



A Universal Solar Tracker Controller



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VOLT4 Europe Limited

Doing more with Less



Frugal Innovation

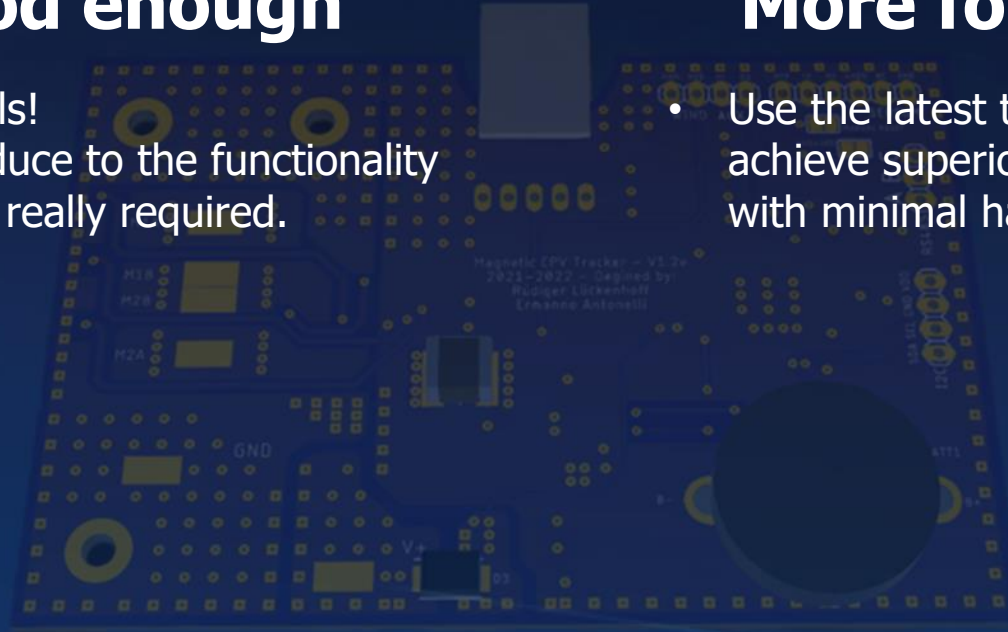


Good enough

- No Frills!
→ Reduce to the functionality that is really required.

More for less

- Use the latest technology to achieve superior performance with minimal hardware and cost.



Frugal CPV Tracker Controller

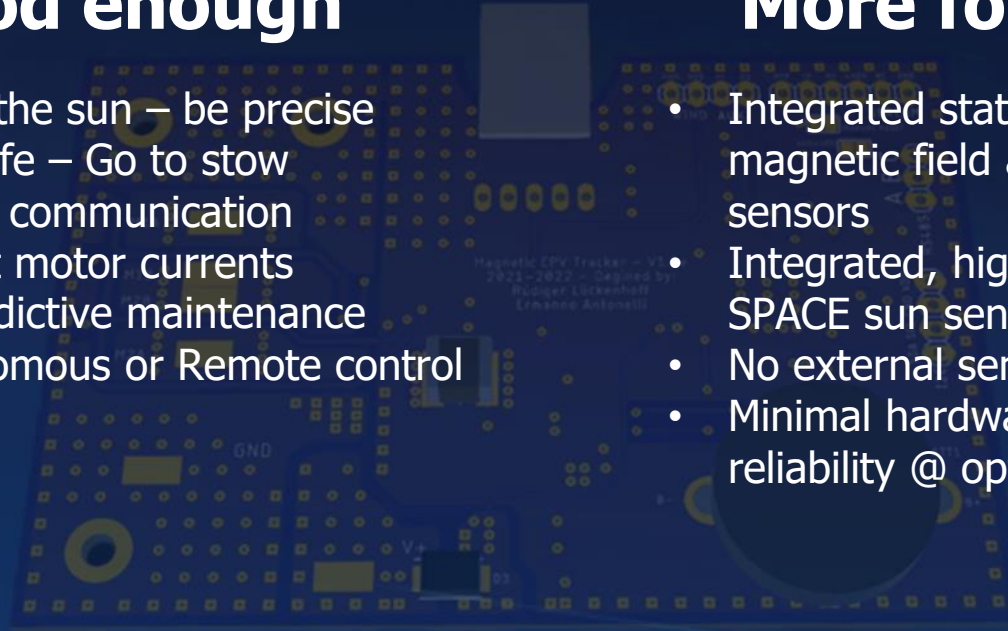


Good enough

- Track the sun – be precise
- Fail Safe – Go to stow
- RS485 communication
- Report motor currents
→ predictive maintenance
- Autonomous or Remote control

More for less

- Integrated state of the art magnetic field and acceleration sensors
- Integrated, highly precise AZUR SPACE sun sensor
- No external sensors
- Minimal hardware → maximum reliability @ optimized cost



Our mission and vision



Mission

Our mission is to bring together disruptive new technologies to enable efficiencies, that will contribute towards an energy efficient zero carbon future



Vision

We believe in making the world a better place, by pursuing innovation, based on strong scientific principles

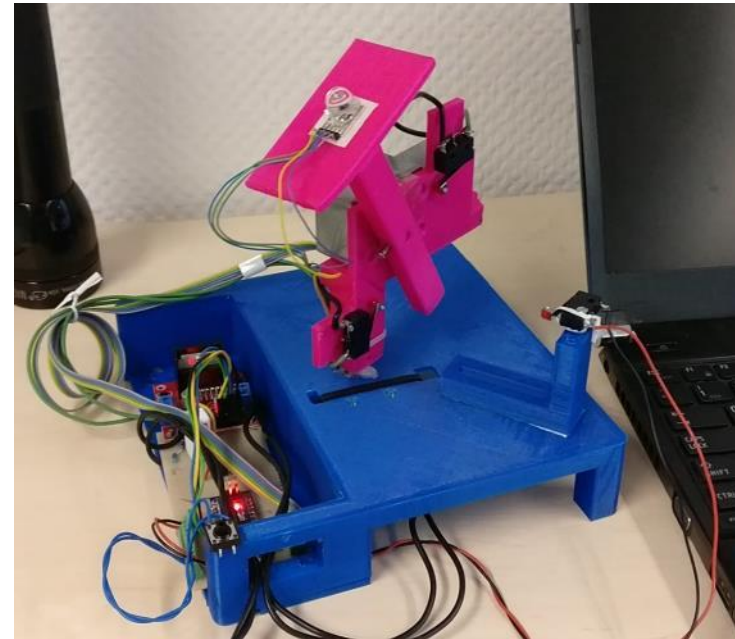
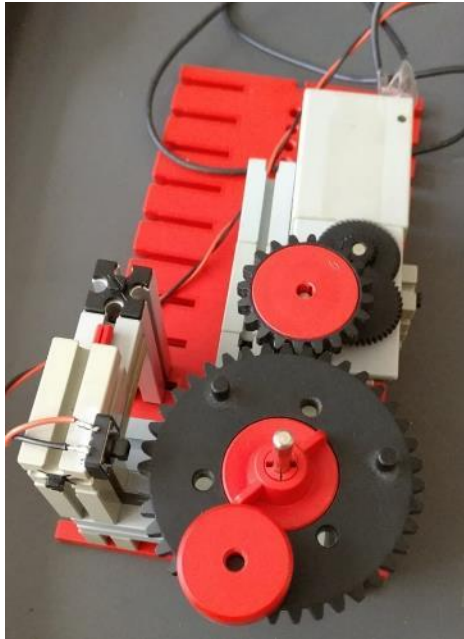


No Expertise without a Learning Curve

(private research R. Loeckenhoff)



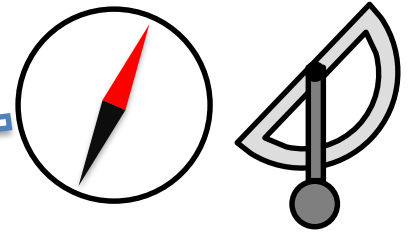
How it started - First attempts with end switches



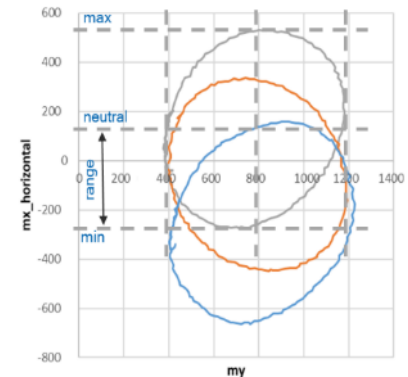
Outdoor Tests with Hermetic Box → CPV-17



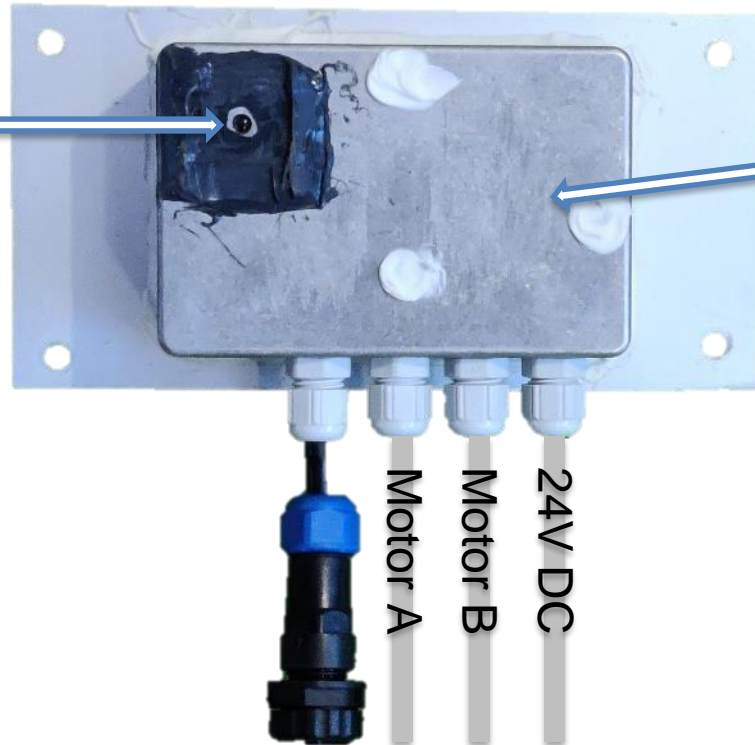
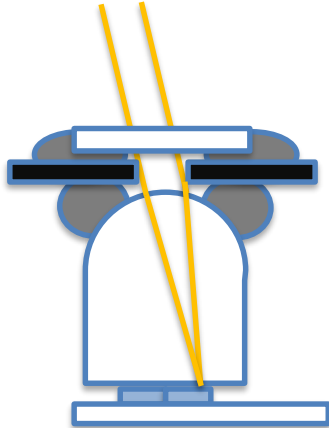
6 axis compass
inside.



Mag. Readings
during calibration



**AZUR SPACE
4 Quadrant
Sensor**



Aug. 7th 2021

Open Source Go Live

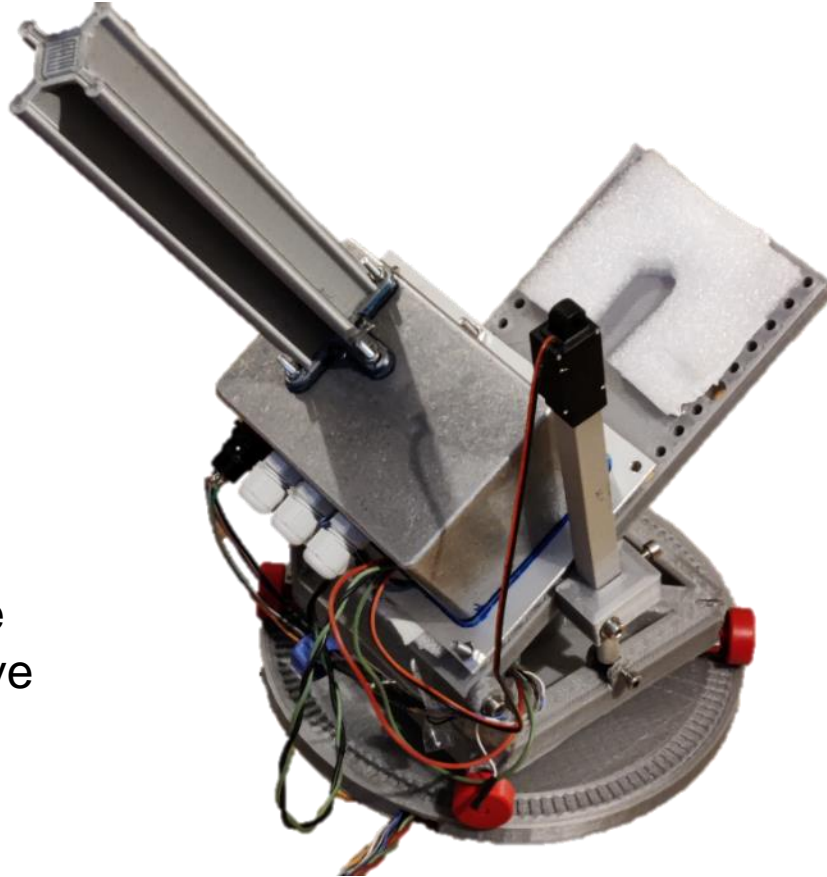
- [Github.com/Solhunter](https://github.com/Solhunter)
- **Compass, tilt and sun sensors**
- **No external sensors (except for wind)**
- **Simple platform: Arduino**
- **Easy to build: Breakout boards**
- **Serial communication**
- **For desktop or full size trackers**



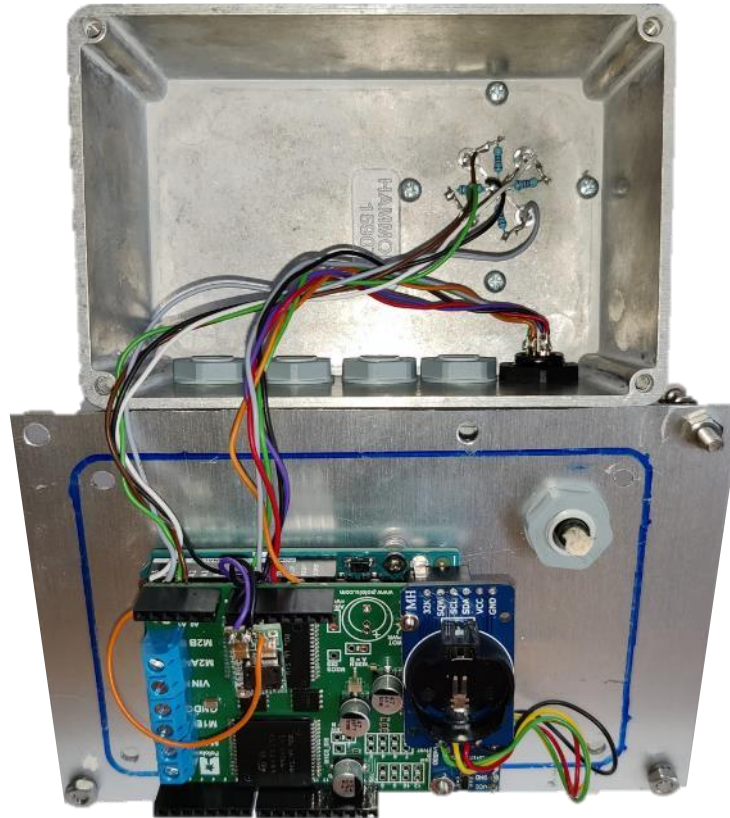
3D-Printed Desktop Tracker



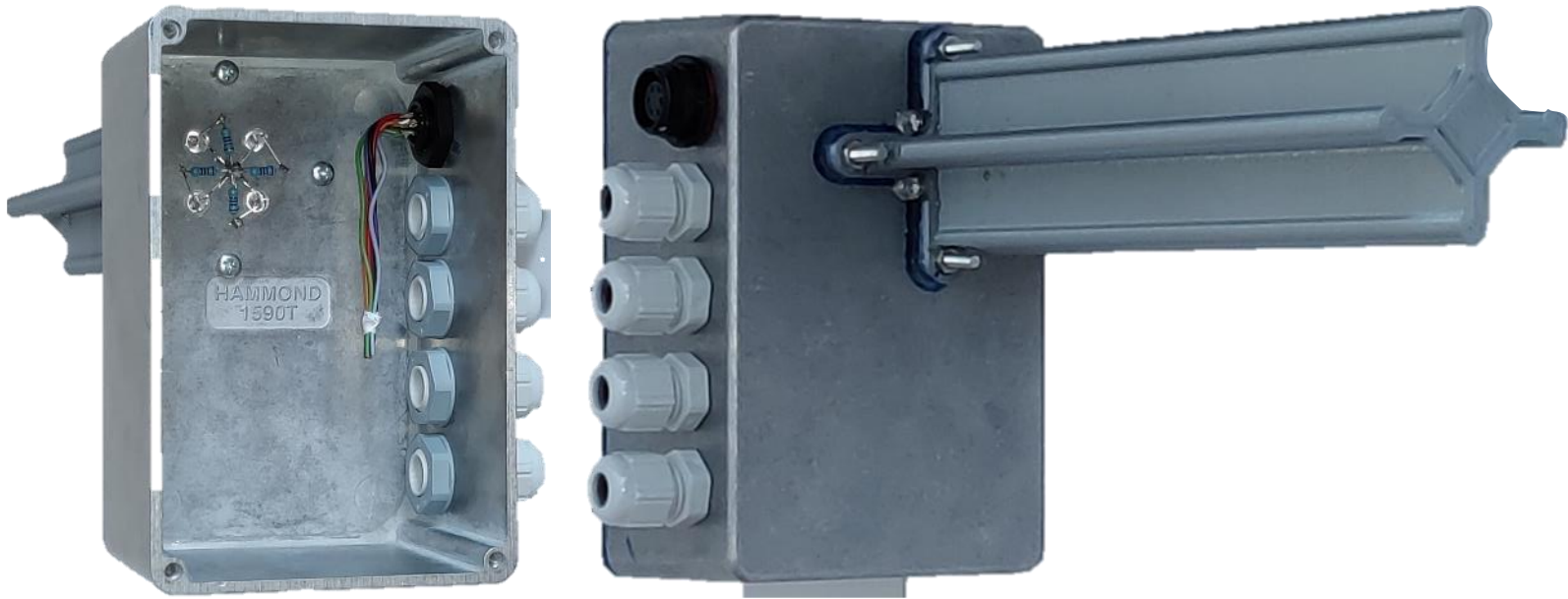
- Fast
- Safe
- Comfortable
- Cost-effective
- Representative



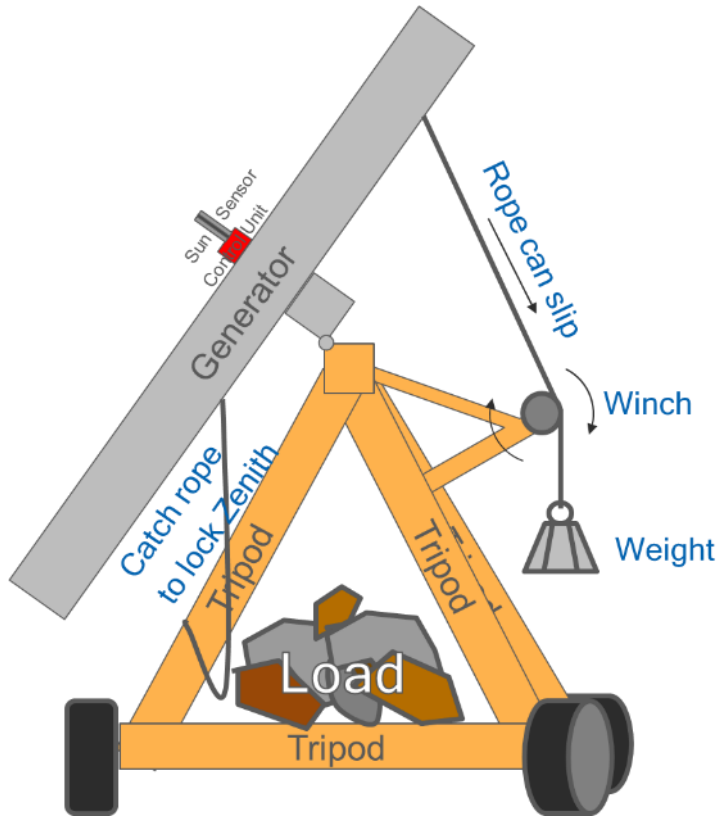
Clean Design with Breakout Boards



Shading beam with LEDs as sensors



A tripod tracker



Fraunhofer ISE Flatcon modules

1st iteration all in one board

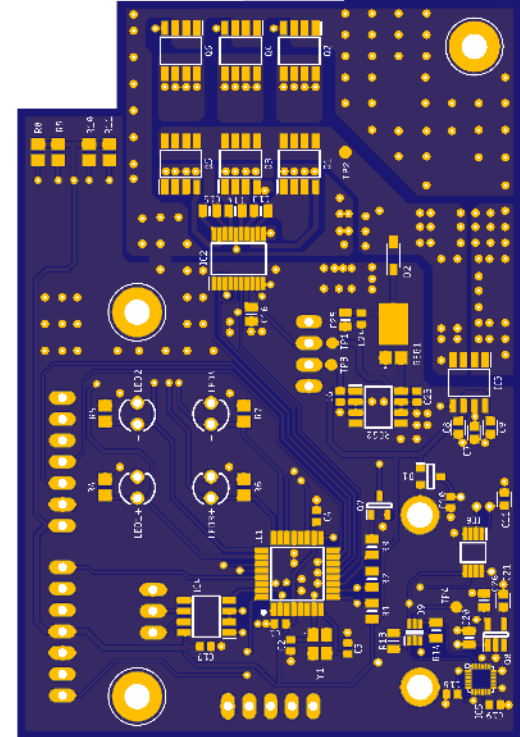


- **VOLT4** becomes involved to create a professional board design.
- Using the proven components of the “breakout board design”

Issues:

- Proven compass chip is outdated.
- New version is out of stock for >1 year.
- Too many options and small errors.

- ➔ Cleanup and redesign
- ➔ Readily available sensor chips
- ➔ Dramatic cost reduction



2nd iteration all in one board



- Latest sensor chips
- Minimum part count
- ➔ Cost effective
- ➔ Reliable
- ➔ Versatile

← 89 mm →

Sun
Sensor

Wind
Analog or
Digital

RS232
Code
Upload

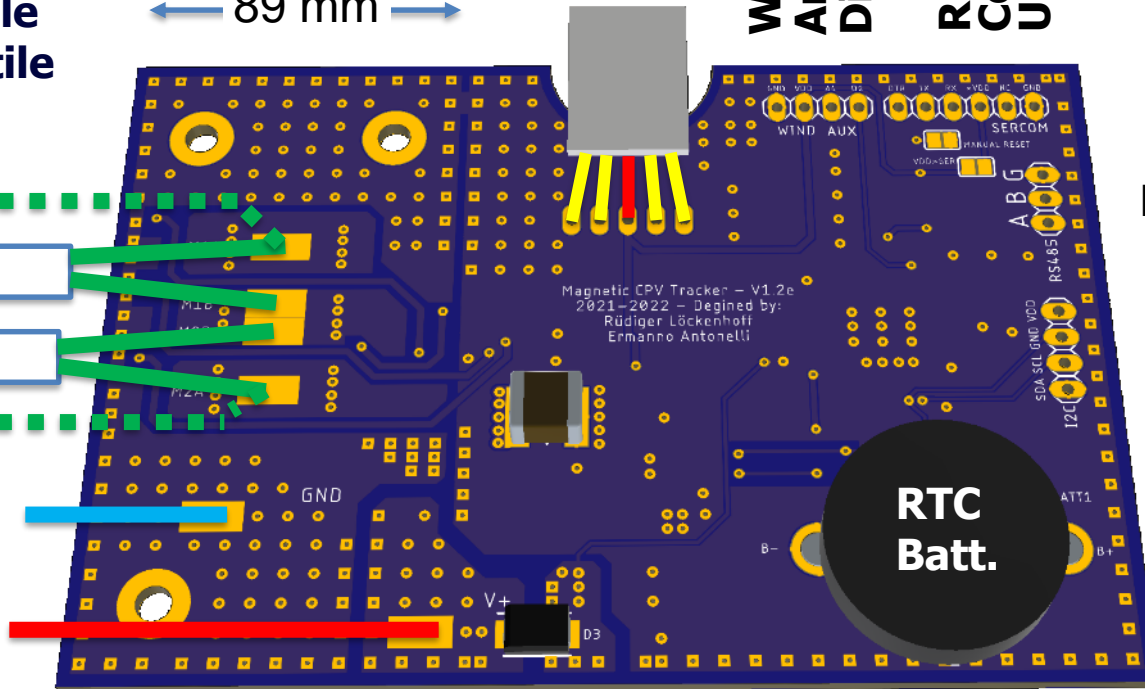
Up to 3
Motors

12-50 V DC
.. 8 A
.. 400 W

RS485 field com.

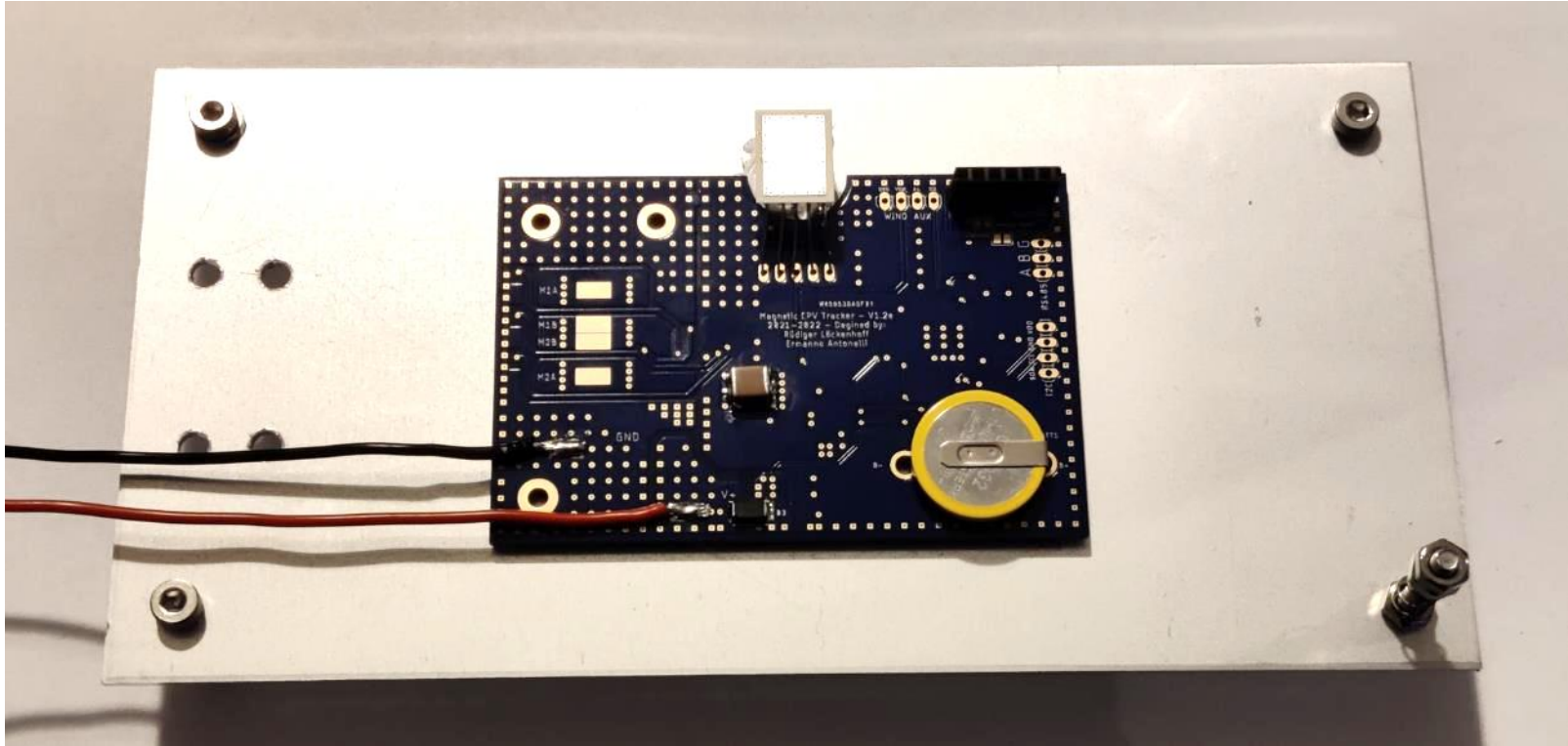
I2C extensions

60 mm



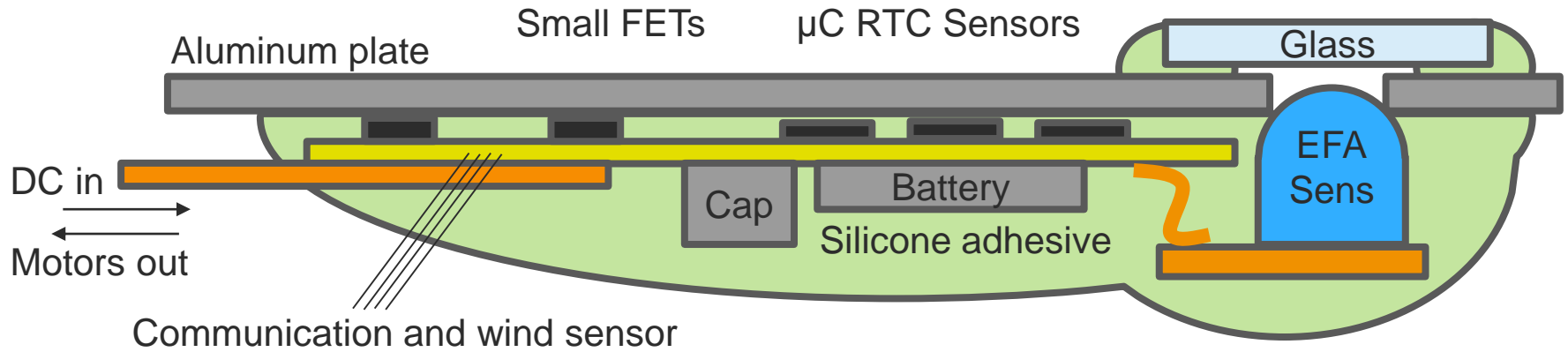
Surge protection & current monitoring

Board & Sensor on a Mounting Plate



Spring loaded bolt

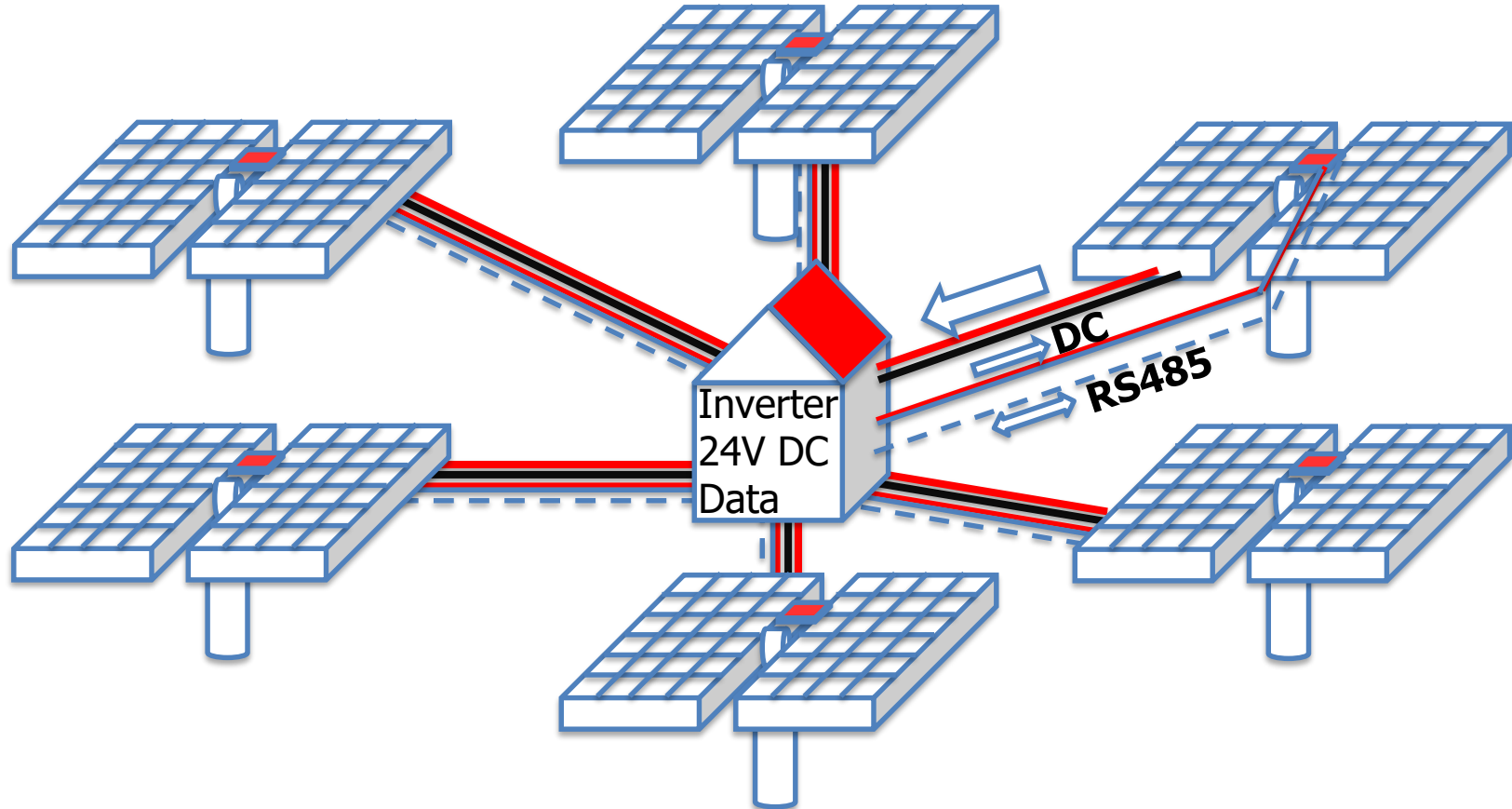
Encapsulation Concept



Field Layout Consideration



- 24 DC Supply and Communication Nodes



Next steps

- **Optimize firmware with new sensors**
- **Outdoor testing**
- **Establish RS485 field communication scheme**

How to serve the CPV community

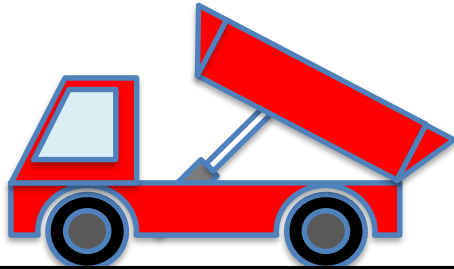
- **Open source design github.com/solhunter for the evaluation of the compass approach,**
- **Assembled hardware prototypes for field testing,**
- **Design suitable for mass production,**
- **Looking for partners.**

Thank you for your kind attention



Special thanks go to

- **AZUR SPACE Solar Power GmbH** for providing the sun sensor and supporting an earlier stage of this project,
- **Fraunhofer ISE** for providing FlatCon modules for the demonstrator on loan.



Track (almost) anything

