Plan of Approach - BabySim

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Version:

Version:	Change:	Date:	Name:
V1.0	Initial document version	29-8-2023	Joris
V1.0	Added information	31-8-2023	Emiel
V1.0	Added information	2-9-2023	Emiel
V1.0	Added Gannt diagram	4-9-2023	Joris

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1 - Project history

Project name and client:

The name of this project is RobotPatient. This project was initiated by Johan Korten by request of the Wilhelmina Kinder Ziekenhuis (will be called WKZ from now on). We are going to do a part of this project. We will be working on a system to show a change in skin colour in the advanced patient simulator doll (will be called APS from now on). Mr Korten will be reviewing our report. The WKZ will receive our report and they will decide if our results are satisfactory.

Project cause:

Out-of-hospital cardiac arrest (OHCA) is a major cause of death, responsible for over 350.000 fatalities in the US. Without early CPR, this condition is fatal in most cases, making it crucial for the patient to commence resuscitation efforts early (Benjamin E.J., 2019). On average, 60% of these patients are assisted by emergency medical services, also known as EMS, individuals who are nearby at the time of cardiac arrest and provide aid to the victim (Rosamond W, 2008). It is of utmost importance that these bystanders are adequately trained to increase the chances of survival, which are doubled as a result (Sasson C., 2010).

Therefore, it is essential to train as many people as possible in performing CPR. These training sessions frequently utilize training manikins, as CPR can be an unpleasant experience for many, making practicing on each other impractical. It is crucial that these CPR manikins are reliable and provide effective feedback.

Commercial CPR manikins often provide minimal to no feedback, and when feedback is provided, it is often challenging for the trainees to interpret. Consequently, trainees may not fully comprehend the information they receive.

Currently, CPR classes are often conducted by a single instructor overseeing an average of 30 to 40 students. Due to this, providing helpful feedback can be quite challenging, resulting in less capable trainees. Instructors often don't have time for every question or improvement due to the high student-to-instructor ratio (Korten, 2022). This can lead to information being forgotten, as well as trainees learning incorrect techniques, which can have severe consequences for the patient.

Stakeholders:

Name:	Function:	E-mail:
Johan Korten	Product owner	Johan.korten@student.han.nl
Joris Bol	Team member ESE	j.bol@student.han.nl
Emiel Visser	Team member ESE	e.visser11@student.han.nl
Manon Sijben	Team member IPO	mam.sijben@student.han.nl
Marlon Reijlink	Team member IPO	ms.Reijlink@student.han.nl

Validation:

During the project Johan Korten and Victor Hogeweij will check and verify our progress. The final validation will be done by the nurses at WKZ. We will check our progress regularly. Preferably once a week or more.

2 - Project result

Objective:
The objective of this research is to develop a baby head in a variety of skin colours that can accurately change its skins appearance corresponding to its condition. This head - or rather the skin - will be built on research already done and must work well with the already existing components.

Description of the intended project result:
The product owner, Johan Korten, has a number of subtasks we can choose from. The aim of these subtasks is to improve the feature set of the current APS doll.

Our job is to find a way to incorporate a change of colour in the skin of the APS doll. One might ask why it's necessary to be able to change the skin colour of a baby.

There are all kinds of illnesses that prenatal infants can get. Some of these illnesses change the colour of the skin.

A yellowish skin or eye whites can be caused by the buildup of bilirubin. Bilirubin is a yellow pigment that forms as a normal byproduct of the breakdown of red blood cells in the body. It is produced in the liver and then excreted into the bile, which aids in digestion. Bilirubin is ultimately excreted from the body through faeces.

The buildup of bilirubin in the blood is called jaundice. Jaundice can indicate a number of conditions such as liver disorders, blood disorders, gallbladder issues, and other medical conditions.

A blueish colour called cyanosis often indicates a lack of oxygen in the blood. The colour change is most noticeable in the skin, lips, nails and/or mucous membranes.

Cyanosis can occur as a result of respiratory problems, heart conditions, or circulatory disorders, which reduce oxygen supply to the tissues. It can be a sign of a serious health issue and typically requires immediate medical attention. Therefore it is important to train nurses on life like scenarios so they are well prepared.

3 - Project activities

Preparation:

Before we can start on the realisation phase we need to prepare ourselves. In he bullet list below you will find a small list of things that need to happen before we can move on to the next step.

- Plan of approach
    - Organization of the project group.
    - Requirements of the client.
    - Goals.
- Preliminary research

  Our research will be split between to groups, one research team consisting out of the IPO students and one out of the ESE students.

  IPO
    - Silicone mix
    - Effect of light
    - Fabrication options

  ESE
    - type of Illumination
    - ways of controlling
    - system build-up
    - communication
    - mounting options
- Designs
    - Functional design.
    - Technical design.

Realization:

After the preparation phase we can start on realizing the product. This phase has been divided in the following points:

- Producing a dedicated driver PCB
    - I2C communication.
    - SAMD21 microcontroller.
    - Formfactor.
    - Power requirements.
- Programming.
    - Code style.
    - Code blocks.
    - Integration.

Testing:

We have to conduct a number of tests to verify if the product meets the requirements set by the client. In the list below you will find all of the tests we have to conduct in order to verify if our product meets the standards of the client.

- A test to check if the lights light up properly.
- A test to check if the desired colours can be achieved.
- A test if the communication protocol has been successfully implemented.
- A power consumption test.
- A skin colour match check.
- A fitment test.

4 - Intermediate results

Throughout the project we will need to submit intermediate results. In this paragraph you will find a list of these results and products.

Plan of approach
The plan of approach will give the reader an indication to why this project came to life, where this project stands as of right now, the assignment is defined and the agreements we made as a project group will be defined in the plan of approach as well. We will also have preliminary risk and cost analysis.

Execution skin colour addition
In the Build plan, the appearance of our solution is described. It specifies, for example, the placement of sensors and actuators. This document ensures clarity on how to complete the assignment as smoothly as possible.

Research report
In the research report, a selection is made between the various components of the project. This includes different actuators that we can use to adjust the skin colour. To make an informed choice, we need to conduct different tests to determine which components are the most suitable for our application.

Functional design
In the functional design, all requirements that the product must meet are described using the SMART method. This report also describes which requirements are deemed important and which are less important.

Technical design
In the technical design, the requirements from the functional design are described in technical terms. This includes electrical schematics and calculations."

Prototype
The final product will contain a number of actuators. These actuators will influence the skin colour of the baby.

Test results
The results of the completed tests will be written down and analysed in this document.

5 - Research quality

Even though the end product is a proof of concept, it still needs to meet certain quality standards. The objective is to create a solution to change the skin colour of the APS doll. To ensure that our solution operates as required, tests are conducted. If a test fails, efforts will be made to address the failed requirements. Various tests are carried out to ensure the product complies with the specifications.

Despite being a proof of concept, the product must be robust to allow for additional testing to ensure its longevity.

To assure the client of its quality, the test results will be shared and discussed with them. This allows the client to determine if the product meets their expectations.

6 - Project organisation

A good organisation and task management is important for every project. The following chapter describes the contribution of every team member and their corresponding task.

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Emiel Visser	Mail: e.visser11@student.han.nl Phone: +31 6 26697550 Function: student ESE	Monday and Tuesday
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Johan Korten	Mail: johan.korten@han.nl Phone: / Function: product owner	Has a supporting roll

7 - Planning

In figure 1 you will find a global planning for the upcoming semester. This planning will end in January.
The planning contains the following:

- Calander week
- Period
- Period week
- Deviating information
- Place of submission
- What are we going to make
- Who

Calander week
Tells you in which calendar week a task ought to be started.

Period
Tells you in which period a task must be done.

Deviating information
Contains possible exceptions, such as: holidays, schedule-free days, etc.

Submission
Tells you which documents or subtasks must be submitted that week.

Place of submission
Tells you where the completed tasks must be submitted.

What are we going to make
Tells you which tasks or subtasks must be done that week.

Who
Tells you who is going to execute the task.

Preliminary planning:

The planning in Figure 1 is a preliminary planning for the coming two periods.

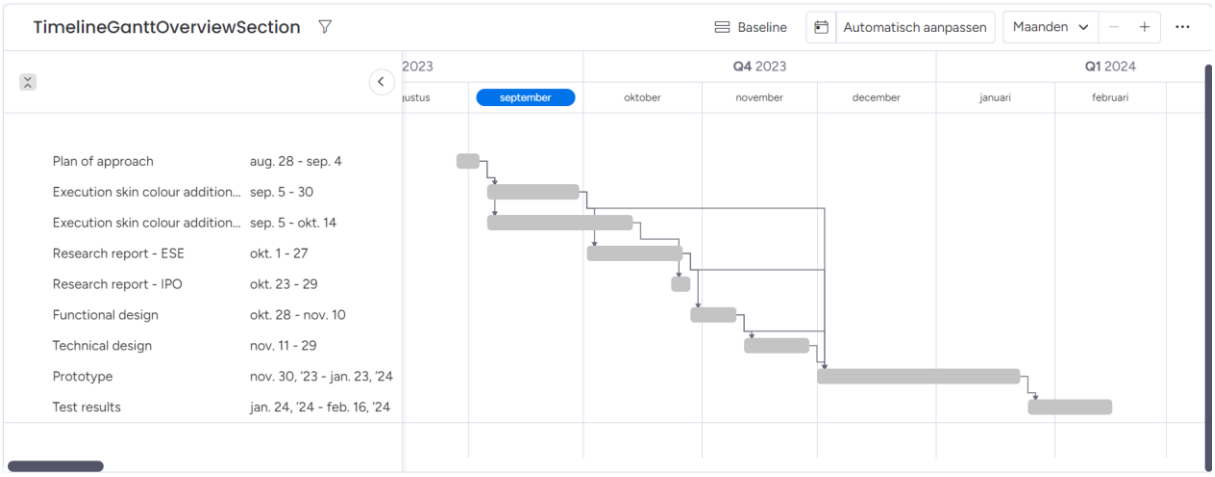


Figure 1

8 - Risks

Incorrect Planning
The project may fail due to an underestimate in the project's duration, resulting in insufficient time allocated for certain parts.

It could also occur that we have left certain components from the planning, leading to issues because they are not yet completed or because they take longer than we had estimated.

Planning is not being maintained
If the schedule is not up-to-date, we can no longer assess which tasks have been completed and which ones haven't. As a result, nobody knows exactly who is working on what and how far along each person is with their task.

We need to ensure that we consistently apply the Scrum methodology throughout the entire project so that we can proactively solve these issues at an early stage.

Project members lack critical knowledge
We are all students, and this project remains a learning process for everyone. It is completely normal that we don't posses the knowledge of all the different facets that are required for this project.

This is something we should be mindful of so that we can seek assistance from teachers, experts, or other classmates at an early stage so we won't get bogged down by a lack of knowledge.

Project members want to make the final product 'too perfect.'
We are all very enthusiastic, which means there may be instances where we want to add too many features or make the interface more aesthetically pleasing than the client needs.

We need to have a clear understanding of what the client truly wants and make sure we stay as close to those requirements as possible.

Purchased materials arrive too late
If we start ordering the necessary materials too late, it may result in us having to wait for these materials. This can consume a significant amount of time and could even lead to the failure of the entire project.

So, we need to start ordering the necessary materials in a timely manner, preferably around week 5 of period 1.

Discovering errors too late
If we notice errors too late, it can lead to missed deadlines and the possibility of critical project components not being completed on time. By consistently applying Scrum, we can prevent this. However, communication remains crucial.

Project members take insufficient responsibility
If project members do not take responsibility for completing their tasks on time or do not proactively pick up new tasks when they finish their current one, it may result in an uneven distribution of tasks, ultimately leading to a backlog in the schedule. Once this backlog occurs, it could potentially cause the entire project to fail.

By consistently applying Scrum, everyone knows who is working on what, and the project leader can assign new tasks to individuals who have some downtime, minimizing time wastage.

Starting integration of individual components too late
Integrating separate systems or code is one of the most critical steps in a project that is often underestimated. We need to be mindful that this phase will consume a significant amount of time.

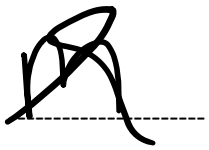
We can prevent delays by ensuring that all individual code components are thoroughly and properly tested. This will help us avoid unpleasant surprises.

9 - Team agreements

Establishing good rules and agreement is key in a successful and well functioning research team. To combat confusion and conflict we wrote down what those exact agreements are.

The following rules apply:

1. It is important that a member notifies the other members in advance if they are absent or late.
2. Trello is our leading planning platform.
3. Deadlines are not guidelines and must be followed as closely as possible.
4. Our working days start at 9:00 on Monday and Tuesday. The possibility to work on the project after the aforementioned hours remains open.

Emiel Visser:	*Manon Sijben:*
	
Marlon Reijlink:	*Joris Bol:*
	

10- Literature list

Paragraph Fout! Verwijzingsbron niet gevonden.**: references**

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