Open Source Hardware for Designing E-bike Drive

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H-Bridges
&
Open Education

Open Source
Hardware
E-bike Drive

Conclusion

Introduction

International Future Energy Challenge

- over 40 universities worldwide each year
- multidisciplinary one-year projects
- attractive topics: electric vehicles, renewables, space applications, etc
- Applied Power Electronics Conference

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Projects & achievements

	Rated power [W]	Year of Design	Rank
Single – phase induction motor integrated drive	900	2005/06	1st place
Ultra-High-Power Density Single-Phase Rectifier for Renewable Energy Sources	1300	2015/16	3rd place
Isolated Bidirectional DC-DC Converter for Residential Energy Storage Systems	1100	2017/18	4th place
E-bike drive	700	2018/19	1st place
Power Supply for Nano Satellites	80	2019/20	Finals in November

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H-Bridges & Open Education

Free Software and Open Hardware Projects

emp.etf.rs/rddc.htm

github.com/Mostovi

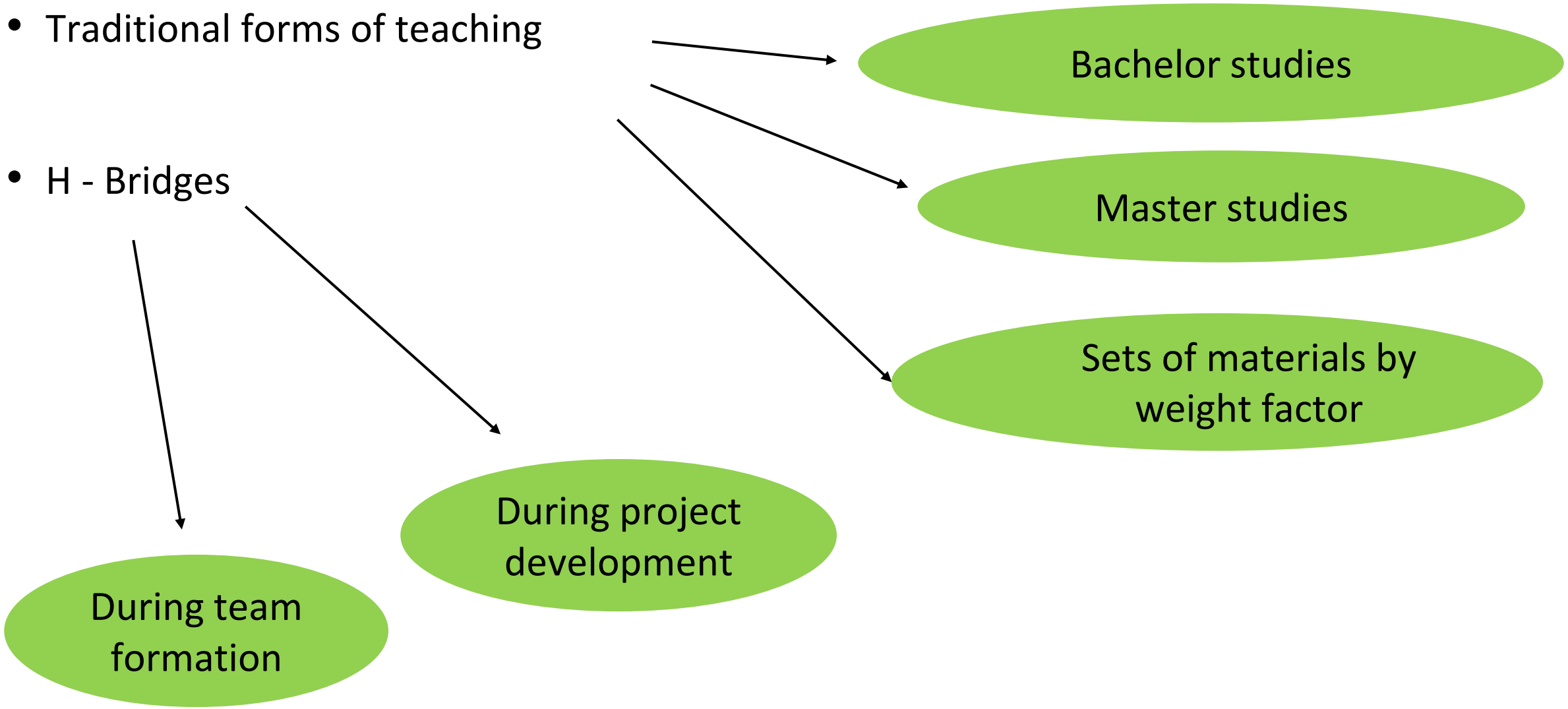
ddc.etf.rs

ONE PROJECT

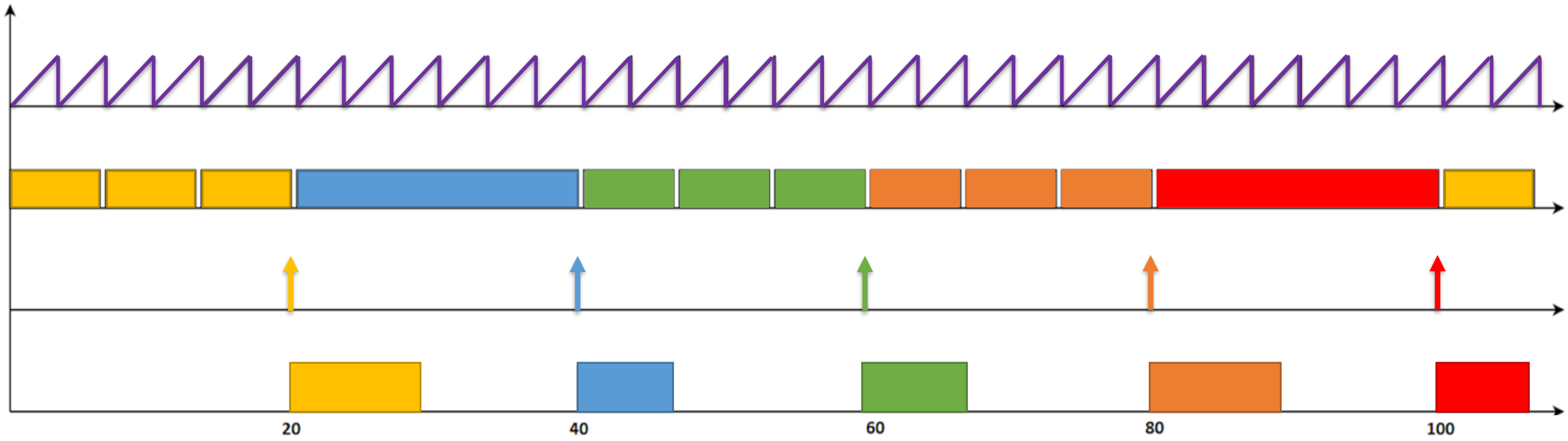
- Source file
- Bill Of Materials
- Gerber
- Simulation package
- Brief hardware design guide
- Brief software design guide

Use of Available Technical Solutions

- Traditional forms of teaching
- H - Bridges



H-Bridges Open System Execution



New students

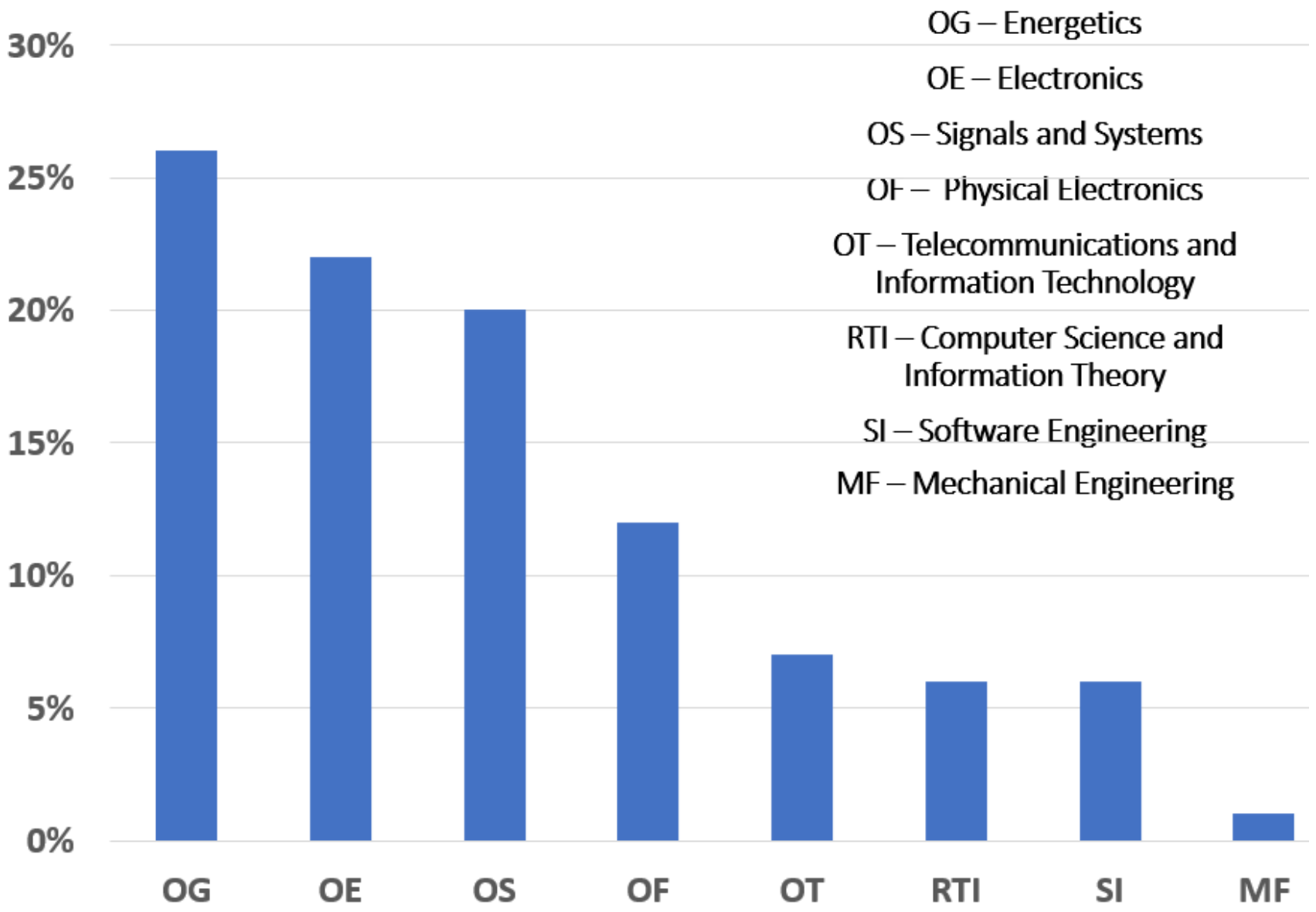
Intro

KTW

R&D

Update

Number of H-Bridges team members



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Open Source Hardware E-bike Drive

Battery pack

Throtlle

Electrical machine

Inverter

1. Order BOM

2. Order PCB

3. Soldering

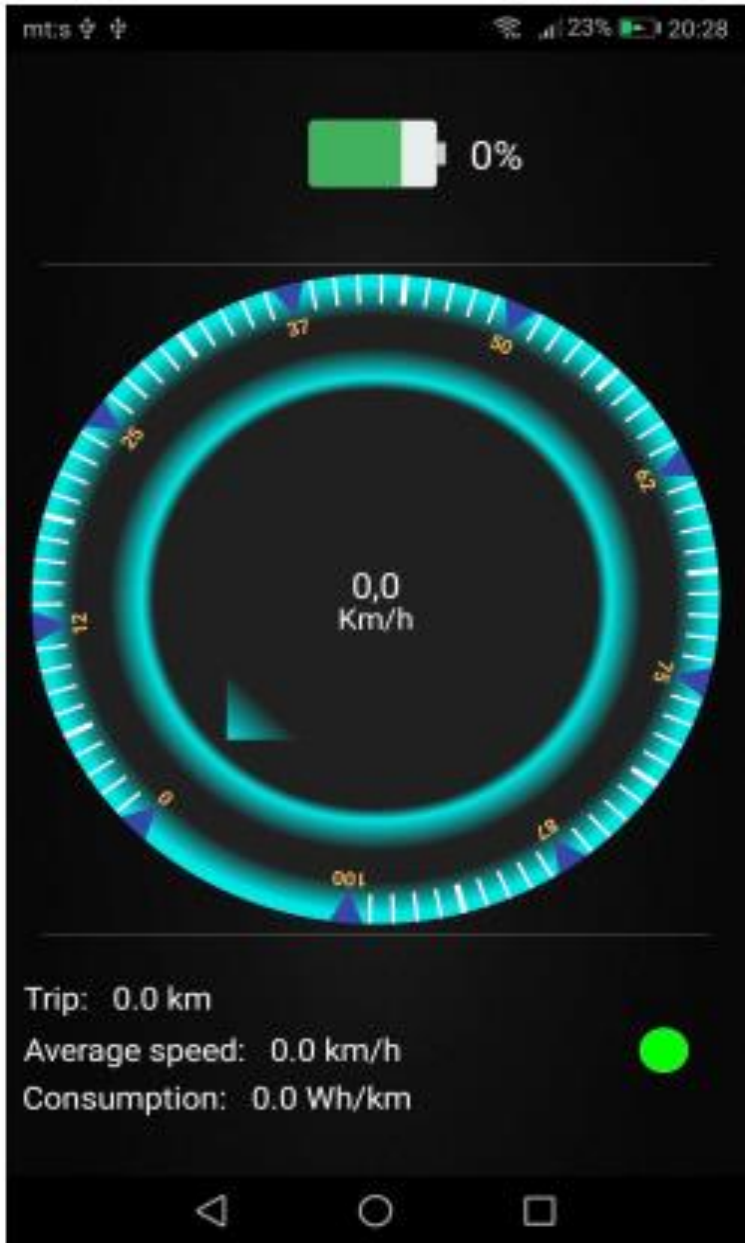
4. Source code and test

5. Housing

6. Assembly

Three-phase inverter with housing *H-Bridges 2018/19*

Additional functionalities



- Free Android application with:
  - Translation speed
  - Battery capacity
  - Average speed
  - Average battery consumption, etc…
- Security system
- Clutch system
- Adaptive limits on traction, speed, power, etc.

System Part	Price [$]
Electric machine with mounting system, delivery and customs	350
Production of Printed Circuit Boards with delivery and customs	60
BOM and its assembly	200
Housing construction and system monitoring	30
Baterija 250Wh sa adekvatnim punjačem	200
Android application	0
Arbitrary traditional bicycle	200

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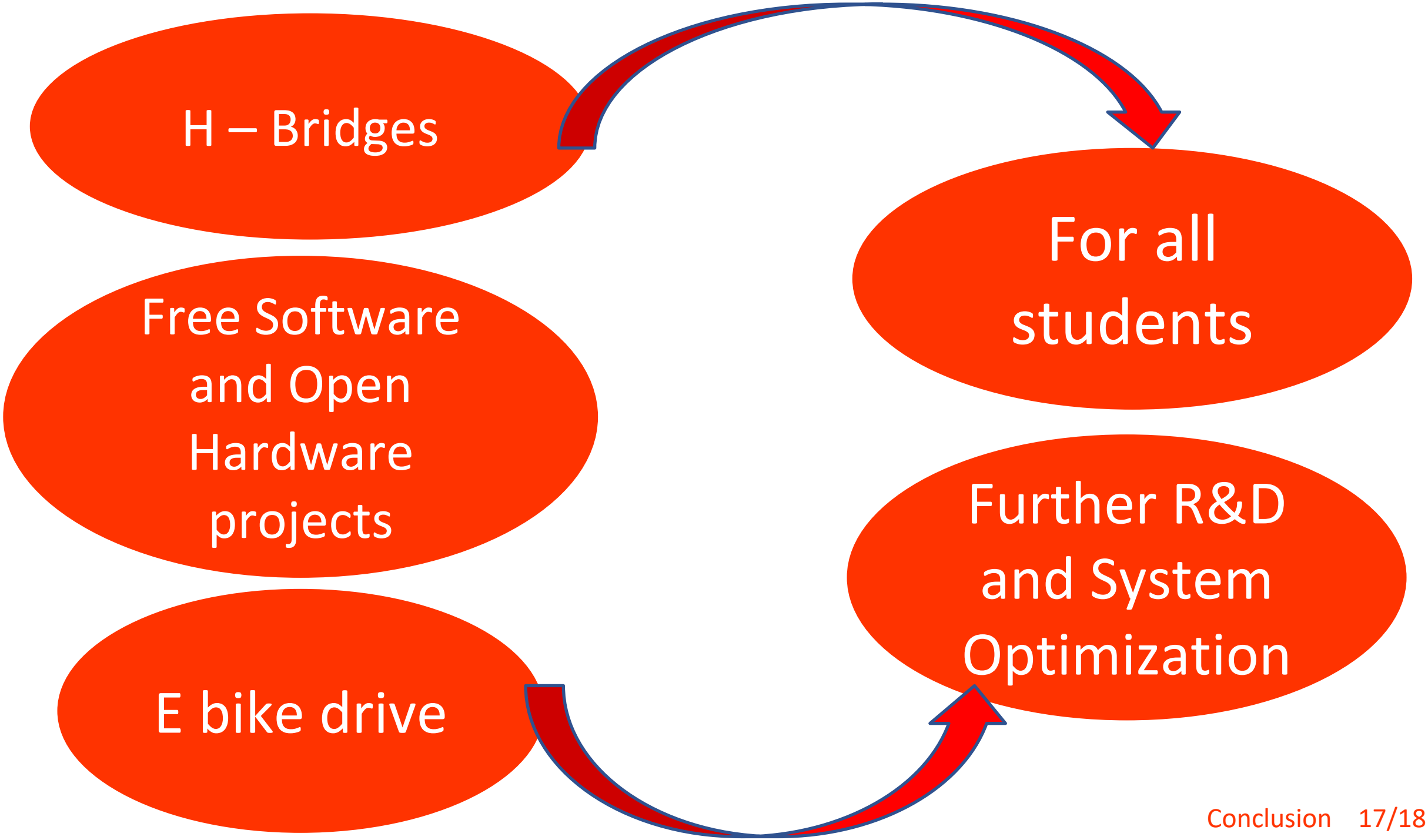
H – Bridges
For all students
Free Software and Open Hardware projects
Further R&D and System Optimization
E bike drive

Thank you!

Q & A