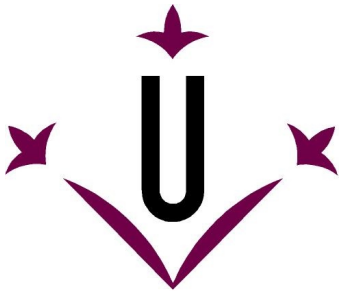

University of Lleida

Master's Degree in Informatics Engineering

Higher Polythecnic School

Sprint 1 Documentation

Ubiquitous Computing and Embedded Systems

Francesc Contreras

Albert Pérez

Marc Visa

November 10, 2021

Table of contents

1 Introduction **1**

2 Product Backlog **2**

3 Sprint 1 Definition **3**
3.1 User stories 3
3.2 Sprint 1 Backlog Tasks 4
3.3 Story Points 4

4 Sprint Review **5**
4.1 Percentage Of Sprint Completion 5
4.2 Cummulative flow 7
4.3 Burn-down report 8

List of Figures

1 Wind turbine generator prototype schema 1
2 Sprint 1 Backlog remaining-completed tasks 6
3 Story points and Tasks/Issues percentatge of completion 6
4 Cummulative-flow graph 7
5 Cummulative-flow table 7
6 Burn-down graph 8

1 Introduction

The purpose of this document is describing the *Sprint 1* for the subject *Ubiquitous Computing and Embedded Systems* project of the *University of Lleida* (UdL) which is about a desing, test, and development of a **Wind Turbine Generator Farm (WTGF)**.

Subsequently, you will appreciate the product backlog tasks at first instance, as well as the selected ones for this first sprint. Even more, the sprint definition.

Finally, is detailed the spint review as ending part, but also the percentatge of completion.

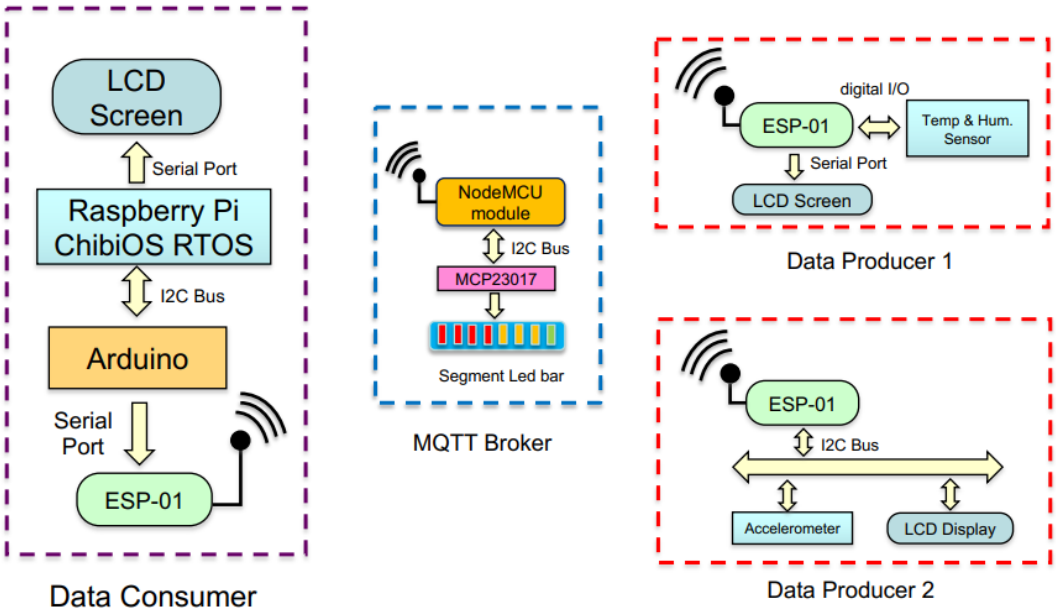

Figure 1: Wind turbine generator prototype schema

2 Product Backlog

The Product Backlog Item (PBI) got a total of **122 story points**, and is described as follows,

Task	**Label**	**Story Point**
Revise Material	Good first issue	2
Read Documentation ESP-01	Learning	3
Read Documentation DHT11	Learning	3
Prepare Arduino Environment	Learning	3
First contact with electronic components	Learning	8
Read Documentation Accelerometer ADXL345	Learning	3
Data Producer 1 development	Enhancement	8
Data Producer 2 development	Enhancement	8
Sprint documentaiton	Documentation	8
Read documentation LCD Screen/Display	Learning	2
Read documentation I2C Bus Protocol	Learning	2
Install ChibiOS to Raspberry Pi	Enhancement	3
Prepare Raspberry Pi environment	Learning	3
Read documentation about NodeMCU module	Learning	3
Arduino interaction with ESP-01	Enhancement	8
Read documentation MCP23017	Learning	3
Test Supervision Station	Testing	5
Test MQTT Broker	Testing	5
Test Data Producer 1	Testing	5
Test Data Producer 2	Testing	5
Data consumer: Data log and Screen representation	Enhancement	8
Data consumer: Ultrasonic LED bar representation	Enhancement	8
Arduino interaction with Raspberry Pi	Enhancement	8

3 Sprint 1 Definition

This first sprint aims to introduce us to work with electronic components, know them better and how to program it. Basically, to make our first steps into the project, investigate about the its parts and do quick tutorials since we may start working on the Data producers.

3.1 User stories

1. As a user I would like to know to obtain the temperature and humidity at the top of the Wind Turbine Generator.
   (a) **Acceptable Criteria:**
      i. The Data Producer 1 uses ESP-01 to receive the data from the DHT11 sensor.
      ii. The ESP-01 sends the data obtained to the LCD Screen to visualize it.
   (b) **Related Task:**
      i. Data Producer 1 Development.
2. As a user I would like to know the Wind Turbine Generator tower movement.
   (a) **Acceptable Criteria:**
      i. Data Producer 2 uses ESP-01 to receive the data from the ADXL345 sensor.
      ii. The ESP-01 sends the data obtained to the LCD Display to visualize it.
   (b) **Related Task:**
      i. Data Producer 2 Development.

The first user story corresponds to the work-block named Data Producer 1, which components related to are:

- ESP-01
- Temperature and humidity sensor (DHT11)
- LCD Screen

The second user story corresponds to the work-block named Data Producer 2, which components related to are:

- ESP-01
- I2C Bus
- Accelerometer (ADXL345)
- LCD Display

Therefore, the sprint goal for this sprint 1 is to have a working version of the Data Producer 1 and the Data Producer 2 of the project, once we got introduced to work with such components.

3.2 Sprint 1 Backlog Tasks

As for this first sprint, it has been picked the following tasks:

Task	**Label**	**Story Point**
Revise Material	Good first issue	2
Read documentation ESP-01	Learning	3
Read documentation DHT11	Learning	3
Prepare Arduino environment	Learning	3
Frist contact with electronic components	Learning	8
Read documentation Accelerometer ADXL345	Learning	3
Data Producer 1 development	Enhancement	8
Data Producer 2 development	Enhancement	8
Sprint documentation	Documentation	8
Read documentation LCD Screen/Display	Learning	3
Read documentation I2C Bus Protocol	Learning	3
Test Data Producer 1	Testing	5

The total story points for the Sprint 1 are **55 points**.

3.3 Story Points

Regarding the estimation story point for each task, we would like to remark that we used **the Scrum Poker technique** via the next webpage https://scrumpoker.online/.

Thus, we assure each of the sprint participants may ponderate each task without interference and anonymously. In this way, the influence is none and we obtain realistic story points for each task.

4 Sprint Review

The goal of this sprint was to get introduced to the electronic components as well as how to program them via the Arduino IDE and its libraries. Initiate us to begin the project for the Data producer 1 development and obviously to start working with its components such as the ESP-01, the Humidity sensor, etc.

In addition, we planned this sprint to start doing our first programs to test each of the components that we should use, such as LCD Screen/Display, or even how to work with the WiFi networks, or how the I2C Bus should be programmed.

The Sprint 1 lasted 14 days, from 29th of October to 11th of November.

4.1 Percentage Of Sprint Completion

The following are specified the percentage of completion for each task of the Sprint 1 backlog, as well as an estimated dedication time in hours for the whole team.

Task	**Completion (%)**	**Team dedication time (h)**
Revise Material	100	1
Read documentation ESP-01	100	2
Read documentation DHT11	100	2
Prepare Arduino environment	100	1
First contact with electronic components	100	4
Read documentation Accelerometer ADXL345	100	2
Data Producer 1 development	100	5
Data Producer 2 development	20	2
Sprint 1 documentation	100	3
Read documentation LCD Screen/Display	100	2
Read documentation I2C Bus Protocol	100	3
Test Data Producer 1	100	3

The total dedication time for the Sprint 1 is **30h**, which means that for 14 days availables we dedicated **2:15h per day** approx.

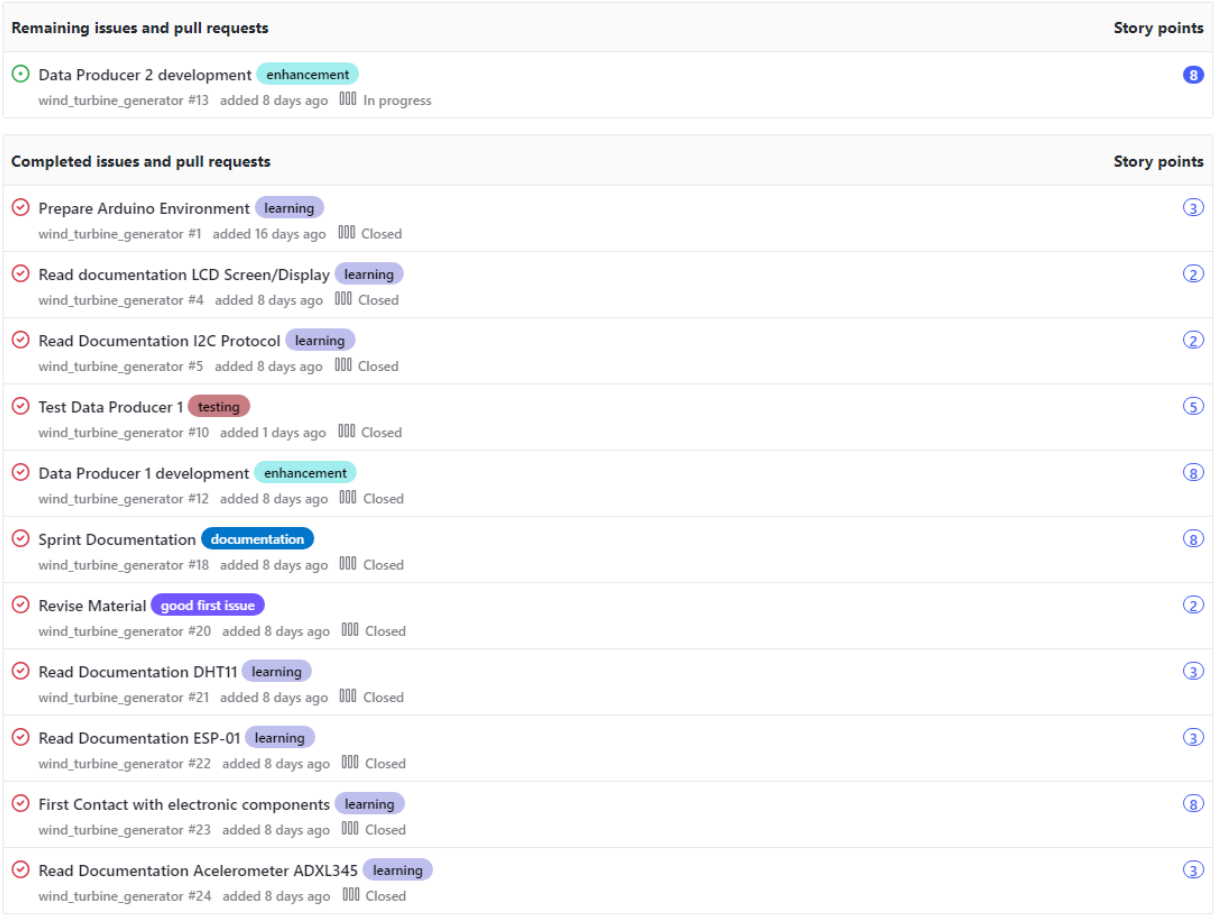

Figure 2: Sprint 1 Backlog remaining-completed tasks

We expected to finally get the two Data Producers as they are similar but we realized that is not as easy as we expected when problems arise. The Data Producer 1 is done, just needs a quick clean of the code and integration with the broker, and the Data Producer 2 we expect to work more on the I2C Bus.

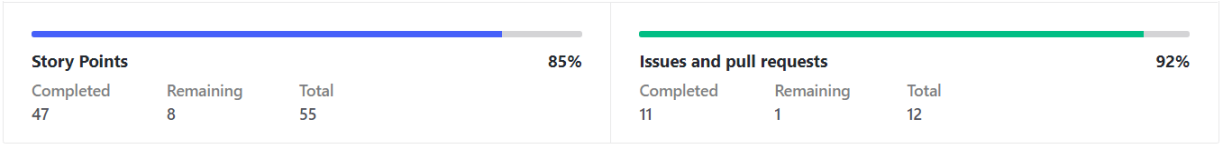

Figure 3: Story points and Tasks/Issues percentatge of completion

Finally, we finish this first sprint with **85% (47/55) of the tasks done**, which means that we have to adjust the number of story points for the next sprint.

4.2 Cummulative flow

The cumulative flow diagram is one of the most advanced analytics in Agile project management. It provides a concise visualization of the metrics of flow. It shows you how stable your flow is and helps you understand where to focus on making your process more predictable.

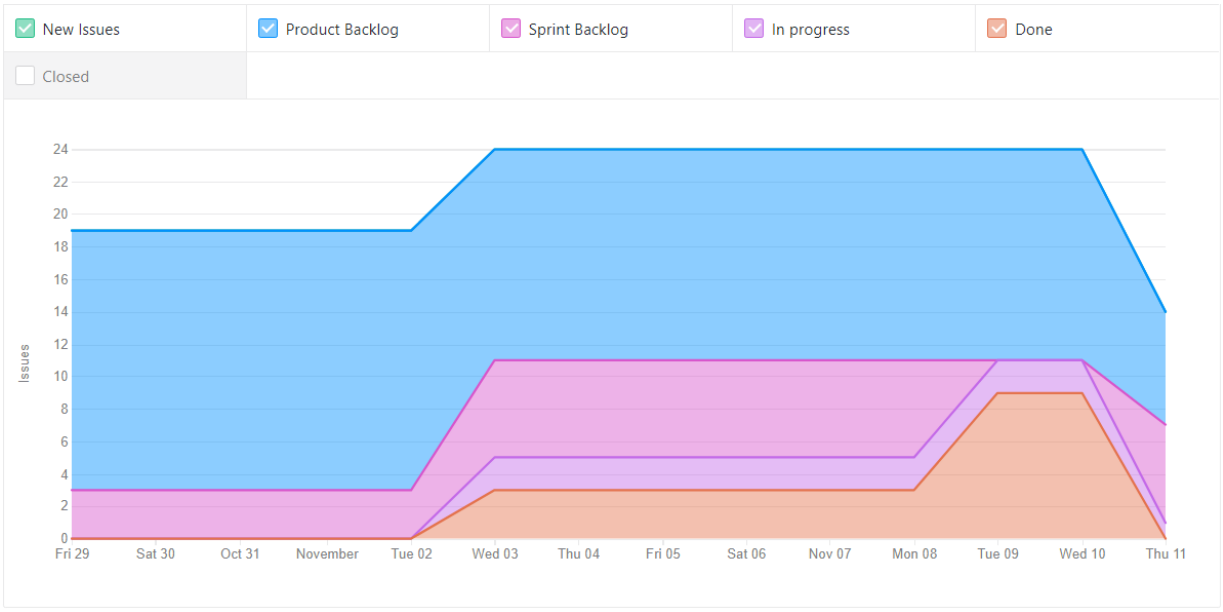

Figure 4: Cummulative-flow graph

Issues in pipeline	November 8th	November 9th	November 10th	November 11th
New Issues	0	0	0	0
Product Backlog	13	13	13	7
Sprint Backlog	6	0	0	6
In progress	2	2	2	1
Done	3	9	9	0
Closed	0	0	0	11

Figure 5: Cummulative-flow table

4.3 Burn-down report

The burn-down chart shows the amount of work that has been completed in a specific sprint, and the total work remaining. Burn-down charts are used to predict your team's likelihood of completing their work in the time available.

The team worked well together and the sprint advanced smoothly. Although everything was new to all of us - from working with Scrum to the chosen technologies, we were well integrated, everyone was very supportive and open to researching, learning, and even teaching if necessary.

Lastly, as mentioned we should adjust the next sprint amount of story points, as we couldn't finish all the tasks in this one, because we just completed 47 from 55 story points. Thus, is still remaingin one task/issue, the Data Producer 2 development.

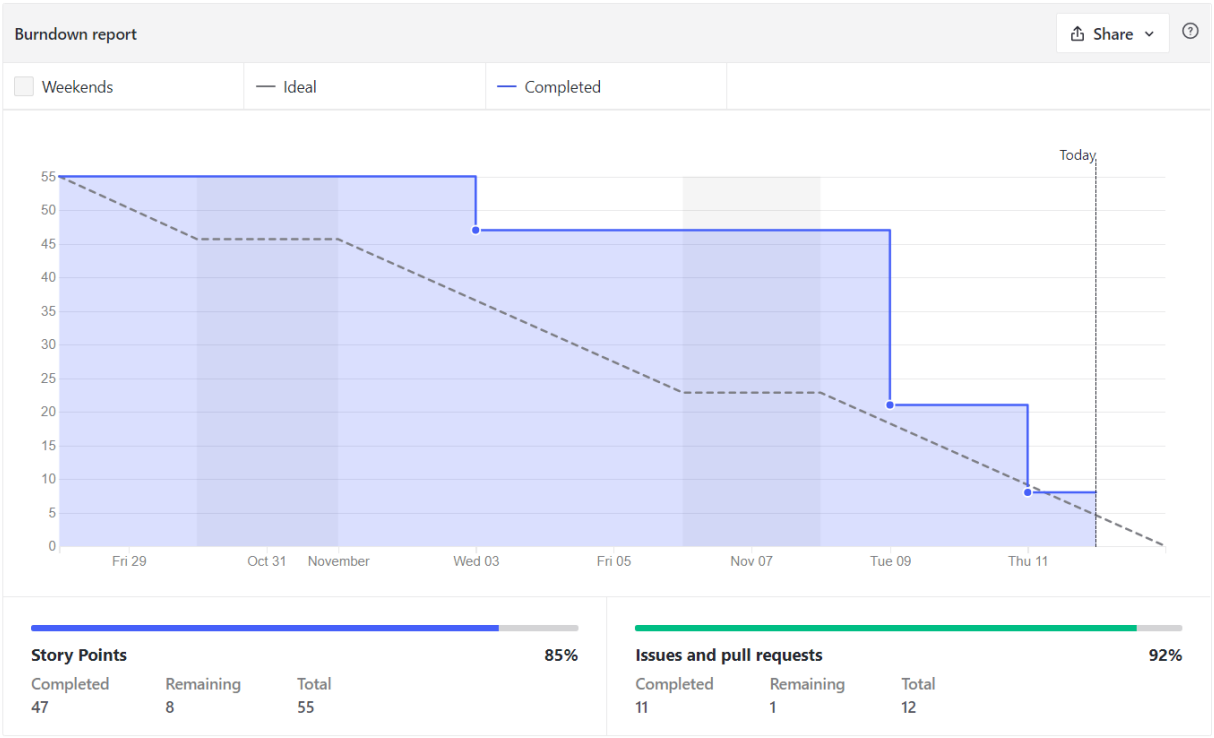

Figure 6: Burn-down graph