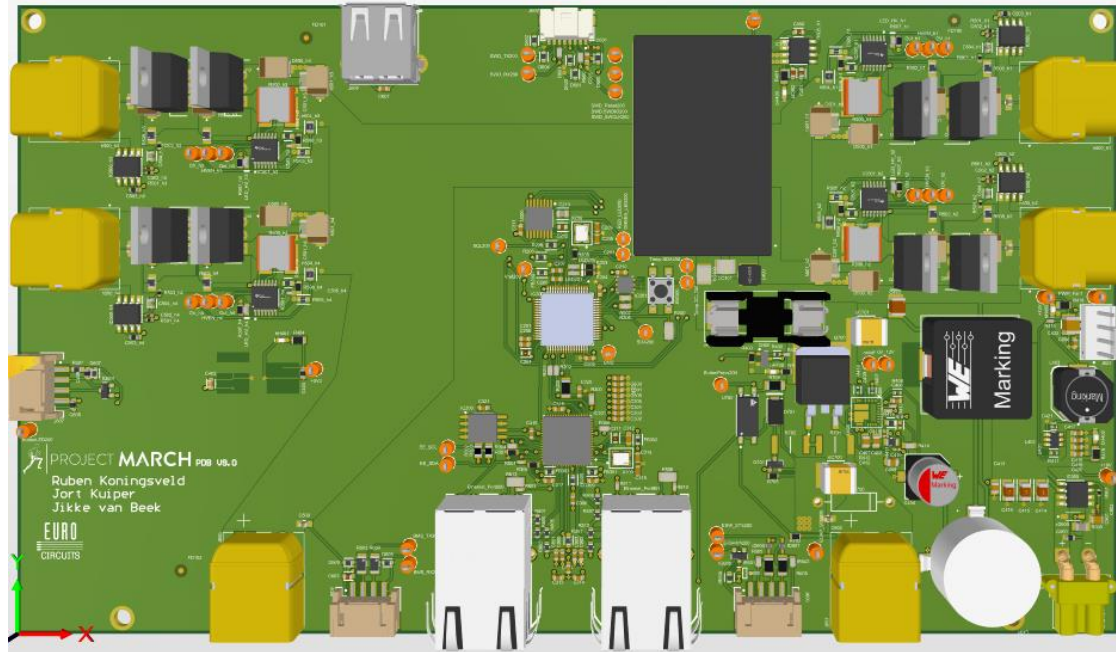


Kitchen

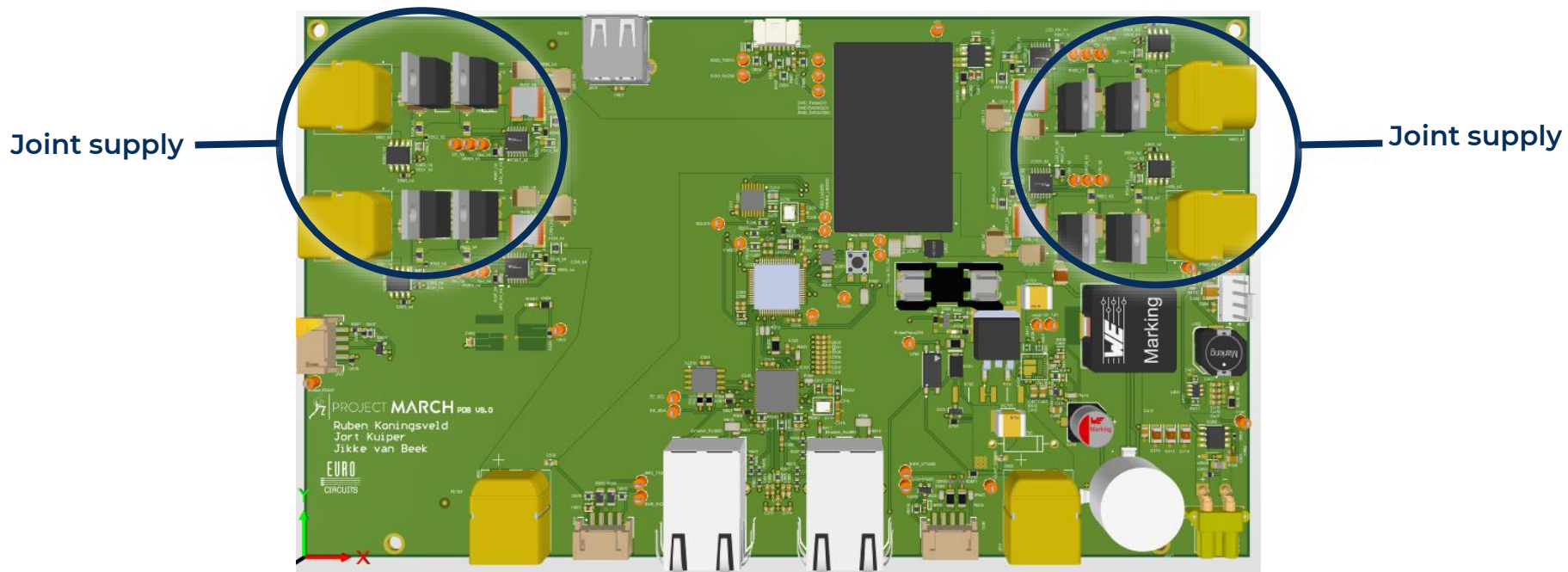
Power Distribution Board (PDB)



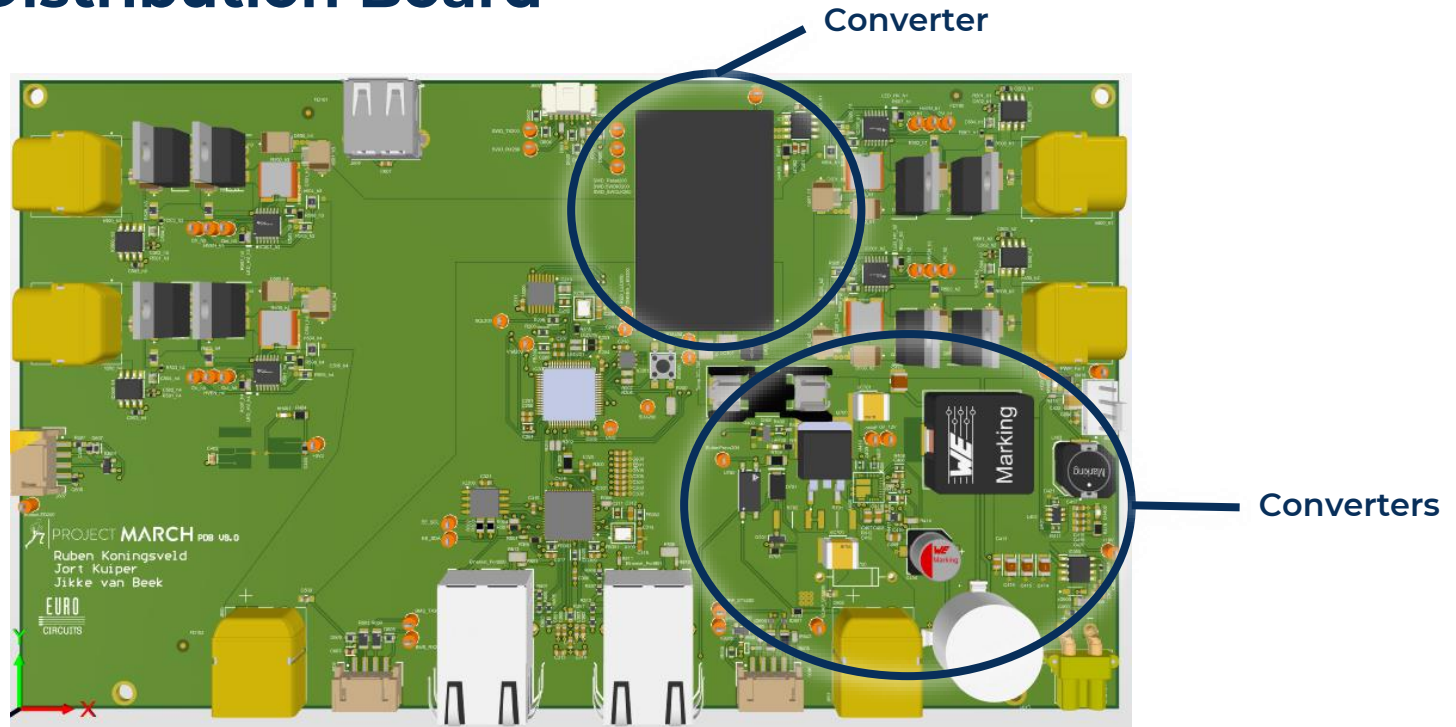
Power Distribution Board



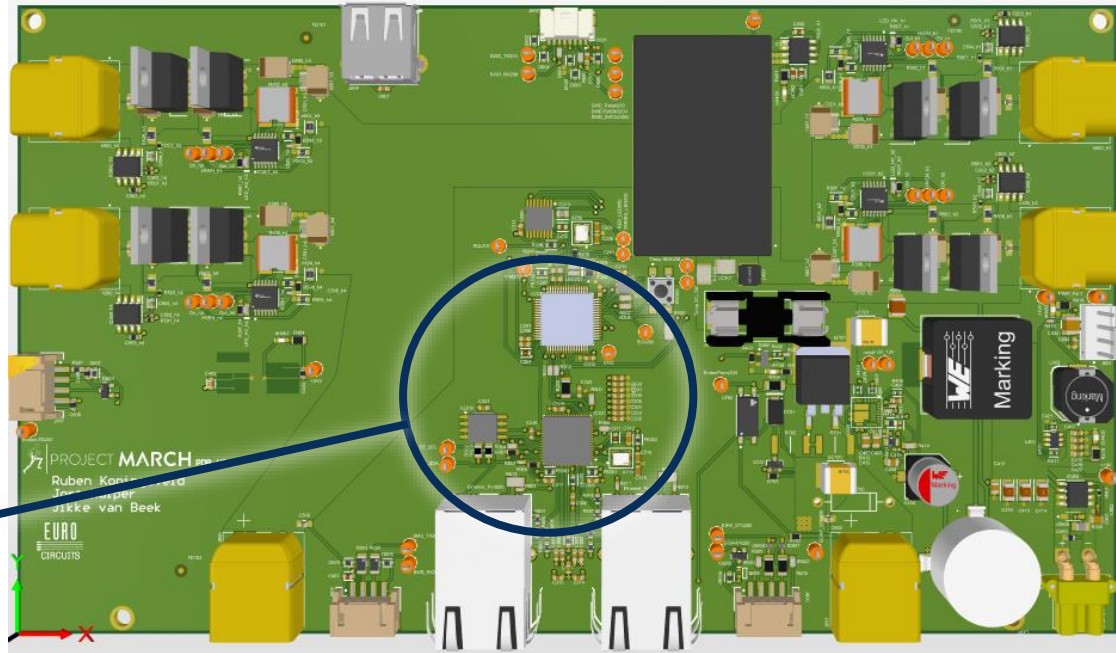
Power Distribution Board



Power Distribution Board



Power Distribution Board



Communication

MDrive

- Double axis motorcontroller
- MDrive receives data via ethercat from all sensors
 - Absolute and incremental encoder
 - AIE absolute encoder (new)
 - Torque sensors

Joints

- Actual movement of the exoskeleton
- Most powerconsuming & big capacitive load
- Hot swap controllers
- MOSFETS in parallel
 - To split the load & heatsink
 - Protect for short circuits



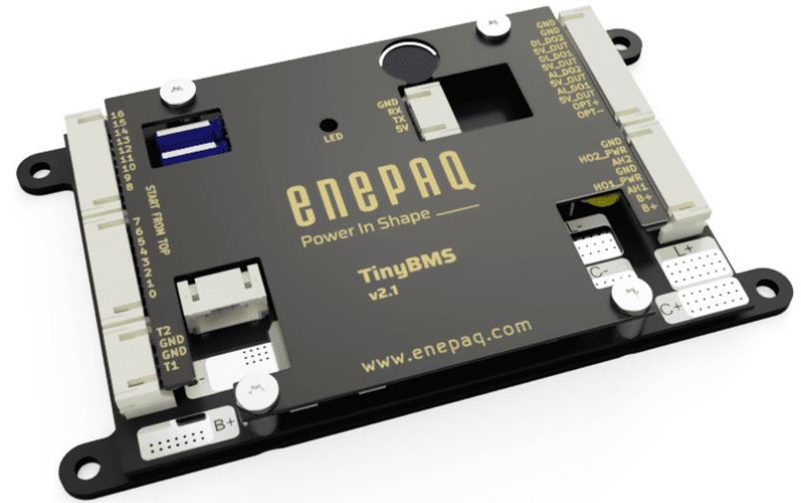
Battery

- 15 LiFePO₄ cells
- Capacity of 3Ah
- Cells assembled by Repower
- Safer than normal lithium ion cells



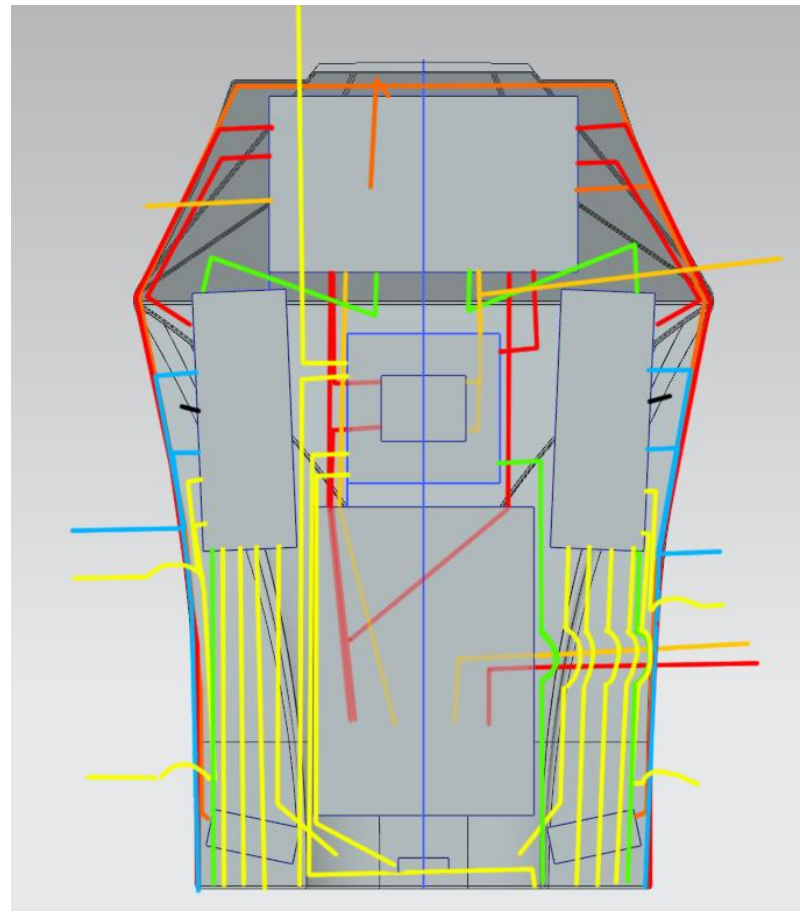
Battery

- Tiny BMS to regulate battery
- Can handle high powers
- Data initiates start sequence of the PDB
- Separate power supply when starting up



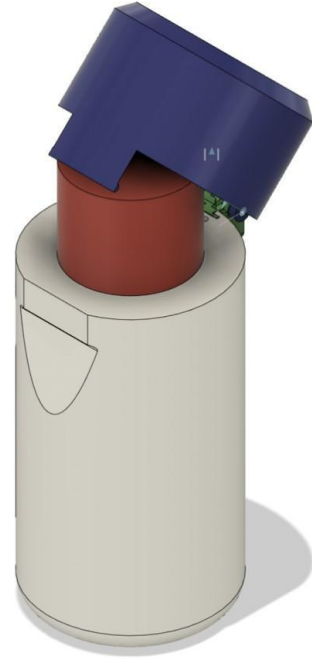
Cables & connections

- Take interference from power cables in to account
- Reliable connectors
- Bending stress



Emergency button

- Emergency button
 - Joint supply shut down
 - Cover preventing accidental press
- Solid state relay (SSR)



<https://www.youtube.com/watch?v=Bm6ndmPpysY>

MARCH VII

Join us at the unveiling of the design of the ninth Project MARCH exoskeleton!

TU Delft Aula

19.00-20.30

MARCH 7th

DESIGN PRESENTATION



DSW

zorgverzekeraar



Sint Maartenskliniek

