I2C Drivers

For

AVR Microcontrollers

Nti Team

Software Requirement Specification Document

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1. Scope of Document

This document specifies requirements on the module DIO Driver.

1.1 Constraints

First scope for specification of requirements on basic software modules is systems which are not safety relevant. For this reason safety requirements are assigned to medium priority.

2. Requirements Structure

Each module specific chapter contains a short functional description of the Basic Software Module. Requirements of the same kind within each chapter are grouped under the following headlines (where applicable):

Functional Requirements: -

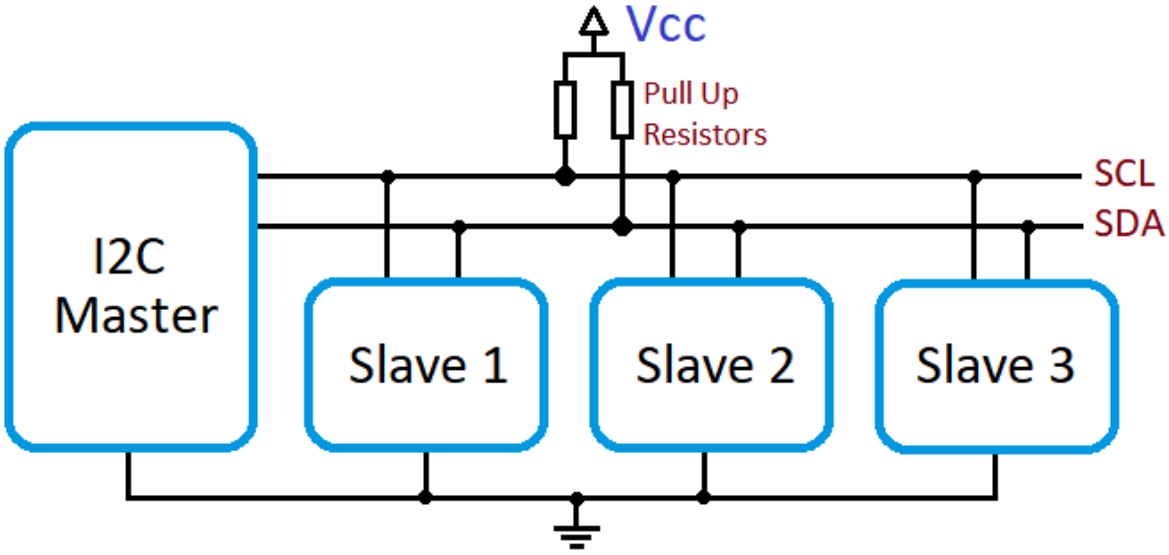
- Configuration (which elements of the module need to be configurable).
- Initialization.
- Normal Operation.
- Shutdown Operation.
- Fault Operation.
- …….

Non-Functional Requirements:-

- Timing Requirements.
- Resource Usage.
- Usability.
- Output for other WPs (e.g. Description Templates, Tooling,...).
- …….

3. Functional Overview

I2C, or Inter-Integrated Circuit, is a popular serial communication protocol used for connecting various digital devices within an embedded system or on a printed circuit board (PCB). It is widely used in a variety of applications, including sensors, displays, EEPROMs, and many other components.



4. Requirement Specification

4.1 Functional Requirements

- [I2C_001] the driver shall be compatible with all AVR microcontrollers.
- [I2C_002] The AVR I2C driver shall not buffer data when providing read and write services.
- [I2C_003] The AVR I2C driver shall provide initialization function to set specific configuration.
- [I2C_004] The AVR I2C driver shall provide start function.
- [I2C_005] The AVR I2C driver shall provide Stop function.
- [I2C_006] The AVR I2C driver shall provide Write function and write with NACK function.

- [I2C_007] The AVR I2C driver shall provide read function and read withACK /NACK function.
- [I2C_008] The AVR I2C driver shall provide function to get status back.

4.2Non-functional requirements

- The driver shall be easy to use and understand.
- The driver shall be well-documented.
- The driver shall be efficient and use minimal resources.
- The driver shall be reliable and robust.
- In addition to the above requirements, the I2C driver should also meet the following non-technical requirements.
- The driver should be open source and freely available to use.
- The driver should be actively maintained and supported by the community.
- The driver should be well-tested and documented.
- The driver should be compatible with a variety of development tools and environments.

File Structure

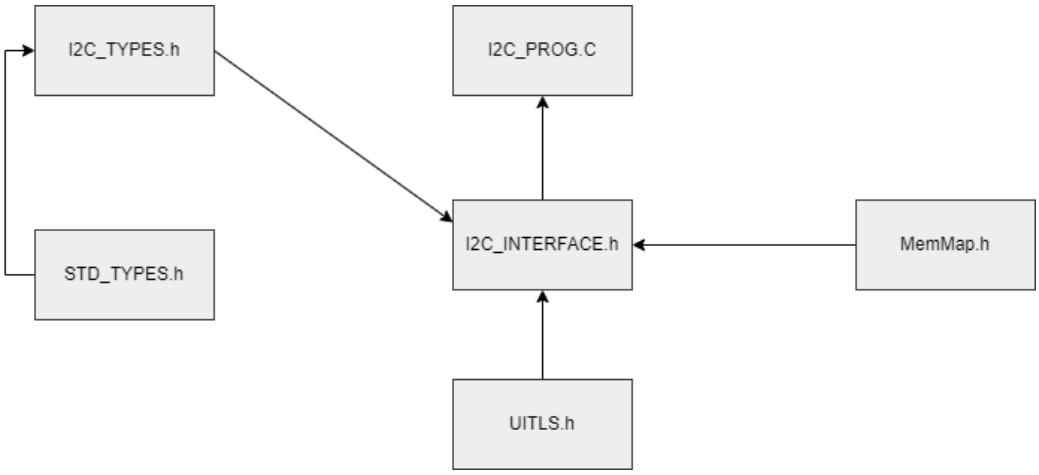


Figure 1: I2C Files

5. State Machine

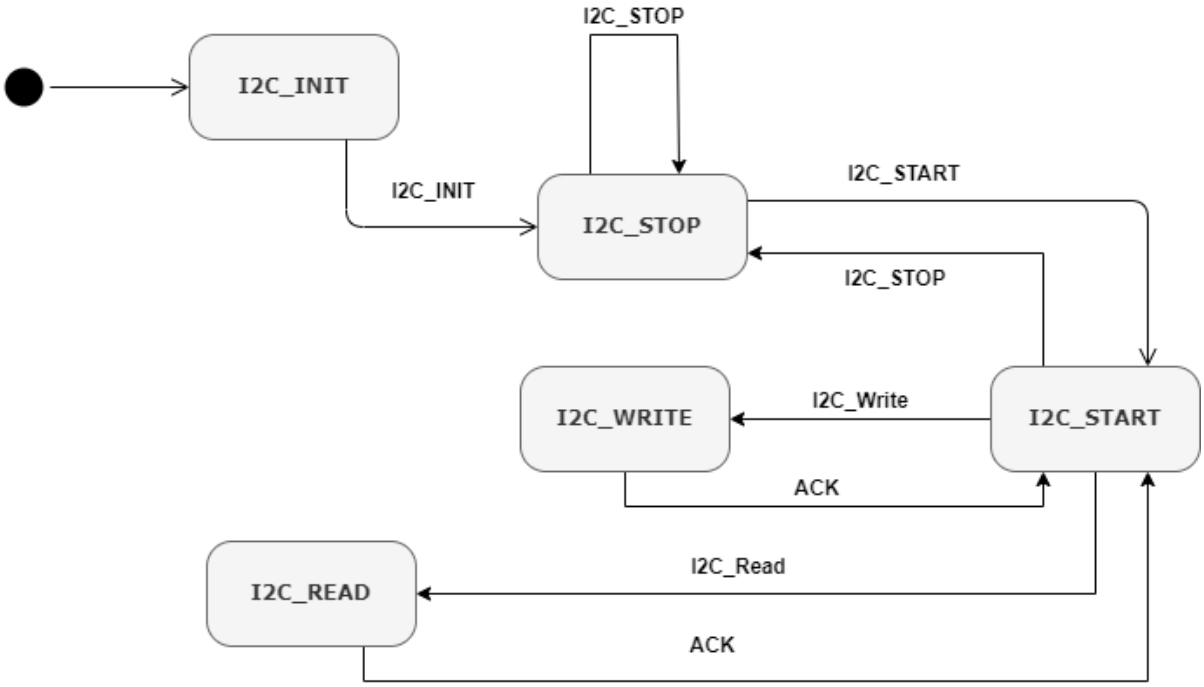


Figure 2: I2C State Machine

Sequence diagram

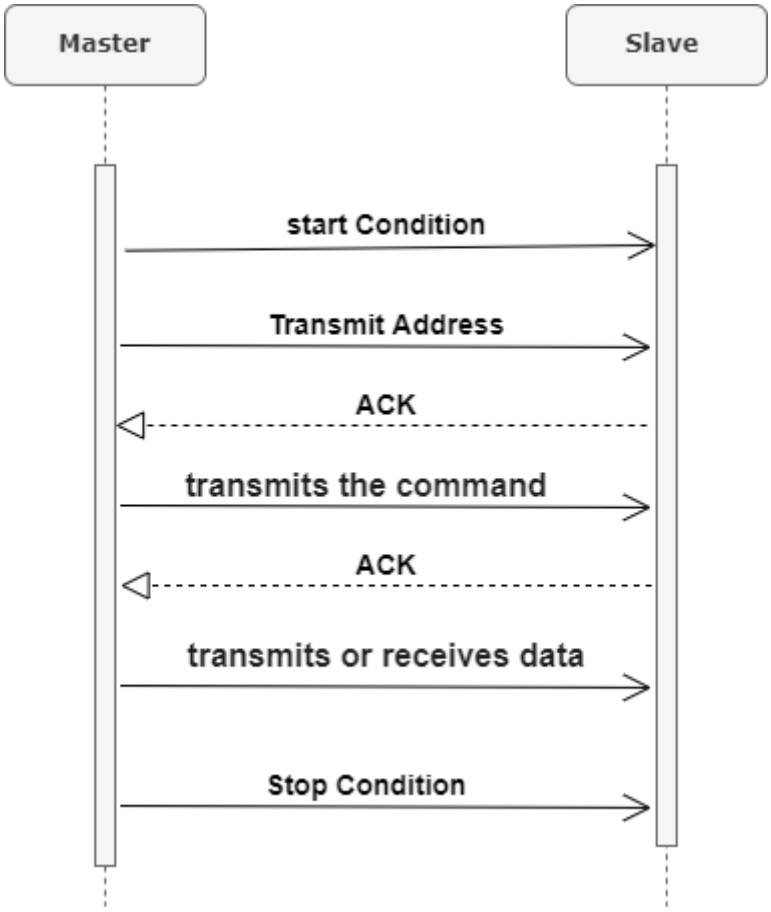


Figure 3: I2C Sequence diagram

Acceptance Criteria

The I2C driver shall be accepted when it meets the following criteria:

- The driver shall compile and run without errors on all AVR microcontrollers.
- The driver shall pass all unit tests.
- The driver shall pass all integration tests.
- The driver shall pass all system tests

6. References

1. Developers of NTI team.
2. AVR Microcontroller Datasheets.