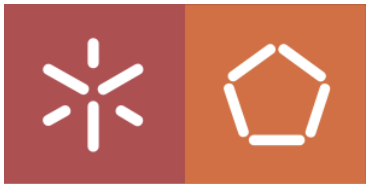

Universidade do Minho
Escola de Engenharia

Master's in Industrial Electronics and Computers Engineering

University of Minho

5S

Sensoring System for Surface Sea Streams

Integrative Project in Industrial Electronics and Computers

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Project Plan

1.1 Introduction

Under the course unity of Integrative Project in Industrial Electronics and Computers the students must apply for professors

1.1.1 Problem Statement

Descobrir o mar Portugal e os descobrimentos Fernando pessoa

1.1.2 Problem Statement Analysis

Chapter 2

Analysis

2.1 Requirements and Constraints

2.1.1 Requirements

- Search and selection of hardware components.
- Software design.
- PCB design.
- 5S 3D design.
- Actual product realization.
- Laboratory tests.

2.1.2 Constraints

- The firmware of the STM32 is allready set.
- The project must be presented for avaluation within deadline.
- The project has to be valitated at the ocean.

2.2 State of the art

2.2.1 Economy

2.2.2 Ecology

2.2.3 Sports

2.3 Market Research

2.4 System Architecture

Chapter 3

Design

3.1 Analysis Review

3.2 Hardware Specification

3.2.1 STM32

microcontroler

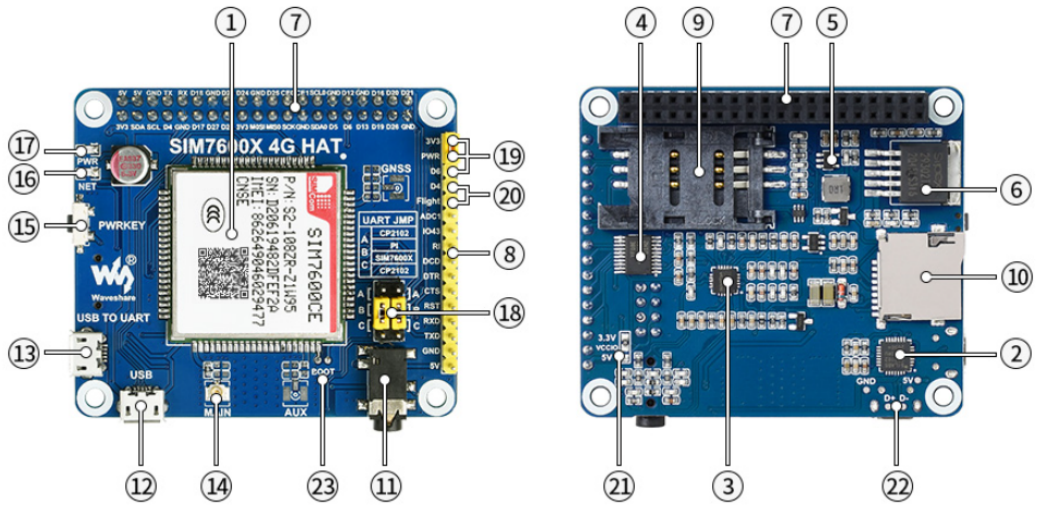
3.2.2 BMI088 IMU Sensor

gyroscope and acelerometer

3.2.3 SIM7600E-H

The module SIM7600E-H, developed by SIMCom, is a 4G/3G/2G LTE module that comunicates via UART commads using an intern parser described on the module datasheet. The waveshare Board with the module, comes with a set of extra functionalities for extra support to the module normal usage.

The following image, taken from the Waveshare board datasheet, lists the hardware features.



1. SIM7600CE-CNSE
2. CP2102 USB to UART converter
3. NAU8810 audio decoder
4. TXS0108EPWR voltage translator
   - translates 3.3V/5V into 1.8V
5. MP2128DT power chip
6. SPX29302 power chip
7. Raspberry Pi GPIO header
   - for connecting with Raspberry Pi
8. SIM7600 control interface
   - for connecting with host boards like Arduino/STM32
9. SIM card slot
   - supports 1.8V/3V SIM card
10. TF card slot
    - for storing data like files, messages, etc.
11. 3.5mm earphone/mic jack
    - for audio actions like making telephone call
12. USB interface
    - for testing AT Commands, and so on
13. USB TO UART interface
    - for serial debugging, or login to Raspberry Pi
14. MAIN antenna connector
15. Module power switch
16. Network status indicator
17. Power indicator
18. UART selection jumper
    - A: access Raspberry Pi via USB to UART
    - B: control the SIM7600 by Raspberry Pi
    - C: control the SIM7600 via USB to UART
19. PWR selection jumper
    - PWR - 3V3: auto startup on power-up
    - PWR - D6: startup/shutdown by the Raspberry Pi D6 pin
20. Flight mode selection jumper
    - NC by default, no flight mode control pin
    - Flight - D4: flight mode is controlled by the Raspberry Pi D4 pin
21. Operating voltage selection jumper
    - VCCIO - 3.3V: set operating voltage as 3.3V
    - VCCIO - 5V: set operating voltage as 5V
22. USB connector solder pads
23. BOOT forced programming solder pads

Figure 3.1: SIM7600 datasheet

The hardware configurations, as idicated on the datasheet should follow the leading steps.

As for the UART communication, the list of commads are listed on the datasheet. As for better flow, here are listed the commadsused along the project and their functionalities.

3.3 Tools and COTS

3.3.1 Tools

3.3.2 COTS

GPS and 4G module

Inkscape

draw.io

STM32 CUBEmx

LaTeX

3.4 Software Specification

3.5 Theorical Concepts

Chapter 4

Implementation

4.1 Hardware

4.2 Software

4.2.1 DataBase Comunication

Chapter 5

Conclusion

5.1 Gantt Diagram

5.2 Bibliografy