



University of Lleida

Master's Degree in Informatics Engineering

Higher Polytechnic School

Sprint 2 Documentation

Ubiquitous Computing and Embedded Systems

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1 Introduction

The purpose of this document is to explain how the 2nd sprint of the project has been developed. First of all, it will introduce the sprint backlog tasks picked from the product backlog of the project, along with the total story points for this sprint. Furthermore, it will mention the sprint goal and the user stories the team has been worked with during the sprint. Finally, it will show the sprint review, which will contain the percentage of the sprint tasks completion, along with the sprint retrospective and the burn-down and burn-up reports. Additionally, it will define the next sprint as the new modules to be working on, new user stories and the sprint goal.

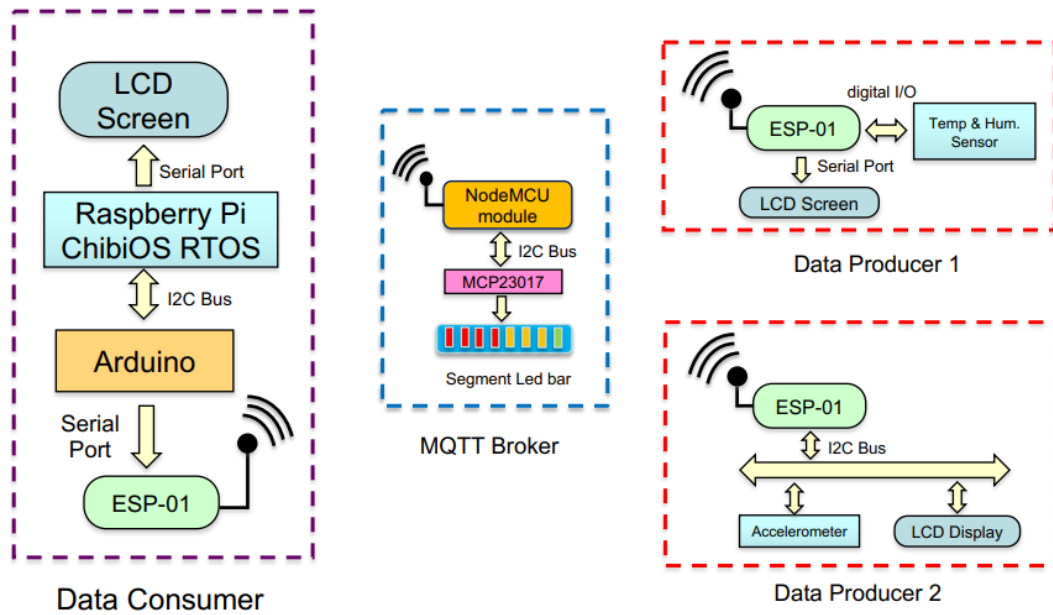


Figure 1: Wind turbine generator prototype schema

2 Sprint Backlog

For this sprint, the total story points is 69 points.

| Task | Label | Story Point |
|---|---------------|-------------|
| Read documentation MCP23017 | Learning | 3 |
| Test MQTT Broker | Testing | 8 |
| Test Data producer 2 | Testing | 8 |
| Data producer 2 development | Enhancement | 13 |
| MQTT Broker development | Enhancement | 13 |
| Read Documentation about NodeMCU module | Learning | 3 |
| Documentation Sprint 2 | Documentation | 8 |
| Data producer 2 documentation | Documentation | 8 |
| MQTT Broker documentation | Documentation | 5 |

3 Sprint 2 Definition

The goal for this sprint is to have a working version of the Data Producer 2 and a working version of the MQTT Broker. The user stories that we have worked with during this sprint are the following:

3.1 User stories

1. 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.
2. As a broker I would like to show the current number of connections as a percentage.
 - (a) **Acceptable Criteria:**
 - i. The MQTT Broker will receive data from Data Producer 1
 - ii. The MQTT Broker will receive data from Data Producer 2
 - (b) **Related Task:**
 - i. MQTT Broker Development.

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

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

The second user story corresponds to the work-block named MQTT Broker, which components related to are:

- NodeMCU module
- MCP23017
- Segment LED Bar

3.2 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 weigh 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 for this sprint was to finish the Data Producer 2 module and the MQTT broker module. We have had a lot of difficulties throughout the sprint. Still, we have accomplished a working version of the Data Producer 2, retrieving and printing data from the accelerometer and a working version of the MQTT broker managing publications and subscriptions.

The Sprint 2 lasted 14 days, from 12 of November to 26 of November.

4.1 Percentage Of Sprint Completion

The following are specified the percentage of completion for each task of the Sprint 2 Backlog, as well as an estimated dedication time in hours for the whole team.

| Task | Completion (%) | Team dedication time (h) |
|---|----------------|--------------------------|
| Read documentation MCP23017 | 100 | 2h |
| Test MQTT Broker | 100 | 1h |
| Test Data producer 2 | 100 | 2h |
| Data producer 2 development | 100 | 12h |
| MQTT Broker development | 100 | 8h |
| Read Documentation about NodeMCU module | 100 | 2h |
| Documentation Sprint 2 | 100 | 3h |
| Data producer 2 documentation | 100 | 2h |
| MQTT Broker documentation | 100 | 3h |

The total dedication time for the Sprint 2 is **35h**, which means that for 14 days availables we dedicated **2:30h per day** approx.

We expected to finally get the Data Producer 2 working well and we accomplished it, but also we achieved a working version of the MQTT Broker, so we finish the second sprint with a **100% of tasks done**, which means that we are likely to finish the project on time, since in the last sprint we will work on the third module of the project.

4.2 Cumulative 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.

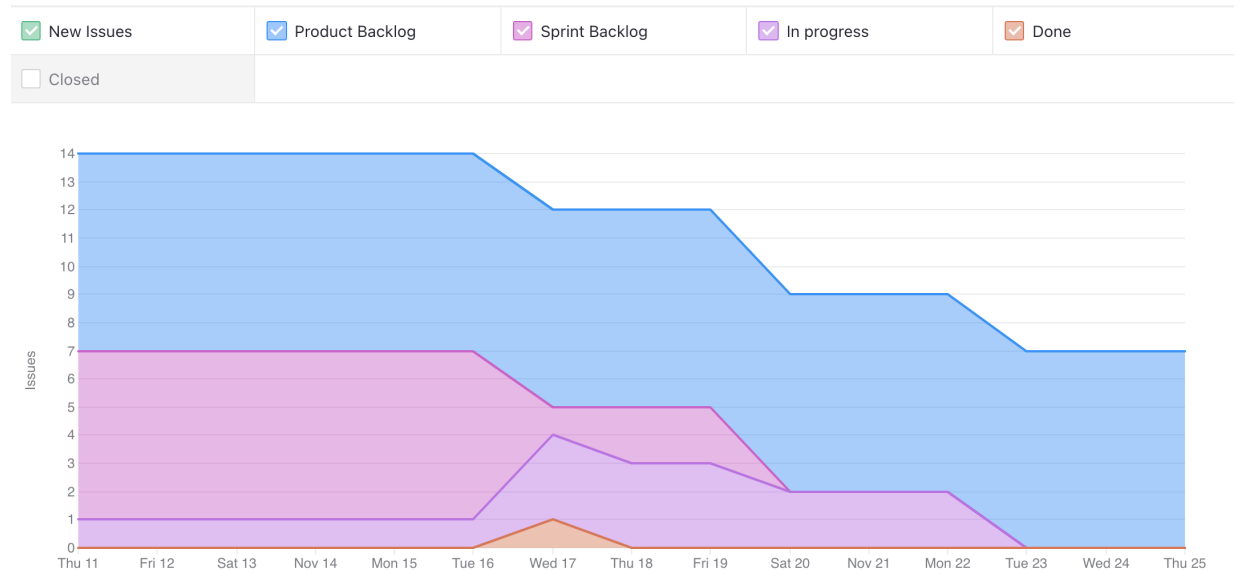


Figure 2: Cumulative-flow graph

| | |
|---|----|
| ✓ Read Documentation MCP23017 learning | 3 |
| wind_turbine_generator #7 added 14 days ago 000 Closed | |
| ✓ Test MQTT Broker testing | 8 |
| wind_turbine_generator #9 added 14 days ago 000 Closed | |
| ✓ Test Data Producer 2 testing | 8 |
| wind_turbine_generator #11 added 14 days ago 000 Closed | |
| ✓ Data Producer 2 development enhancement | 13 |
| wind_turbine_generator #13 added 14 days ago 000 Closed | |
| ✓ MQTT Broker Development enhancement | 13 |
| wind_turbine_generator #17 added 14 days ago 000 Closed | |
| ✓ Read Documentation about NodeMCU module learning | 3 |
| wind_turbine_generator #19 added 14 days ago 000 Closed | |
| ✓ Documentation Sprint 2 documentation | 8 |
| wind_turbine_generator #25 added 14 days ago 000 Closed | |
| ✓ Data Producer 2 documentation documentation | 8 |
| wind_turbine_generator #27 added 7 days ago 000 Closed | |
| ✓ MQTT Broker documentation documentation | 5 |
| wind_turbine_generator #28 added 7 days ago 000 Closed | |

Figure 3: Cumulative-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.

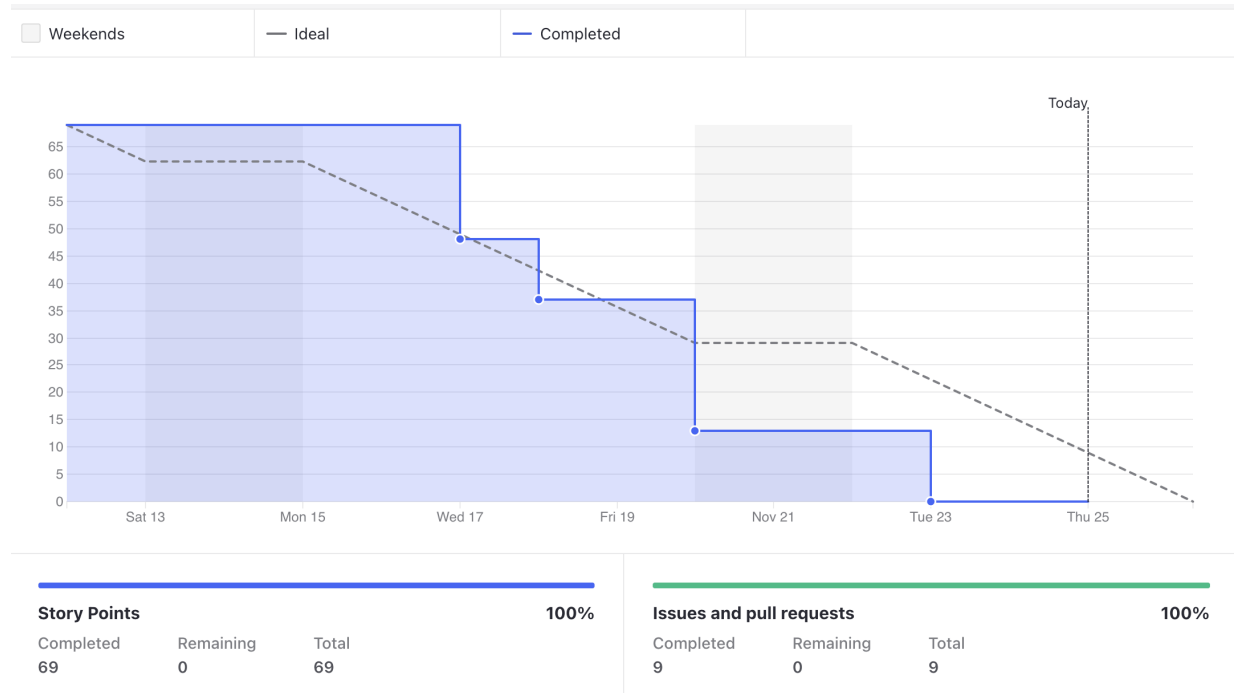


Figure 4: Burn-down graph

5 Conclusions and Next Sprint

The team worked well together and the sprint advanced smoothly. Now we shall prepare the last issues and tasks to work on the last sprint and we think that if we keep working as we have done, we shall have the project finished by the end of the third sprint.

Therefore, for the last sprint we will focus on the Raspberry PI configuring the environment and installing the ChibiOS, but also on the Arduino, at first, working on the interaction with the corresponding ESP-01, and finally, with the Raspberry PI.

Thus, for the last sprint, we only need to adjust all the components to work together following the project schema. And make tests, for sure.