Position Sensing and Imitation
Final Presentation

Konstantin Koslowski, Mathis Schmieder, Moksha Birk

TU Berlin
Department of Telecommunication Systems
Telecommunication Networks Group

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Introduction

Reminder: Goal Statement

- **Goal:** Mimic position and motion of a plate

- **Sensing:** 3D MEMS attitude sensor embedded in a plate
- **Communicating:** Implement industrial bus
- **Actuating:** Rotate a plate using motors

System Specifications

Functional Overview

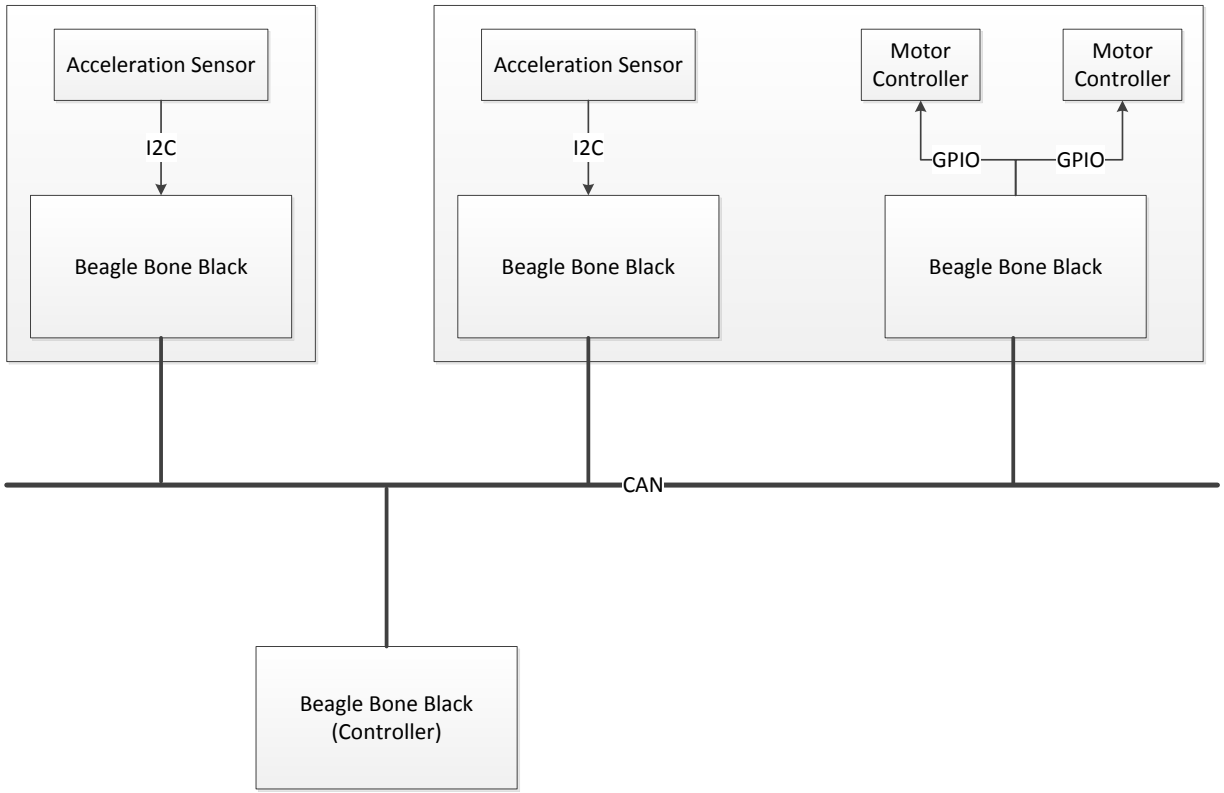

Figure: Diagram of the Functional Specification

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Bus

Bus specification

- EtherCAT could not be implemented due to
  - Unsuccessful compilation of the EtherCAT example on Linux
  - Problems with Ethernet NIC incompatibilities

- Using fallback option CAN
  - All nodes are BeagleBone Blacks
  - CAN controller: SN65HVD230

CAN

Bus Design

Reminder:

- **Timing goal:** Move plate to desired position within 1 second
- Actuation takes up to 500 ms
- Sensors report mean value every 100 ms

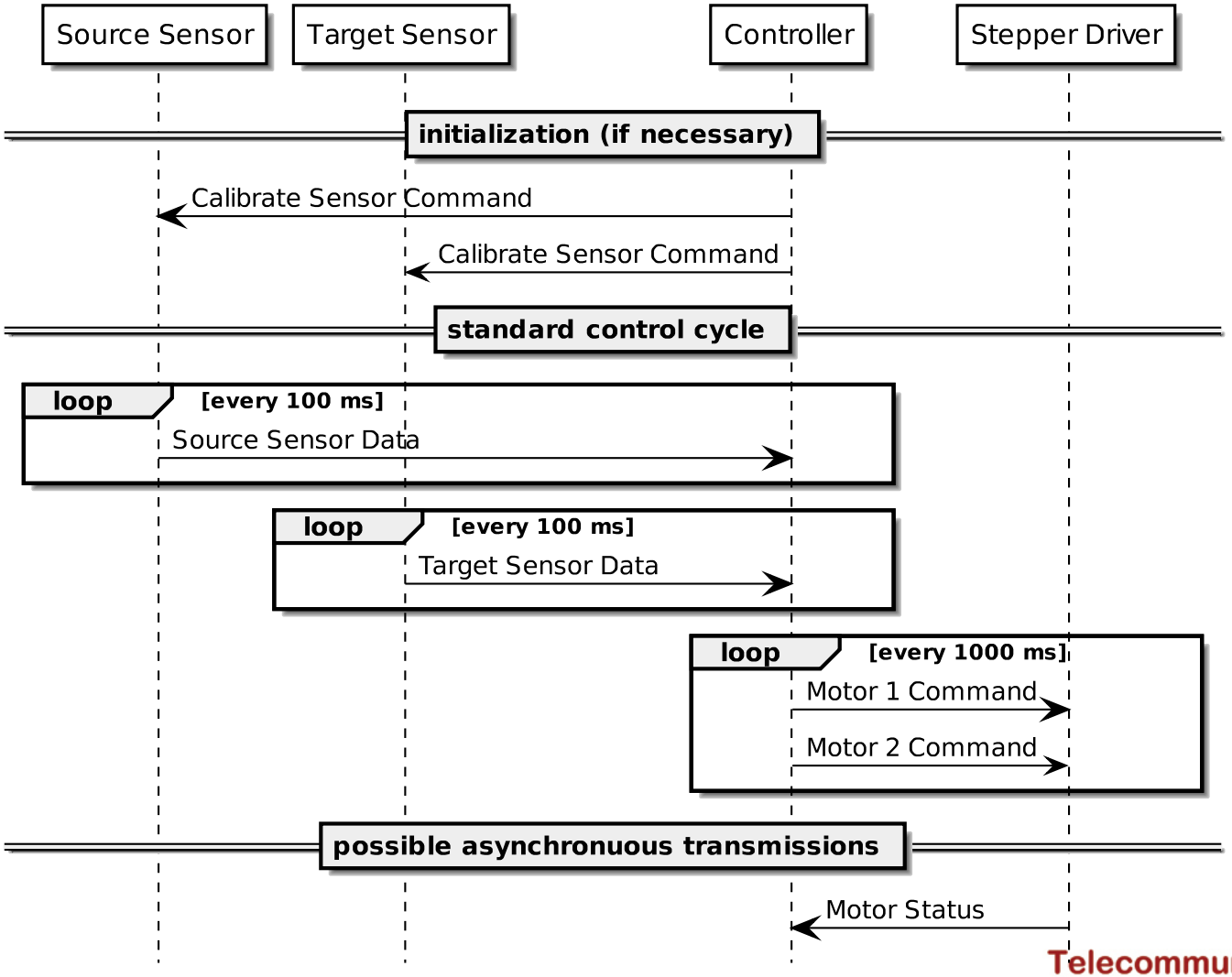
- Required cycle time: 100 ms
- Sensor values are periodically fed to the Controller from a buffer
- Controller computes movement commands and sends them to the drivers

Messsage ID Descriptions

Message Type	ID / Priority	Length
Motor Command	1	8 Bytes
Motor Status	2	6-8 Bytes
Sensor Command	4	6 Bytes
Sensor Data	8	6-8 Bytes

Table: Messages in the network

Message Sequence Diagram



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Presentation

Review

Review

Goals:

- **Overall** Mimic position of a plate: ✓
- **Sensing** Read MEMS sensor data via I2C: ✓
- **Communication** Implement industrial bus: ✓
  We had to use the fallback solution, CAN.
- **Actuation** Move plate around two axes: ✓
- **Timing** Move plate within 1 second: ∼
  Initial movement is fast, but system might oscillate
- **Documentation** Extensive *doxygen* code documentation: ✓

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Discussion

Thanks for your attention!

Questions? Ideas? Suggestions?