Mining Environment Inspection Module

ECEN 5613 – Embedded System Design

Project Design Review (PDR)

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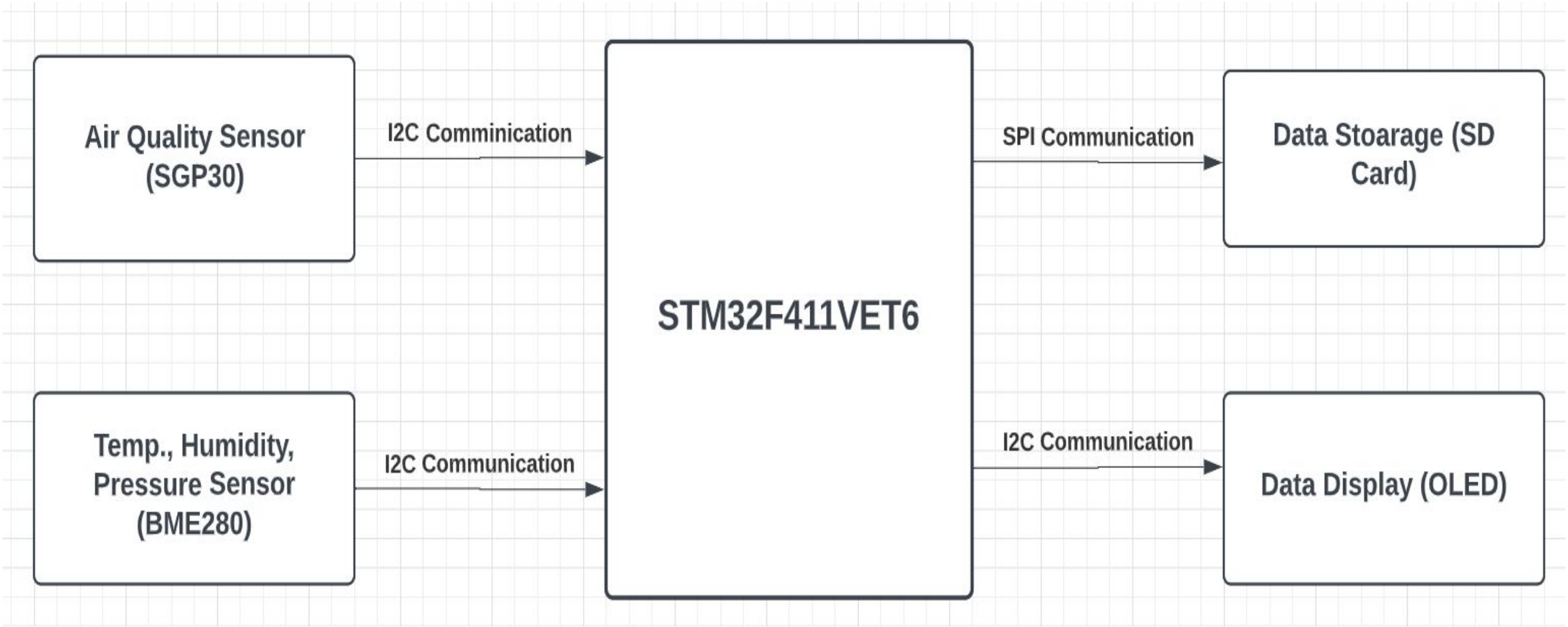
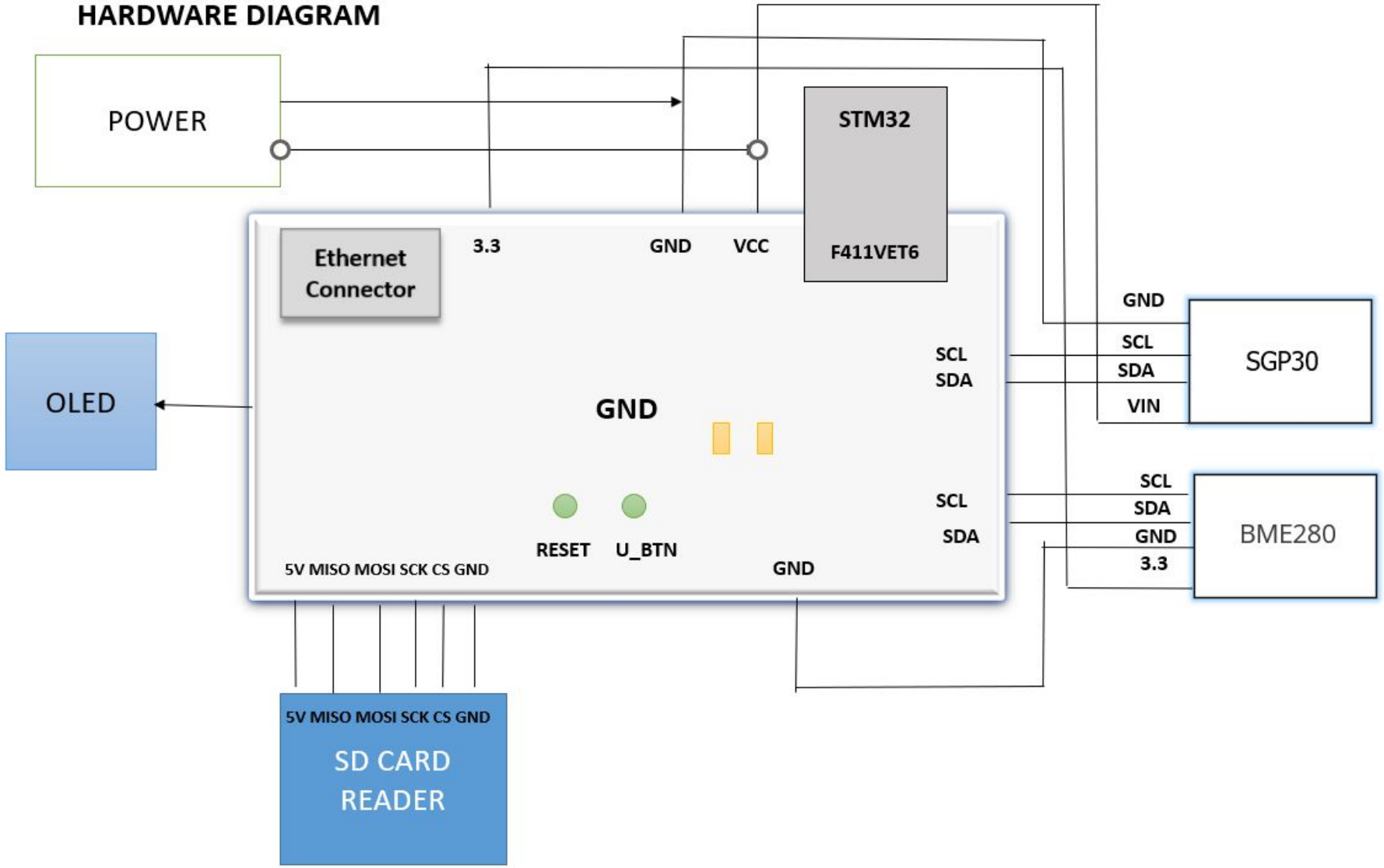
Project Overview

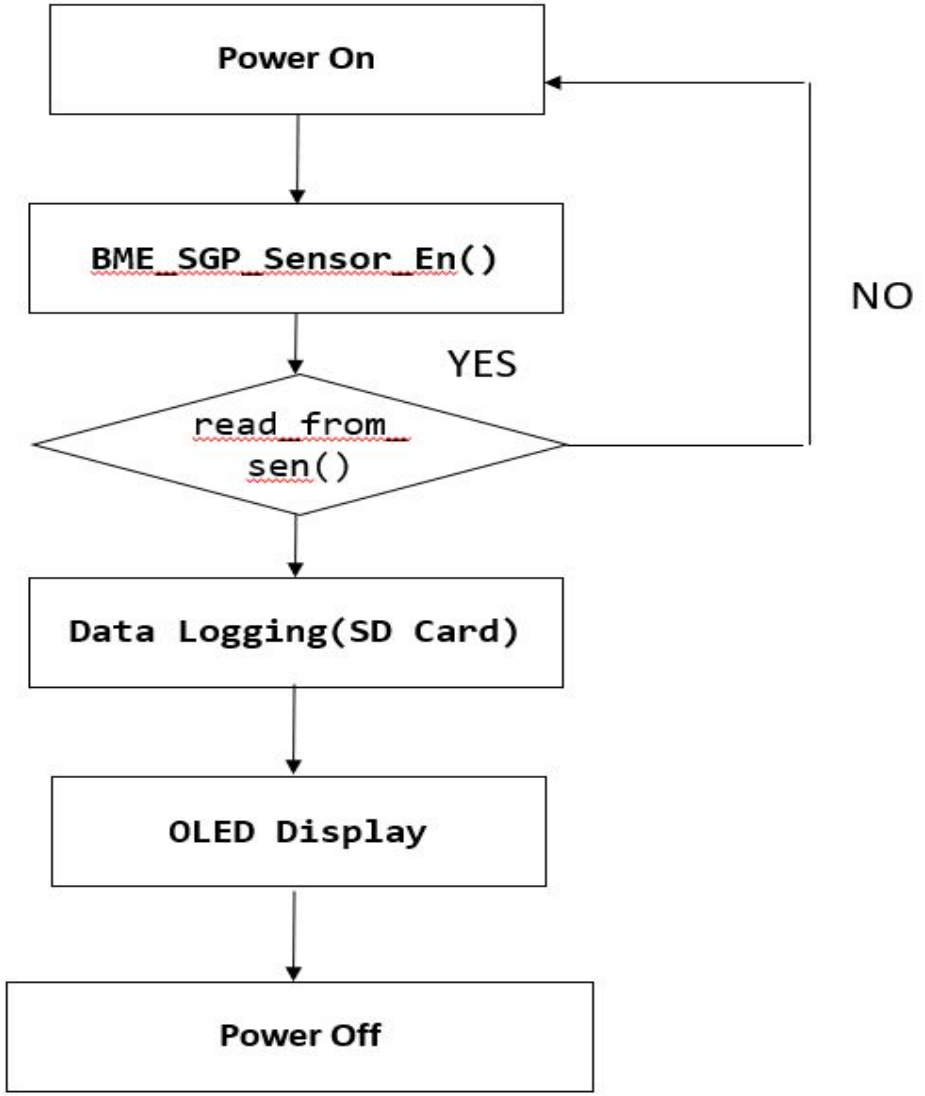
- Developing a portable device to inspect the mining-environment in order to decide whether the mine-environment is safe for the mine-workers or not.
- Determining the environment conditions like the harmful gases present, temperature, pressure and the humidity based on the sensor data
- Log the environment data and use this information for the decision making.

Block Diagram

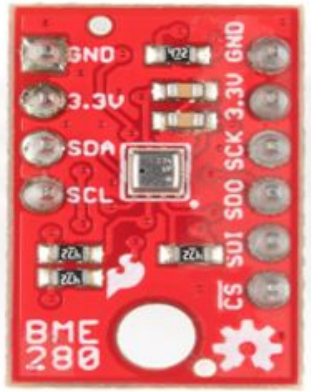



HARDWARE DIAGRAM
POWER
STM32
F411VET6
Ethernet Connector
3.3
GND
VCC
OLED
GND
SCL
SDA
RESET
U_BTN
5V MISO MOSI SCK CS GND
GND
SCL
SDA
VIN
SGP30
SCL
SDA
GND
3.3
BME280
5V MISO MOSI SCK CS GND
SD CARD READER

Software Flow Diagram



Sensor Details

Sensor Name	Functionality & Features
Air Quality Sensor – **SGP30** 	• Detects hydrocarbons and carbon dioxide levels in the surrounding environment. • I2C interface • 3.3V or 5V compatible
Temperature, Humidity & Pressure Sensor – **BME280** 	• Measures ambient temperature, barometric pressure, and relative humidity. • I2C/SPI interface

Project milestones

Task	Student(s) Responsible	Target Completion Date	Expected Completion Date
Ordering Components	Both	19 March	19 March
Interfacing Air Quality Sensor SGP30	Vaishnavi	26 March	26 March
Interfacing BME280 Sensor	Mrunal	26 March	26 March
SD card over SPI data logger to record data points	Both	9 April	9 April
OLED interfacing	Vaishnavi	16 April	16 April
PCB designing	Mrunal	23 April	23 April
Testing and Stretch goals	Both	Last week	Last week

New Software/Hardware Implementation

- Data Logging using SD card (SPI Communication, FatFs File System)
- PCB Design (using Altium) and manufacture of prototype
- OLED Display
- Temperature Sensor hardware bring-up (Extended)
- Data communication via Bluetooth (Extended)

Project Deliverables

- **Project Basic Goals**
  - Interfacing Air Quality Sensor SGP30 with STM32 Microcontroller.
  - Interfacing BME280 Sensor with STM32 with STM32 Microcontroller.
  - SD card over SPI data logger to record the data.
  - PCB designing
- **Fall-back plan**
  - Wireless data display using Bluetooth in case data logging through SD card does not work
  - Solderless breadboard implementation if PCB board isn't functional
- **Stretch requirements**
  - Motor driving Bot
  - Temperature Sensor Bring-Up