Integrated Systems for Industry and Space Applications
Midterm Presentation

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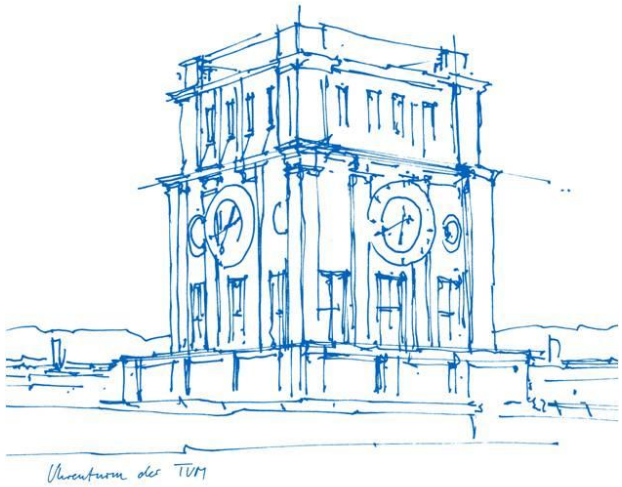


Munich, 16th of December 2022

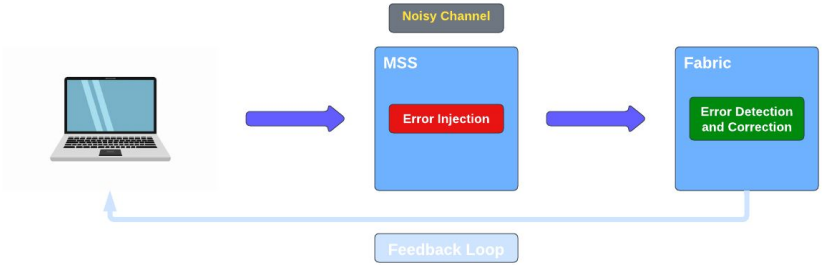
Agenda

- Project Goals and Requirements
- Specification
- Design Concept
- Development Plan
- Verification and Test Planning
- Concept discussion

Project Goals and Requirements

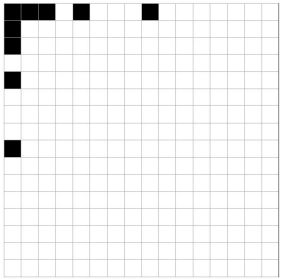
- Project Goal:
  - Error Detection and Correction as a way to deal with noisy communication channels

- Project Requirements:
  - Generate Data in PC and Send it to Makerkit
  - Simulate the effect of a noisy/unsafe communication channel using the MSS
  - Implement a Single Error Correction Double Error Detection Logic in the Fabric using Hamming Codes
  - Correct Data and Send it back to PC

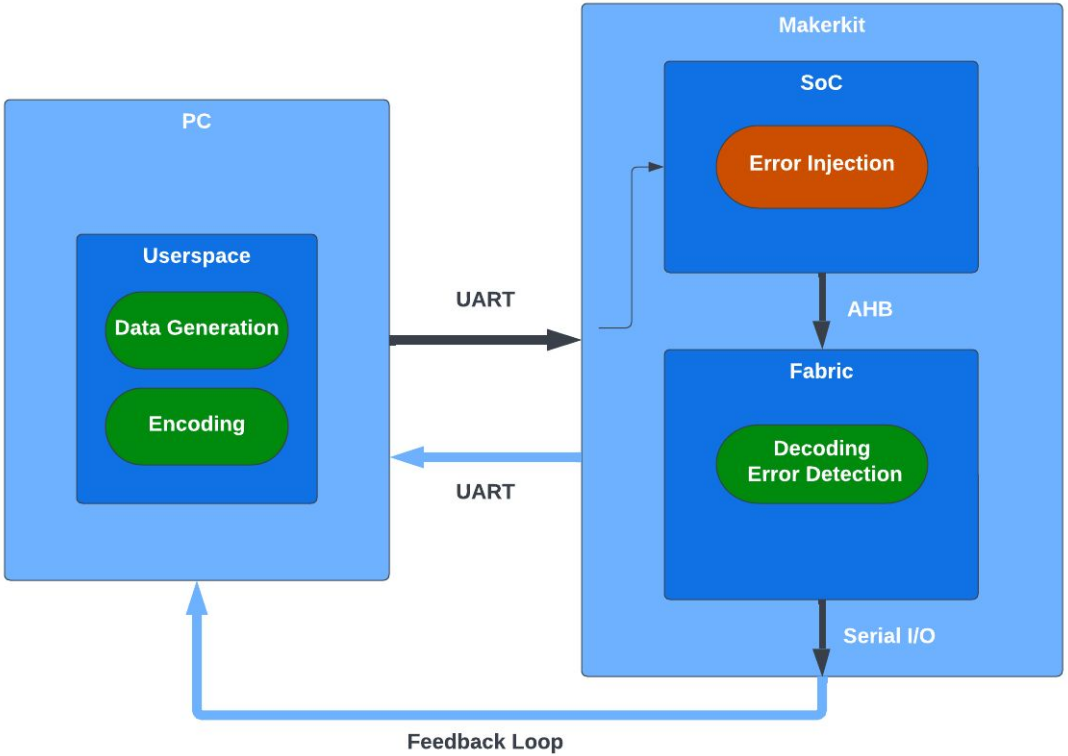


Specification

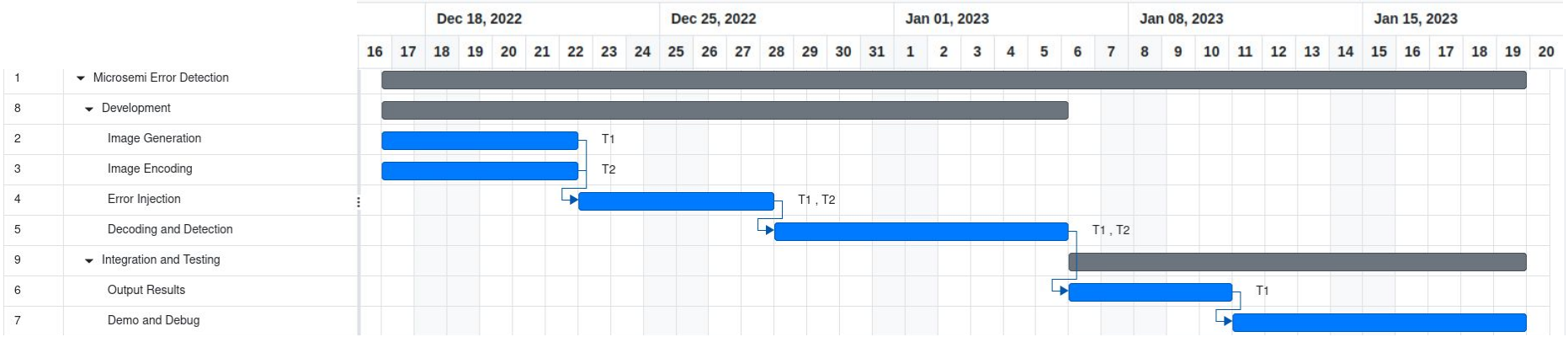
- Communication:
  - PC - MSS: UART
  - MSS - Fabric: AHB
  - Fabric - PC: SPI through Serial I/O or UART
- Data:
  - Size/Format before Encoding/Decoding: 247 Bytes (Example)
  - Encoding/Decoding: Hamming Codes
  - Size/Format after Encoding/ before Decoding: 16x16 Bits Grid
- Error Injection:
  - Takes place in the MSS
  - Randomly flip 2 bits per Grid
- Error Detection/ Error Correction
  - Takes place in the Fabric
  - Process controlled by internal Buffer (should register flags for idle,done,faulty states)
  - Gives a Feedback about frequency and location of errors in data



Design Concept



Development Plan



Verification and Test Planning

- Verify Encoding and Decoding
  - ➢ Prepare Test Vectors to verify Hamming Codes

- Verify/Assure error injection occurs
  - ➢ Provide option to extract the faulty data from MSS and visualize it before being corrected

Concept Discussion

Thank you for your attention