Project Plan

Real Time Cryostat Control for the MOSAIC project

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Introduction

The Astronomical Instrumentation group of SRON, the Netherlands Institute for Space Research, is working on the design of a new sensor that can measure the spectrum of radio emissions from galaxies and other objects in deep space (Multi-Object Spectrometer). The sensor has the ability to measure the radio spectrum for 25 objects at the same time. Additionally the beam of each pixel can be steered electrically to lock onto an individual astronomical object.

This sensor is based on novel superconducting circuits, which need to be cooled down to cryogenic temperatures to function. Development and testing of the new instrument takes place at the TU Delft's Else Kooi laboratory. Part of the test setup is a cryostat able to reach a temperature of around 0,25 Kelvin.

The cryostat refrigerator contains multiple devices which need to be controlled manually. Currently manual controlling is done for each device separately. The manual controlling is done partly on the computer and partly on the devices itself. The goal of this project is to create one single program that can control the system and read out information.

In this document we will discuss how we are going to achieve this goal. We will state how we are going to work together, how we will use Git, when we state something is done and what we will finish each week.

Meeting Plan

As communication is a key element for a good working project, we explain who is a participant of the project and how they are related to this project.

Project members

The project team consist of four members: Bernard, Maiko, Ruben and Louis. The project team will work at the TU Delft faculty of EWI in room LB 1.0850. To ensure managing the project goes smoothly the development framework SCRUM will be used. There will be a SCRUM meeting every morning at 9:30. At this meeting the current state of all work will be discussed and the work will be divided between the team members. To give an overview of the current work we will use ZenHub (a GitHub extension). This makes it possible to create and manage issues in Git from the ZenHub board. You can swap these issues between columns to indicate whether the issue is one of the following: new, for this week, in progress, needs to be reviewed, done or closed. This ZenHub board will be updated after each task and will be used during the SCRUM meeting.

To make sure we stay on track during the project we will also make a weekly planning. This will be done by making a sprint plan. This will be a table that contains tasks, subtasks and who is going to do this task. At friday, before creating the sprint plan for next week, the sprint plan of the previous week will be reflected in a retrospective. This will state whether tasks are actually completed and whether there were major problems while performing the tasks.

Client

To ensure that the program that we make is actually what the client wants it is important to meet with the client on a regular basis. The client of this project is SRON, the Netherlands Institute for Space Research. We have two contacts within SRON: Juan Bueno, who will be at the TU Delft on tuesdays and fridays, and Sebastian Haehnle, who will be present everyday at the TU Delft. Every tuesday at 9:30 there will be a meeting with the client and the project team. In this meeting important decisions as well as the current status of the project will be discussed.

Supervisor

The supervisor of the project is Robbert Krebbers. He will represent the educational interest of the TU Delft and will mostly guide and advise the project team. There will also be a weekly meeting with him on friday.

Midterm meeting

Halfway during the project there will be a midterm meeting with the project team, the client, the supervisor and the project coordinator. In this meeting the project will be evaluated and problems will be discussed.

Git

For this project a Git repository is used, which can be found on the following link: https://github.com/BBekker/CryostatControl . Since this repository is private it is required to request access to it from one of the project members. The dev branch contains the most recent stable version of the week, this includes the finished features of the week. On the master branch there is always a working version and will be updated every week. Issues on Git can consist of coding problems as well as todos and new features to be implemented.

Definition of Done

To guarantee that the product fulfils our expected quality we create a definition of done (DoD). All of these points should be checked whenever evaluating whether something is done or not:

1. Methods which are not self explanatory should be provided with documentation above explaining the method.
2. Pull requests, which contain code written by a member of the project team, are reviewed by at least two other group members indicated by a comment.
3. All the code builds without errors before a pull request can be accepted. This is checked by a continuous integration testing service integrated in the github repository.
4. Unit tests and integration tests are written and passing with a test coverage of at least 75%. This coverage should be reached at the end of the project. If the coverage is lower, it should be documented why.
5. System tests should pass, which means the developed program should meet the requirements.
6. Design choices of the program are documented and can be found in the final report.
7. The SCRUM board is used for issues and *todo* subjects for each week and can be found integrated on the git repository.

Roadmap

To give an overview of how the project is going to work out we made a roadmap. In the roadmap below, on the left you can see all the weeks of the project. All the major components of the project can be found on the right side. The first week is mainly focussed on research, what needs to be done and how we are going to do this. Next we will make the GUI (Graphical User Interface) and work on the communication between all the devices. Following that we want to implement the basic functions of the program. These basic functions will contain both the automated sequences and the manual mode . Then we will work on retrieving information from the devices and showing this in graphs. Finally we want to make the python integration where it will be possible to use python scripts to retrieve certain data from our program. At the end we will focus on making the final report.

Week	Goals
01-05 / 05-05	Project plan done
	Research report done
	Equipment ready for use
08-05 / 12-05	Basic GUI done
	Communication equipment to pc working
15-05 / 19-05	Basic functions implemented
	Correct data retrieval from equipment
22-05 / 26-05	Data handling (graphs, logging)
29-05 / 02-06	Python integration working
	Program deadline
05-06 / 09-06	Review code
12-06 / 16-06	Draft report finished
19-06 / 23-06	Review report
26-06 / 30-06	26-06 Deliver final report.
	Prepare presentation