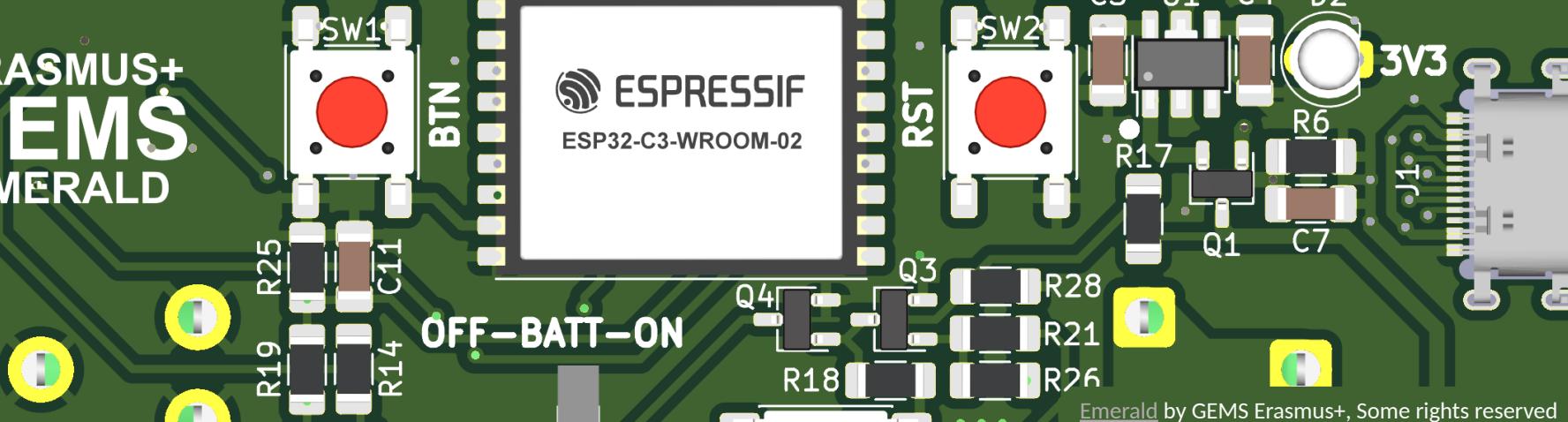


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Mechatronic system design

Building Robots: System Integration

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About

1 Mechatronic system

3 Workflow

2 Robotic system

4 Problems - Solutions

Mechatronic system



Mechatronics

- 1 Mechanical engineering
- 2 Electrical engineering
- 3 Computer science

Mechatronic system is a
programmable device that combines
mechanical and electronic
components to achieve a desired
functionality.

Robotic system

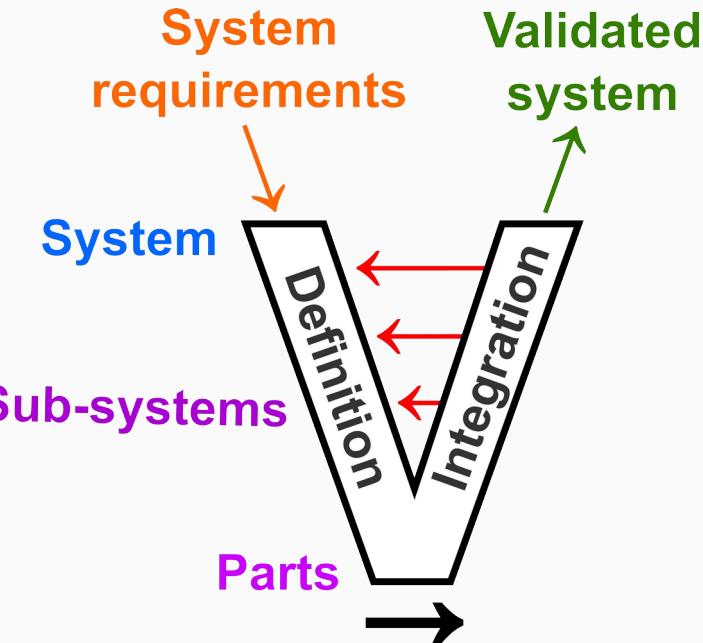
Robotic system is a mechatronic system capable of automated movement in a complex environment.



Robot

- 1 A mechatronic system**
- 2 Movement in environment**
- 3 Automated or manual**

Design workflow



V-model for system design

Simplified

- 1 Definition → Specifications
Integration → Connections
- 2 → Implementation
(creation of components)
- 3 ← Verification
(test based feedback loop)

Smart Servomotor example

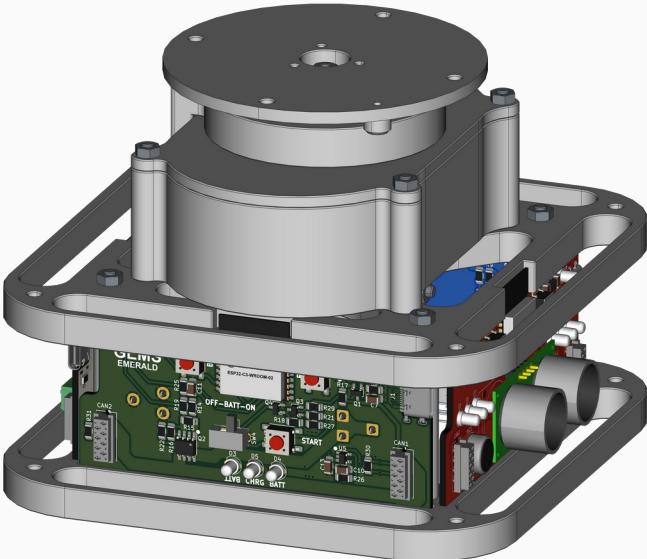


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- 1 Educational, modular**
- 2 Easy to produce and repair**
- 3 Part size → compromise**

Problems

Reason for problems

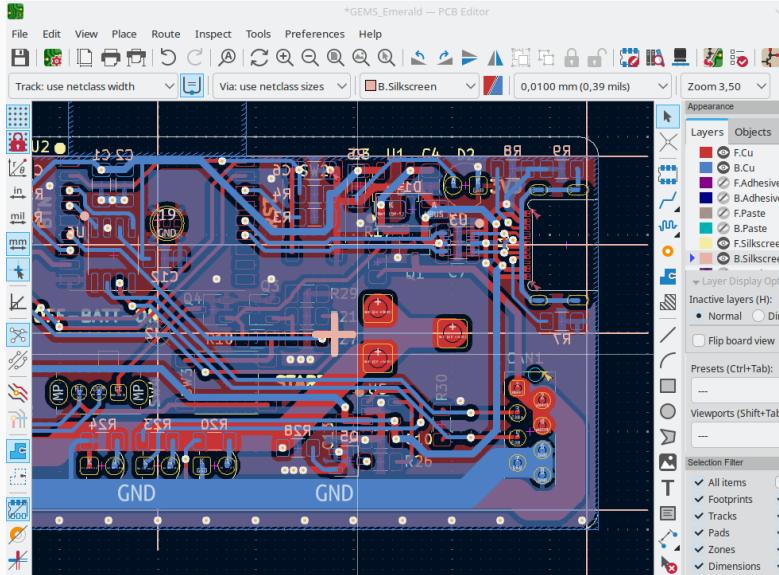


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1 System complexity

2 Lack of knowledge and information at the start

3 Economic constraints (time and resources)

Solutions

Advice for solutions

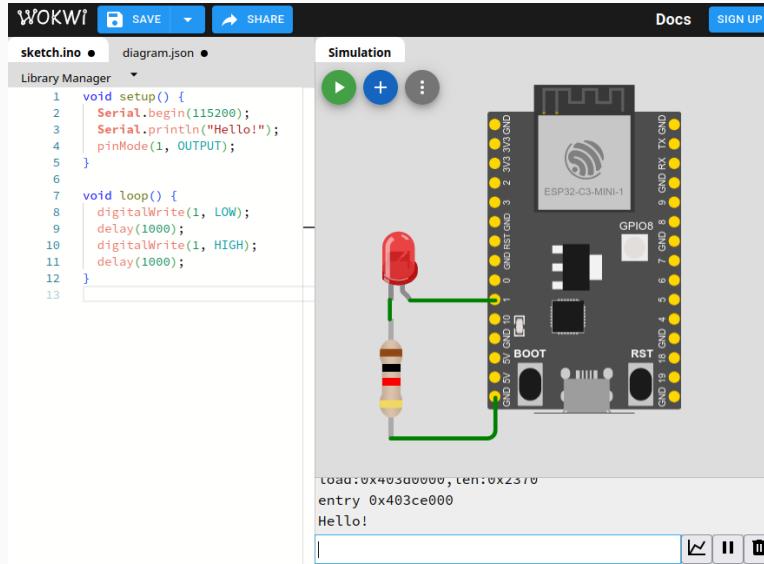
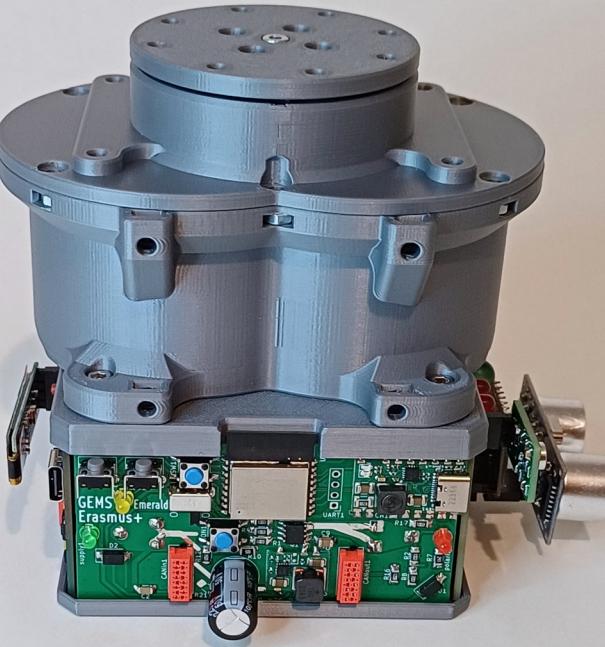


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- 1 Modularity and Simplicity**
- 2 Incremental development**
- 3 Proof of concept testing
“Hello world!” examples**

Importance



Understand mechatronic design process

1 Consequences of decisions

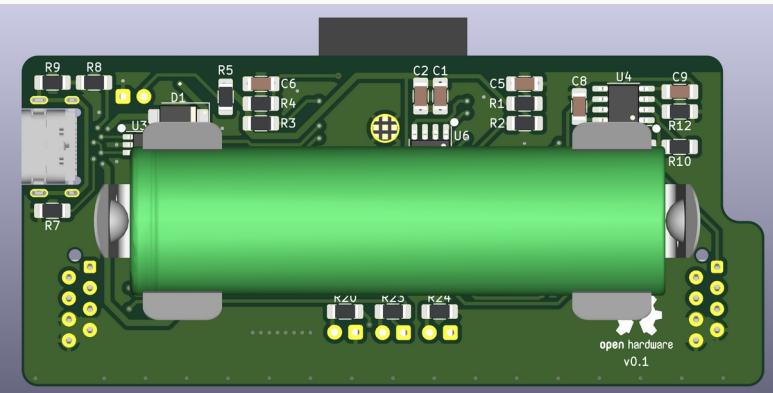
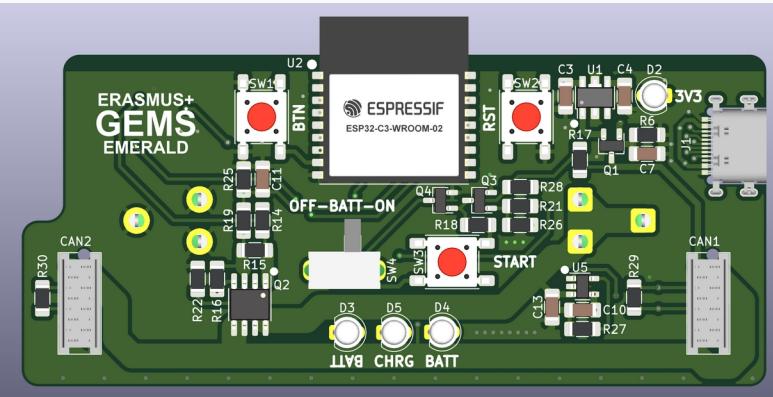
2 Manufacturing and Assembly

3 Failure effects

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Task

Emerald module PCB

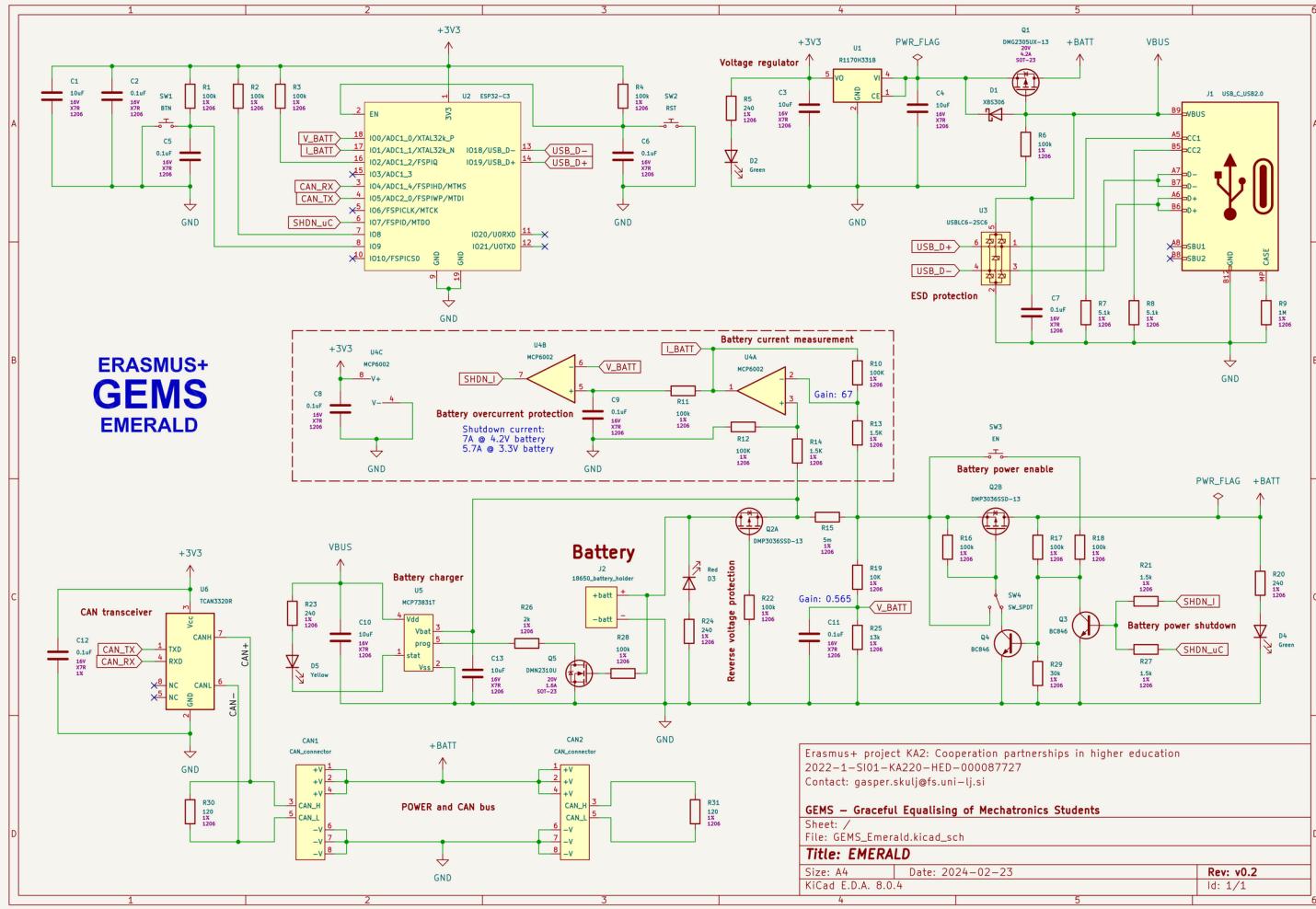


1 GitHub → KiCad project

2 ? → Schematic → PCB layout

3 Create a block diagram

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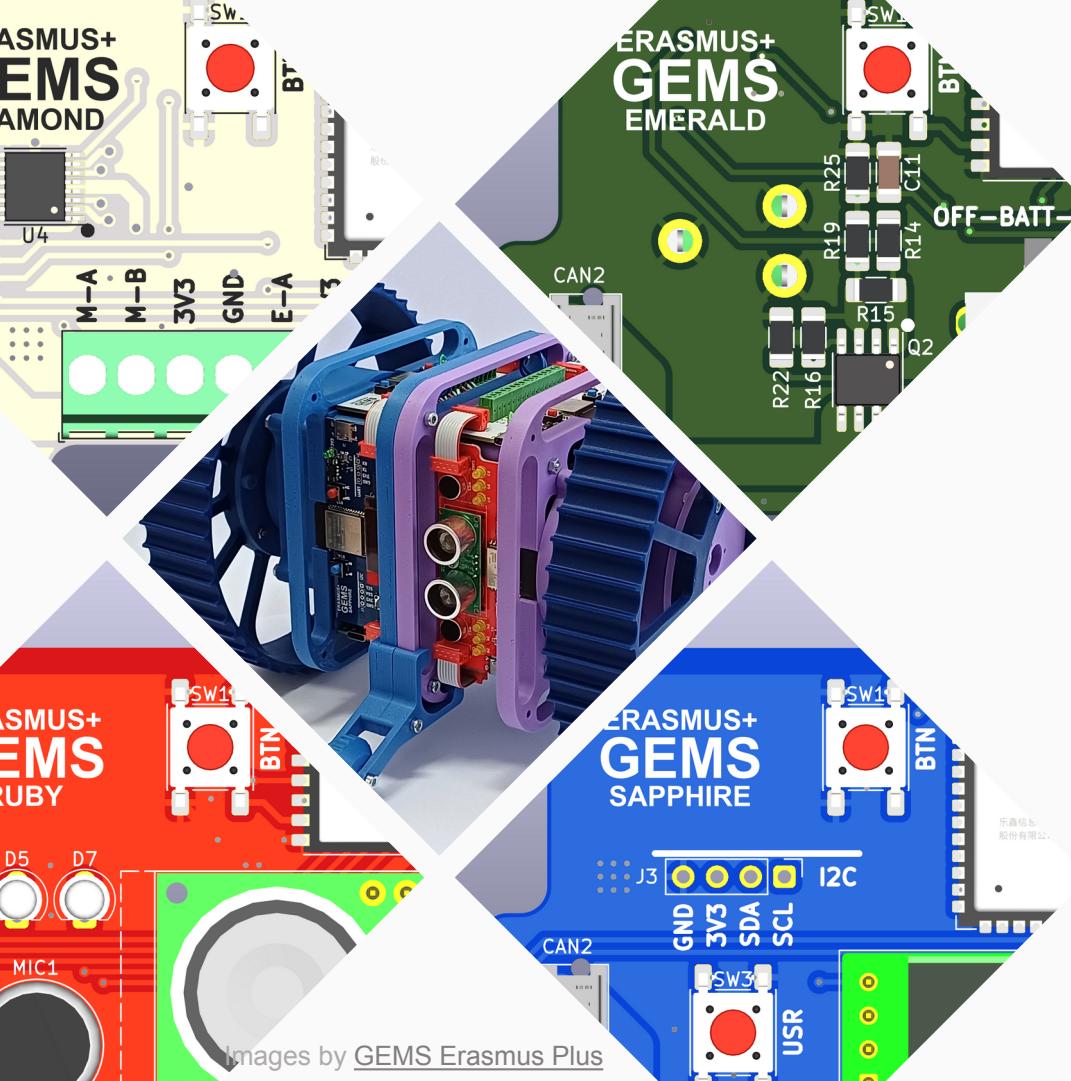


Conclusion

A photograph of a female student with long brown hair, wearing a black top, working in a laboratory. She is focused on a task, looking down at a piece of paper and writing with a pen. On the desk in front of her is a complex electronic setup mounted on a silver aluminum frame. It includes a motor, various sensors, and a breadboard with many wires. To her right is a digital multimeter (DMM) with red and black probes. Behind her is a computer monitor displaying some data. The background shows typical lab equipment and shelving.

Mechatronic system design

- 1 Complex and iterative process**
- 2 Simplicity and functional independence**
- 3 Continuous research and learning**



Thank you for watching!

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