A screenshot of a cell phone

Description automatically generated

System Design Document

# Hardware:

## Embedded board:

* Embedded board (STM Nucleo 64) – Arm Cortex M3/M4

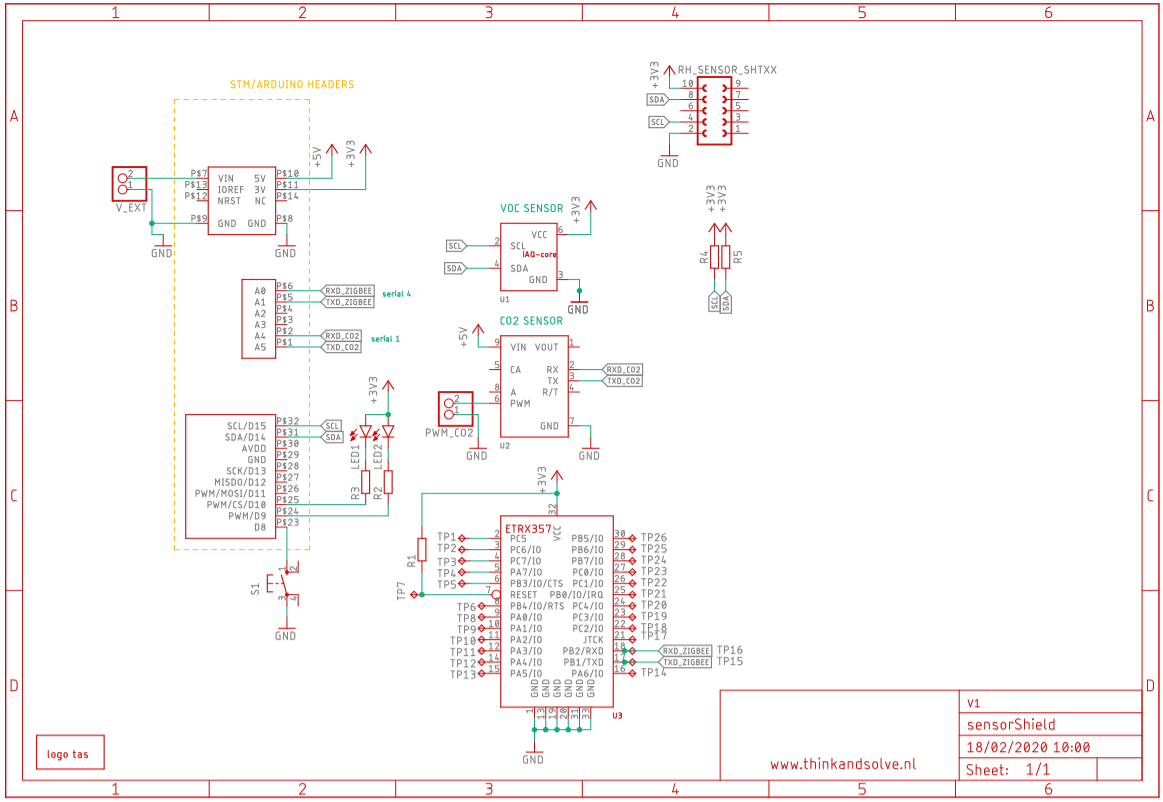
## Sensors:

* Cubic CM1106 CO2 sensor (UART)
* Sensirion SHT20x humidity/temperature sensor (I2C)
* Sensirion SPS30 Particulate Matter sensor (I2C/UART)

## Communication:

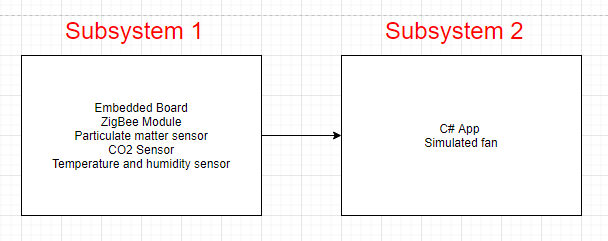
* ETRX357 Zigbee module (UART, AT-Commands)

## Wiring diagrams:



# System design

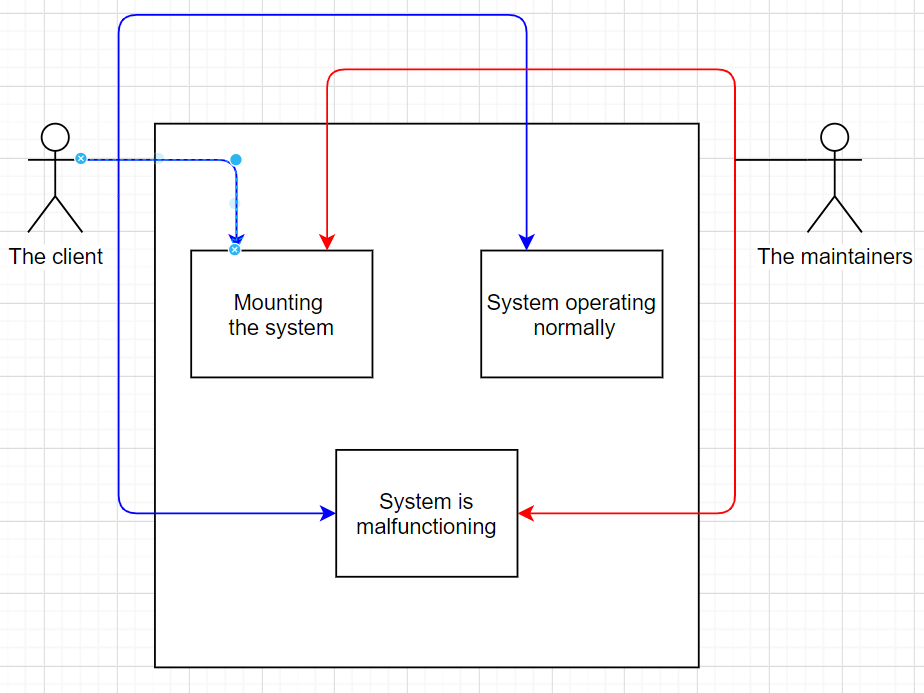
## System architecture diagram



## System context diagram

Our system contains both the embedded board with the connected sensors and ZigBee module and the C# app with the simulated fan.

Our external entities will be the client and the maintenance team (us).



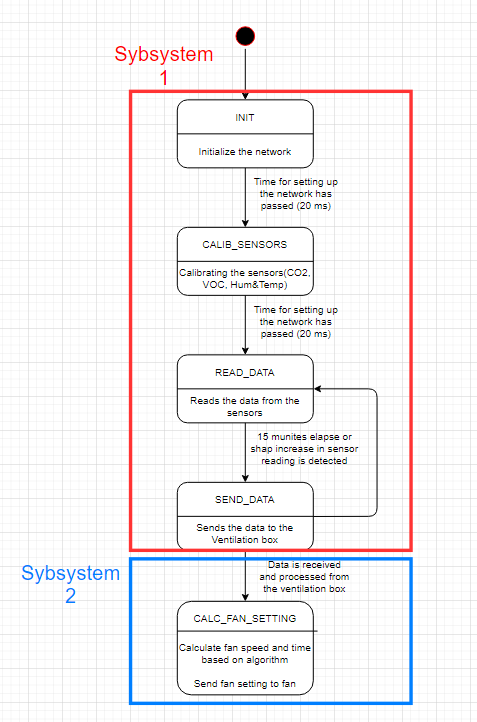
# Communication protocols

Messages are sent every 15 minutes and at sharp changes of CO2, matter, temperature or humidity.

STM Nucleo – master;

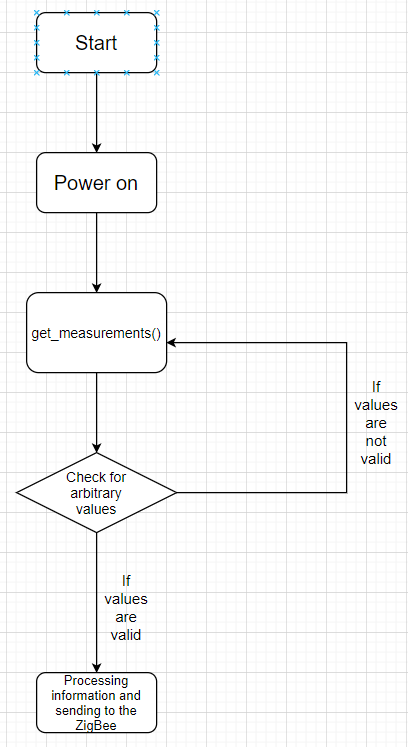
ZigBee Module – slave;

State diagram

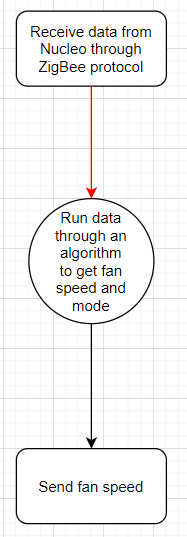


# Control flow charts

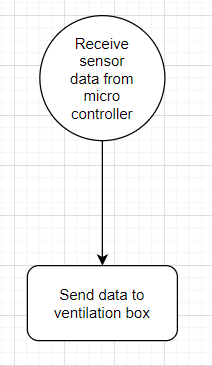
* The control flow chart for the communication between the modules and the ZigBee.



* The control flow chart for the communication between the ZigBee and the Ventilation Box.



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* The control flow chart for the communication between the Ventilation Box and the fan.