Project plan

Group name

Arcade Brigade

Project name

INDUSTRY PROJECT

*GAME CONSOLE*

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| --- | --- | --- | --- |
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# Introduction

We over at Arcade Brigade want to develop a gaming console system. It includes consoles that consist of a screen, joystick, and the board itself. Players can play one of the games, with more games coming down the line, between each other in the same room. Its main goal is to serve as a party game to brighten up the mood.

# Project management

## Internal communication

Initially, our group started out as 6 people, but as the semester went along, more and more people quit their studies and left. At the end we are left at 2 people, which made the situation quite a bit more challenging.

The way we handled communication and workload is we set up a Discord channel where each person had to give an update weekly on what he is working on and what he plans on working for the next week. We made sure to be available and active in case someone gets stuck and needs help or someone has a question and needs further clarification.

## Customer communication

The way we plan on communicating to the customer is by scheduling sprint demos in intervals of 2 weeks, where we will showcase the progress that we have made over the sprint, along with plans for future sprints.

Alongside that we also plan to keep the customer regularly updated via e-mail in case we face any challenges or require further clarification on a certain aspect. The same holds true in the other direction – we will always be available for any questions of changes that the customer requests.

## Coach communication

The communication between our team and the coaches will also be regularly scheduled to the same sprint demos, where we will be expecting any feedback regarding the current situation of the project or the planning for future sprints.

We also plan on sending our code for code review, to make sure we are on the right track and following the correct way of working.

# Scope and deliverables

The project will consist of multiple system, each equipped with an ESP32 development board, connected to a SparkFun Qwiic Micro OLED Breakout Display and Qwiic Joystick.

The system communicates with each other wirelessly sending packets about game state. The communication is not done over the Internet, so range is a limitation. The consoles also operate via USB, so they can be powered using a portable battery.

The way a game is created is one of the players chooses a game to play and a lobby for that game is created. Once a sufficient number of players has joined the lobby, the game will start by itself or the lobby owner has to start the game (depends on the game). Once a predefined goal in the game is reached, the game will end, and the players will be returned to the main menu.

In case a person disconnects, the other players get notified and the game gets terminated.

# Project plan and milestones

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| --- | --- | --- |
| **Activity name:** Project plan | | **Delivery date:** Sprint 1 (6.11.2020) |
| **Input:** Use cases, deliverables, risk analysis, project structure and organization | | |
| **#1** | **Activities:** | |
| The project plan includes everything regarding the work of the team, including how the team will function, how the project will be organized, what the team is expected to deliver, how communication with the client takes place and an analysis of the risks. | | |
| **Output:** A general plan of how the project will proceed | | |

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| **Activity name:** System design document | | **Delivery date:** Sprint 1 (6.11.2020) |
| **Input:** Wiring diagram, Sequence diagram, System context diagram, System architecture diagram, State machine diagrams | | |
| **#2** | **Activities:** | |
| The system design document includes more technical information regarding the project such as how each subsystem is structured and operates and how different subsystems communicate with each other. | | |
| **Output:** A document explaining how the system functions | | |

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| **Activity name:** Wireless communication | | **Delivery date:** Sprint 2 (20.11.2020) |
| **Input:** Multiple ESP32 microcontrollers | | |
| **#3** | **Activities:** | |
| The team shall set up a testing environment to determine which form of wireless communication is most suitable and provides the least latency and hardware overhead. | | |
| **Output:** Functioning communication skeleton | | |

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| **Activity name:** Communication protocol | | **Delivery date:** Sprint 2 (6.11.2020) |
| **Input:** Communication skeleton | | |
| **#4** | **Activities:** | |
| The team shall work on developing a protocol that helps identify the message sender and the purpose of the message more effective. | | |
| **Output:** Robust communication protocol | | |

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| **Activity name:** Integration testing | | **Delivery date:** Sprint 3 (4.12.2020) |
| **Input:** Communication skeleton | | |
| **#5** | **Activities:** | |
| The team will work on merging the game console code with the communication protocol by sending the joystick readings of one node to another one. | | |
| **Output:** Better integrated system | | |

# Requirements

## Functional requirements

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| **Requirement** | **Description** |
| FR\_01 | The system shall have a display and an input. |
| FR\_02 | Users shall be able to play games selected from a menu. |
| FR\_03 | All games shall include two or more players. |
| FR\_04 | Some games shall support more than two players. |

## Non-functional requirements

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| **Requirement** | **Description** |
| NR\_01 | Packet transfer between two consoles shall take no more than 100ms. |
| NR\_02 | If one of the nodes is disconnected during a game, the game is aborted. |
| NR\_03 | Packet transfer between two consoles shall take no more than 100ms when there are no more than 3 other wireless networks in the environment. |
| NR\_04 | **A single console shall be able to play games on battery power for no less than 30 minutes.** |
| NR\_05 | **The system shall take no more than 100ms to transfer packets between two consoles when the distance between two nodes is no more than 2 meters.** |
| NR\_06 | **The system’s consoles shall be identical.** |
| NR\_07 | **Each of the consoles shall have a main menu from which games shall be chosen.** |
| NR\_08 | **When no console in the network has started a game, all nodes can choose to start any game.** |
| NR\_09 | **A player can quit the game, at which point the game will be aborted.** |

# Risk analysis

In this project we have defined the following risks:

1. Bad time management. Even though everything is scheduled and always updated in Git, the possibility that someone forgets to check their scheduled times for meeting is still there.
2. Not meeting due dates for deadlines. Programming and embedded systems are not always straightforward, and things almost never go according to plan. Additionally, it could be the case that someone is having troubles with their assignment, which could further slowdown the process.
3. Sprint demo failing. Sprint demos are always botched together solution just for demonstration purposes and prototyping. Thus, there always exists the possibility that the demo fails, which will leave the client dissatisfied.
4. A project team member fails to deliver their part. Perhaps someone will have struggles with their task, maybe personal problems or lack of organization, anything can go wrong even on a personal level. This could lead to significant delays.
5. Documentation is incomplete. The team members are already quite familiar with the documentation process, however there could still be some holes in the process. Mentor’s input should be considered at all times.
6. Provided hardware malfunctions. The solutions the team is going to be working with are well-tested and stable products, however hardware is hardware and something could always go wrong.
7. Lockdown due to Corona. Taking the rising cases of COVID-19 in the last month, a second lockdown is really likely, which will have a big impact on our way of working.

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| **Risk** | **Probability** | **Impact** | **Mitigation** |
| 1. Bad time management | Medium | Medium | Every meeting is scheduled in advance and everyone’s preferences are taken into account |
| 1. Not meeting due dates for deliverables | Low | High | Due dates are carefully tracked and scrum master makes sure everything is delivered on time |
| 1. Sprint demo failing | Medium | High | Sprint demo prototypes are carefully tested a day before the event |
| 1. A project team member fails to deliver their part | High | Medium | Scrum master keeps track of how everyone’s handling their tasks and offers help if needed. |
| 1. Documentation is incomplete | Low | Medium | We make sure to keep the client and the mentor updated to make sure everything is delivered correctly. |
| 1. Provided hardware malfunctions | Low | High | In case of any issues the client is to be contacted and new hardware is requested as soon as possible. |
| 1. Lockdown due to Corona | High | Medium | We try to adapt as best as we can, making frequent meeting online using Teams or Discord |