

**Robotics Project - DeskDash**

Project plan

Lapland University of Applied Sciences

Machine Learning and Data Engineering

Kojo Denkyi

Svetlana Emden-Bazhenova

Eemil Halkola

Maiju Karhu

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# Revision History

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| **Version** | **Date** | **Summary of changes** | **Author** |
| 0.01 | 20.02.2022 | First version of the template | S. Emden-Bazhenova |
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# Table of Contents

[1. INTRODUCTION 4](#_Toc216257654)

[1.1 Backround 4](#_Toc216257655)

[1.2 Scope 4](#_Toc216257656)

[1.3 Main functions 4](#_Toc216257657)

[1.4 Boundaries 4](#_Toc216257658)

[1.5 Preliminary schedule 4](#_Toc216257659)

[1.6 Quality objectives 4](#_Toc216257660)

[2. PROJECT OBJECTIVES 5](#_Toc216257661)

[2.1 Project outputs 5](#_Toc216257662)

[2.2 Special requirements 5](#_Toc216257663)

[2.3 Requirement assurance 5](#_Toc216257664)

[3. OVERALL APPROACH 5](#_Toc216257665)

[4. MAJOR FUNCTIONS AND WORK AMOUNT ESTIMATES 5](#_Toc216257666)

[4.1 Major functions 5](#_Toc216257667)

[4.2 Work amount estimates 5](#_Toc216257668)

[5. PROJECT RECOURSES 6](#_Toc216257669)

[5.1 People 6](#_Toc216257670)

[5.2 Hardware and software 6](#_Toc216257671)

[5.2 Facilities and special resources 6](#_Toc216257672)

[6. MANAGEMENT 6](#_Toc216257673)

[6.1 Time schedule and use of recources 6](#_Toc216257674)

[6.2 Reporting 7](#_Toc216257675)

[6.3 Project meetings 7](#_Toc216257676)

[6.4 Control meetings 7](#_Toc216257677)

[6.5 Risk management 7](#_Toc216257678)

[7. DOCUMENTATION 7](#_Toc216257679)

[7.1 Project archives 7](#_Toc216257680)

# 1. INTRODUCTION

## 1.1 Background

The DeskDash project aims to develop an autonomous indoor delivery robot for office environments. The robot is designed to transport small packages efficiently, reducing the need for unnecessary trips and enhancing workplace productivity. Leveraging advanced robotics platforms like Raspberry Pi and ESP32, DeskDash integrates room mapping, pathfinding, and obstacle avoidance technologies to navigate autonomously within an office space.

## 1.2 Scope

The project focuses on designing, developing, and deploying the DeskDash robot for logistical applications in office environments. The key outcomes of the project includes:

* A fully functional DeskDash robot capable of autonomous delivery.
* Integration of self-charging capabilities.
* Implementation of room mapping and pathfinding features.
* Real-time obstacle detection and avoidance.
* Multi-user access via a Wi-Fi connection.

## 1.3 Main functions

- Item Delivery: Transporting small packages within the office environment.

- Destination Finding: Efficiently navigating to specified delivery points.

- Automatic Room Mapping: Creating and updating maps for accurate navigation.

- Pathfinding: Calculating the most efficient routes between delivery points.

- Self-Charging: Automatically docking for recharging when the battery is low.

- Obstacle Avoidance: Identifying and bypassing objects in its path.

## 1.4 Boundaries

## The project focuses solely on the design, development, and testing of the DeskDash robot. The project does not include:

## User training for operating the robot.

## - Maintenance and support after project completion.

## 1.5 Preliminary schedule

Upcoming meetings and deadlines for main tasks will be agreed upon as the project goes on.

## 1.6 Quality objectives

- Project finished on time

- Finished product works as intended

- Amount of work is as planned

# 2. PROJECT OBJECTIVES

## 2.1 Project outputs

Produce a robot with different sensors. Prepare an operating system for it.

## 2.2 Special requirements

Learn robotics and build one.

## 2.3 Requirement assurance

Learning to combine AI and robotics. Learning to architecture, using sensors, machine vision sensors, platforms, operating systems, networks, software, and teamwork.

# 3. OVERALL APPROACH

Project started on 11th of February 2025. We are forming an idea based on the Power Point presentation made in the class 11.02.2025.

We will have the exhibition day on the 24th of April 2025.

# 4. MAJOR FUNCTIONS AND WORK AMOUNT ESTIMATES

## 4.1 Major functions

Sprint #1. Project Planning and Design

Sprint #2. Early Development & Prototype Setup

Sprint #3. Component Integration & Core Features

Sprint #4. Database setup, Testing

Sprint # 5. Final Adjustments & Exhibition Prep

## 4.2 Work amount estimates

|  |  |  |
| --- | --- | --- |
| Major functions | Description | Work amount estimates |
| Sprint #1. Project Planning and Design | - Define project scope and objectives.- Research and select components.- Create a project timeline and assign responsibilities.- Draft initial design concepts and system architecture. | 20 h |
| Sprint #2. Early Development & Prototype Setup | - get the components- Set up development environment (hardware and software). | 33 h |
| Sprint #3. Component Integration & Core Features | - Fine-tune sensors for accurate readings.- Link all devices - Perform multiple tests to ensure reliability.  - Developing notification Logic | 50h |
| Sprint #4. Database setup, Testing | System-wide testing  * Ensure secure data transmission | 30h |
| Sprint # 5. Final Adjustments & Exhibition Prep | - Compile all project documentation summarizing design choices and results.- Create Video and prepare to present the solution. | 30h |

# 5. PROJECT RECOURSES

## 5.1 People

Tommi Kokko ([tommi.kokko@lapinamk.fi](mailto:tommi.kokko@lapinamk.fi)) - responsible teacher

Team members:

Kojo Denkyi (kdenkyi@edu.lapinamk.fi)

Svetlana Emden-Bazhenova – secretary ([semdenba@edu.lapinamk.fi](mailto:semdenba@edu.lapinamk.fi))

Eemil Halkola ([ehalkola@edu.lapinamk.fi](mailto:ehalkola@edu.lapinamk.fi))

Maiju Karhu (maikarhu@edu.lapinamk.fi)

## 5.2 Facilities and special resources

Physical recourse of the project includes a fully equipped lab and classroom spaces. The lab provides essential tools, including soldering stations, multimeters, sensors, oscilloscopes, and testing rigs, along with workstations and laptops with necessary development software.

# 6. MANAGEMENT

## 6.1 Time schedule and use of resources

## The project schedule, including tasks, timelines, and resource allocation, is available in a graphical format within Azure DevOps.

## 6.2 Reporting

Internal reporting will take place primarily between team members and the project supervisor/teacher. Reports will be facilitated through Microsoft Teams. Memos will be written by the secretary after each project meeting to summarize discussions, action items, and decisions made. Memos will be generated after every meeting and distributed to all team members and the project supervisor.

## 6.3 Project meetings

The project meetings will be held on a weekly basis to ensure effective communication and collaboration among team members. However, depending on project requirements and any emerging issues, we may schedule additional meetings as needed. Meetings will take place online via Microsoft Teams or in-person on campus, depending on participant availability and project requirements. Secretary writes a memo. The chairman of the project is Svetlana Emden-Bazhenova.

The agenda consists of three main questions:

1. What has been done?
2. What will be done?
3. What’s the issues?

## 6.4 Control meetings

Control meetings will be held before the end of each Sprint online in Teams or offline at the campus. After each control meeting, a retrospective report will be written. The retrospective will be shared with the team and supervisor to ensure continuous improvement.

## 6.5 Risk management

The team will conduct a thorough risk analysis once a week during project meeting. This regular evaluation ensures that potential risks are continuously identified and assessed.

Once risks are identified, we assess their probability of occurrence and their potential effects on the project. This assessment allows us to categorize each risk based on its likelihood and impact. Following this evaluation, we develop comprehensive strategies to mitigate the risks.

# 7. DOCUMENTATION

## 7.1 Project archives

All project documentation is saved on the Teams platform under the Team5 channel, in the Files section. Everyone on the team has access to all the files. All meeting memos are saved in “project meeting memos” folder.

# 8. ATTACHMENTS

Risk analysis.