PROJECT DOCUMENT

Blueprint Automation

Backlog

Version / Status	Description	Author	Date
0.1	MoSCOW, Sprint Planning, Participants	Hidde, Sanne, Julian, Christian	18/03/2022
0.1	Background, Project Definition, Group Info, Risk and Dependencies,	Sanne, Julian, Hidde	01/04/2022

Table of Contents

1. Background/ Problem

Blueprint Automation wants to switch to Beckhoff PLC for future products. The downside of switching to Beckhoff is that it does not provide a tool to visualize and play back the robot's movements. We are going to make a visualization in JavaScript that can also run on Beckhoff PLC.

2. Project Definition

Main research question:

- How can we create a JavaScript application to visualize and play back the movements of a machine that runs on Beckhoff PLC?

Sub question:

- How do we connect the PLC to the JavaScript application?
- How do we visualize the machine in JavaScript?
- How do we store the movement data from the PLC?

Project Objectives (SMART)

Specific

The purpose of this project is to visualize a robot on a computer with JavaScript.

Measurable

The project is completed when all requirements are met, and the project owner is satisfied with the results.

Achievable

We will work 2 days a week on the project and are not very familiar with JavaScript yet. Learning JavaScript will take the most time, but we have a lot of time to work on the project so we should be able to complete a large part of the project.

Relevant

With this project we can learn a lot about about a plc, the communication between a PLC and JavaScript, and how we can visualize data on computer.

Time Bound

We will reach our goal by the end of this semester (four/five months or six sprints).

Approach and working method

Approach

For our project, we will use scrum. Each sprint we will hold a sprint delivery with the client and show a new extension to the project that we have selected for that sprint.

Defined methods (Dot Framework)

For this project, we will use the Dot Framework to find an answer to the main question and sub questions.

Project Requirements (MoSCoW)

Must:

- Have a visualisation of the robot.
- Code the visualisation in JavaScript.
- Record and play back movements of the simulation.

Should:

- Make it easy to modify the JavaScript application for different machines.
- Reuse the configuration file.

Could:

- Make a webserver to run the JavaScript application on.

Wont:

- Control the robot using the JavaScript application.
- Be a virtual twin.

Project Deliverables

Project scope

Organizational Scope

To keep the project running smoothly, we want to use a scrum board. This way everyone can see what still needs to be done per sprint and who is working on what. We can also keep track of what has happened in each sprint and where we are still lagging behind.

We also use a general planning to create an approximate idea of what still needs to be done and how much time we have left.

Technical Scope

We use the PLC we got from Blueprint Automation. For the project we will use a servo motor to simulate the delta robot, but for the first sprint we use a button. The PLC we got is a Beckhoff PLC.

Application Scope

At the end of this project, we will have provided demo code of the JavaScript application that visualizes a delta robot. We will also provide the code that runs on the PLC to connect to and communicate with the JavaScript application.

Documentation

At the end of this project, we will deliver a project plan and a design document explaining the software we created.

3. Sprint Planning

Sprint #	Goals
Sprint 1	• Make communication between the PLC and a JavaScript application • Find out how to request data from the PLC • Create a simple JavaScript application with moveable 3D models
Sprint 2	• Find out how to connect 3D models with data from the PLC • Create a new model of the delta robot to visualize the movement • Create a demo of this
Sprint 3	• Find out how to properly store the incoming data • Expand the JavaScript application to also support visualising products • Define protocol for the configuration file • Create a demo of this
Sprint 4	• Add graphs to the JS application • Find out how to play back the recorded movements • Finish JavaScript application

4. Participants / Interested parties

Contributors

Name	Role
Hidde Roos	Student / Developer
Julian de Jong	Student / Developer
Sanne Hermans	Student / Developer
Christian Diekmann	Student / Developer

Other Participants	Role
Vincent Peters	Client
Suzana Andova	Teacher

5. Organization and Responsibilities

Blueprint Automation:

Blueprint Automation will be our client for the project. We expect clear requirements from BPA on what the final product should look like. In addition, BPA will give us feedback after each sprint with things we need to improve on to get the best result.

Fontys:

From Fontys we expect to receive global guidance within the project.

Notulist:

The notulist makes sure that he takes notes at every meeting that takes place, so that these notes can be read back later. The whole group can read back what was said in the meeting and thus also find the feedback.

6. Risk and Dependencies

Risk

Risk	Chance	Consequences
Absence: long-lasting or recurring absence from sickness or other causes could potentially be a risk for us. Not having enough workforce to reach the goal we set beforehand could lead to falling behind and have a negative effect on the motivation of the group. It is important that we respond quickly when this happens and modify our planning to make it achievable again.	Low	Medium
Hardware errors / breakdown: hardware problems could occur during our project. Having to fix these errors could significantly increase development time. Complete breakdown of parts of the hardware would mean we have to arrange a replacement, which could also take a lot of time or might not even be possible at all.	Low	Medium
Lack of knowledge: lack of knowledge means we would have to invest some more time in researching. This will not be a problem, but when research takes longer than expected timing problems could arise.	Medium	Medium
Lack of communication within the group: not communicating enough or poorly could result in uncertainties and tension within the group. It is important that we stick to the communication plan we set up beforehand to ensure smooth collaboration.	Low	High

Dependencies:

- The PLC: if the PLC stops working, we can't finish our project. We must get a new one and that takes time.
- Our client: if the communication with our client is bad it is hard to make our project.
- Our group members: When someone stops or becomes sick, we have to make this project with less people,
- The communication between the PLC and the JavaScript: if we can't make this to work, we can't move on with the rest of the project because it won't work.

7. Group Info

Group Appointments

Every project day we have a meeting at 9.00 in the morning to discuss what we are going to do and another meeting at 15.00 to show our progress and say if you need help or anything.

We have more rules, they are in the cooperation agreement document.

Communication Plan

For the communication in our group, we use WhatsApp and Teams. This communication is for the whole week. If someone has a question, he or she can ask them in these groups.

For the communication with our customer every Friday we send an email with our progress. That way the customer keeps updated with what we are doing.