Prototyping

Faezeh Pasandideh E-Mail: faezeh.pasandideh@hshl.de

Gido Wahrmann E-Mail: gido.wahrmann@hshl.de

Stefan Henkler E-Mail: stefan.henkler@hshl.de

Use Case

Autonomous Driving

- https://www.youtube.com/watch?v=vfirAm1ITMo
- Enabler for the future of driving
- Autonomous routing, obstacle detection, parking, …

[https://www.forbes.com/sites/enriquedans/2021/06/11/the-future-of-autonomous-vehicles-product-orservice/?sh=5ed0a2f5892f, March 28, 2023]

Use Case

Autonomous Driving

- Develop an autonomous vehicle that can drive autonomously on a given track
  - Based on line detection
- Being able to detect obstacles
  - Remove and driving around based on identifying the colour.
- Optimizing the speed
- Different routings
  - Driving in oval
  - Drive an eight
- Parking
- … and even more

Prerequisite

- Create a team git
- Add all team members
- Add all lectures!
- Upload continuously your results to git
  - These includes the responsibilities
  - (Pre-) final version are uploaded within of the specified deadlines
- Divide the overall task into separate parts for each team-member in the following way, like:

			Name1		Name2		Name…
#	Task	Short summary	Todo (incl. Deadline)	Done (incl. Finishing date	Todo	Done	…
1	Task1						
2	Task2						
…	Task…						

HOCHSCHULE HAMM-LIPPSTADT

Task 1

- Develop a first system engineering model based on the Systems Engineering lecture
  - This includes all parts of the analysis
  - Outcomes are SysML Diagrams
    - Focus on requirements, including Requirements Diagrams, Use Case Diagrams, …

Task 2

- Refine your system engineering model and develop a first prototype
  - Being able to follow a line and detect obstacles
  - First version is simulated in tinkercad
  - Prerequisite for task 3 – using prototyping HW
  - System specification with SysML (pre final version)
  - Deadline: 27.04.25 eob

Task 3 – Milestone 1 (relevant outcome for evaluation)

- Refine your system engineering model and refine your protoype
  - Outcome: final version of Systems Engineering Diagrams
  - Realization of simulated prototype in HW
    - Algorithm is based model based specification – well defined mapping of state machines to code (switch case pattern)
  - First sketch of overall prototype (paper prototype)
  - Deadline: 04.05.05 eob.

Relevant criteria

- Quality of solution
  - Originality
  - Completeness
  - Integrity
- Usage of methods and techniques
  - Usage of process specific tools like github, trello, …
  - SysML/UML Diagrams like
    - Requirements, Use Cases, Scenarios, Constraints, Block-Diagrams, …