**Networked Embedded Systems**

**Practicum 3: Sensors and Communication**

**Group number: 8**

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# Theory Questions

*Answer the questions below in your own words, add diagrams, formulas, and calculations if necessary*

1. **What is calibration and why do the sensors need that? How are calibration values used to calculate the measurement result? Visualize the relation between calibration curve and measured values (simplified, e.g., linear curves).**
2. **Describe I2C. Where do we use it? How does communication via I2C work?**
3. **Describe UART. What does the abbreviation mean? How does communication via UART work?**

# Task A: Read Data from the LIS3MDL Magnetic Sensor

## A.1. Calculations

*Describe the necessary startup sequence. Which registers are involved and what does each command do?*

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter Description** | **Value** | **Unit (if any)** | **Register Address** |
|  |  |  |  |

*Registers for measurement:*

|  |  |
| --- | --- |
| **Description** | **Register Address** |
|  |  |

*How is the magnetic value of each axis calculated from the involved registers? Explain!*

## A.2. Implementation

*Describe your solution. Add all relevant code snippets into a listing or as screenshots and describe their purpose. Remember to use generic methods with well-defined parameters!!*

## A.3. Results

*Add a screenshot of the UART output.*

## A.4. Discussion

*Describe your experiences (e.g., design decisions, problems, lesson learned). Which part of the code will be reusable?*

# Task B: Read Humidity Values from the HTS221 Sensor

## B.1. Calculations

1. *Describe the necessary startup sequence (e.g., set CTRL\_REG1 (20h) to 0x81). What is the default value of CTRL\_REG1?*
2. *Describe how the relative humidity is calculated (incl formula) and describe each parameter! Which registers are involved? Which parameters are constants? Which parameters change? Where do you find the values that are needed for your calculation?*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Description** | **Value or source** | **Unit (if any)** | **Register address** |
|  |  |  |  |  |

## B.2. Implementation

*Describe your solution. Add all relevant code snippets into a listing or as screenshots and describe their purpose.**Remember to use generic methods with well-defined parameters!!*

## B.3. Results

*Add a screenshot of the UART output.*

## B.4. Discussion

*Describe your experiences (e.g., design decisions, problems, lesson learned). Which part of the code will be reusable?*

# Task C: Read Temperature Values from the HTS221 Sensor

## C.1. Calculations

*Describe how the temperature is calculated (incl formula) and describe each parameter! Which registers are involved? Which parameters are constants? Which parameters change? Where do you find the values that are needed for your calculation?*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Description** | **Value or source** | **Unit (if any)** | **Register Address** |
|  |  |  |  |  |

## C.2. Implementation

*Describe your solution. Add all relevant code snippets into a listing or as screenshots and describe their purpose.**Remember to use generic methods with well-defined parameters!!*

## C.3. Results

*Add a screenshot of the UART output.*

## C.4. Discussion

*Describe your experiences (e.g., design decisions, problems, lesson learned). Which part of the code will be reusable?*

# Task D: Read Temperature & Pressure Values from the LPS22HH Sensor

## D.1. Calculations

*For the startup, you have to set the registers CTRL\_REG1 and CTRL\_REG2. Based on the application notes, choose a fitting operation mode and justify your choice*

|  |  |  |
| --- | --- | --- |
|  | **Register** | **Value** |
| CTRL\_REG1 |  |  |
| CTRL\_REG2 |  |  |

*Describe how the pressure is calculated (formula) and fill in the following table:*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Description** | **Value or source** | **Unit (if any)** | **Register Address** |
|  |  |  |  |  |

*Describe how the temperature is calculated (formula) and fill in the following table:*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Description** | **Value or Source** | **Unit (if any)** | **Register Address** |
|  |  |  |  |  |

## D.2. Implementation

*Describe your solution. Add all relevant code snippets into a listing or as screenshots and describe their purpose.**Remember to use generic methods with well-defined parameters!!*

## D.3. Results

*Add a screenshot of the UART output.*

## D.4. Discussion

*Describe your experiences. Does your solution have any limitations? How would an ideal solution behave in your opinion?*

# Index

**Keine Indexeinträge gefunden.**

## Figures

**Es konnten keine Einträge für ein Abbildungsverzeichnis gefunden werden.**

## Code Segments

**Es konnten keine Einträge für ein Abbildungsverzeichnis gefunden werden.**

## Tables

**Es konnten keine Einträge für ein Abbildungsverzeichnis gefunden werden.**