# 

**Project Charter**

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**Table of Contents**

[1 Charter Introduction 4](#_Toc153297742)

[1.1 Document Change Control 4](#_Toc153297743)

[**1.2** **Executive Summary** 5](#_Toc153297744)

[2 Project Overview 6](#_Toc153297745)

[2.1 Project Summary 6](#_Toc153297746)

[2.1.1 Project Objectives 6](#_Toc153297747)

[2.2 Project Scope 7](#_Toc153297748)

[2.2.1 Key Activities 7](#_Toc153297749)

[2.2.2 Key Requirements 8](#_Toc153297750)

[2.2.3 Deliverables 9](#_Toc153297751)

[2.3 Milestones 10](#_Toc153297752)

[2.4 High-Level Project Plan 11](#_Toc153297753)

[2.5 Project Risks, Assumptions, and Constraints 13](#_Toc153297754)

[2.5.1 Risks 13](#_Toc153297755)

[2.5.2 Constraints 13](#_Toc153297756)

[3 Project Organization 15](#_Toc153297757)

[3.1 Project Team Structure 15](#_Toc153297758)

[4 Project References 16](#_Toc153297759)

[5 Glossary and Acronyms 17](#_Toc153297760)

**Table of Figures**

[Figure 1 High-level Project Timeline 11](#_Toc153297772)

[Figure 2 Organization Chart for Xn Tnn Pnn 15](#_Toc153297773)

**List of Tables**

[Table 1 Document Revision Record 4](#_Toc153297761)

[Table 2 Project Objectives 6](#_Toc153297762)

[Table 3 Project Scope : key activities 7](#_Toc153297763)

[Table 4 Project Scope : Key Requirements 8](#_Toc153297764)

[Table 5 Project Scope : Key Deliverables 9](#_Toc153297765)

[Table 6 Project Milestones 10](#_Toc153297766)

[Table 7 Project Risks and Management Plans 13](#_Toc153297767)

[Table 8 Project Constraints 13](#_Toc153297768)

[Table 10 Project References 16](#_Toc153297769)

[Table 11 Project Terms and Definitions 17](#_Toc153297770)

[Table 12 Project Acronyms and Definitions 17](#_Toc153297771)

# Charter Introduction

## Document Change Control

This document’s revision control record is kept in Table 1.

Table 1 Document Revision Record

|  |  |  |  |
| --- | --- | --- | --- |
| Revision # | Date of Issue | Authors | Brief Description of Change |
| 1.0 | 2024-02-13 | Sergio Ara Del Olmo | Started filling out general information about group members and project |
| 2.0 | 2024-02-15 | Sergio Ara Del Olmo | Added information regarding the project |
| 3.0 | 2024-02-15 | Luke Squire | Filling out requirements and objectives |
| 4.0 |  |  |  |

## **Executive Summary**

<Provide a brief summary (≤ 1 page) of the project. Summarize the most important aspects of the project by answering the questions:

This project charter outlines a proposal for the design and manufacture of a backpack accessory for the PuppyPi quadruped backpack. With ever increasing interest and research into robotics, it has become ever more important to find meaningful ways to integrate these technologies into our lives. Cutting edge companies like Boston Dynamics are among of number of pioneers in the industry developing science-fiction level technologies. Despite being founded in the 1990’s, the everyday consumer has little to no interaction with advanced robotics in everyday life. Although this project was initiated by the Faculty of Engineering at the University of Alberta through the ENGG 160 “Introduction to Engineering Design” course, the appeal of quality robotics accessories spans far wider then the course instructor. Any open source and accessible technologies in the field can help push the industry forward, advancing the presences of robotics in our lives, and subsequently the interest of the general public.

Given a number of projects to choose from, our team, (π26), chose the PuppyPi backpack project. The backpack project seemed most within our capabilities out of all project options. The belief that this project would best allow us to create something quality played the largest role in our choice. Additionally, 3D printing, robotics, and compact design were among the interests of our team members, further motivating our decision. The project will be demonstrated during a design evaluation event at the end of the 2024 winter term. The main goal of this project is to design a backpack for the PuppyPi quadruped robot that enhances its ping-pong-ball-carrying capabilities. More specifically, the backpack should allow the PuppyPi to obtain 6 ping-pong balls and carry them without fail during a number of trials. Although this project is made specifically for the ENGG 160 course, provided it is successful, it may prove to be a quality accessory to any PuppyPi owner.

The project was initiated by the ENGG 160 course where we were given the choice between multiple project such as designing a new bus stop, creating a backpack for a puppypi, making a pendulum measuring device, and a musical instrument. We have chosen to proceed with the puppypi backpack for our project.

* + Who will use the final deliverable of the project, or for what purpose was it made?
    - Depending on the project, the end-users may be the project team and the course instructors, or they may be external to the course.
    - Explain the project’s purpose (also known as goal) based on what was in the original proposal. This should be expressed in one or two sentences.

The end user for this project is the course instructor for ENGG 160 who will review our project and grant us a pass or fail grade for the project. The purpose of the project is to design a puppypi backpack. The backpack should be able to follow some conditions which will be elaborated further on in the charter.

* + Who will be impacted by the project?
    - That is, who are the stakeholders, who cares that it exists and is delivered?

The project will target those who are looking to have a backpack for their puppypi that can efficiently transfer and small objects, specifically balls, from the backpack and release them in specific locations that the user desires.

The following elements are usually covered in the Executive Summary:

* Project initiator -
* Key stakeholders -
* Project objectives and expected outcomes -
* Major milestones
* Key deliverables
* Key risks
* Estimated total costs. Sometimes this is a constraint (we are given a budget) and sometimes it is a deliverable (we have to estimate it and provide to the customer/stakeholders).
  + In ENGG 160 estimated costs are provided with the project proposal as a constraint.

***Hint;*** Subsection 1.2 may be easiest to write after completing most of the other sections. >

# Project Overview

## Project Summary

Design a functional and aesthetically pleasing backpack for the PuppyPi robot, aimed at enhancing its ping pong ball transport capability in time for the Winter 2024 design evaluation event.

### Project Objectives

A list of initial project objectives is provided in Table 2.

Table 2 Project Objectives

|  |  |
| --- | --- |
| Objectives | What is measurable |
| 1. Securely accept and transport payload | * The backpack will be functional as a backpack. * The backpack will meet its functional requirements |
| 1. Unique Design |  |

|  |  |
| --- | --- |
| 1. Has locking mechanism | * Backpack will have a locking mechanism to ensure it does not detach from robot while in use, as well as allow for easy attachment and removal |
| 1. Unique \ creative design | * Backpack will have at least one unique design feature not in utilization by other ENGG 160 teams. |
| 1. Is shock absorbent | * The project backpack will minimize the rebounding of payload when deposited. |
| 1. Easily manufactured | * Backpack will be easily recreated by anyone with access to 3D printing technology and standard maker-space tools |

|  |  |
| --- | --- |
| 1. **Can hold transport a payload** |  |
| sdfsf |  |
|  |  |
|  |  |
|  |  |

## Project Scope

In this section, the key activities, key requirements to be met, and deliverables for the project are defined.

### Key Activities

<Outline the major activities required to successfully complete the project (e.g., develop module ABC, develop requirements document, write test plan, create final presentation, etc.).

Indicate which activities are associated with a “milestone”, which is an important event in the project marking significant progress such as the end of a project phase.

Keep to 10 or less.

Add rows as required >

A list of the key activities for the project is provided in Table 3.

Table 3 Project Scope : key activities

|  |
| --- |
| Key Project Activities |
| 1. Brainstorm and conceptualize initial solutions |
| 1. Access the PuppyPi robot and analyze outlined requirements |
| 1. Create detailed lists of constraints and ideas |
| 1. Generate possible deigns |
| 1. Screen and rank designs |
| 1. Choose official design |
| 1. Develop documentation and 3D model of prototype |
| 1. Manufacture and test prototype |
| 9. Identify key issues and append design |
| 10. Produce final design documentation and artefacts |
| 11. Manufacture and test final prototype |
| 12. Design Evaluation Event |

### Key Requirements

<Define the key requirements for the project. They must be functional; that is, they must describe what the system does, some physical characteristic, or similar. Think of what needs to be designed and implemented to meet the objectives; what does something have to do for the solution to work. Do not state requirements that are inherent in the solution, such as specific materials, components, processes, etc., these are system requirements that are the result of a design.

Be sure to use verbs like must, shall, may, or should. These are standard verbs for requirements; do not define requirements in a way that leads to uncertainty about whether or not they must or should be met.

Do not have more than 20 requirements. There should be at least 5.

Add rows as required >

The key requirements for the system are listed in Table 4. Here the words “must” and “shall” mean the requirement is mandatory and the words “may” and “should” mean the requirement is desireable.

Table 4 Project Scope : Key Requirements

|  |
| --- |
| Key Project Requirements |
| 1. The backpack must be less then 100 grams |
| 1. Shall not extend beyond robots backpack more than 20 mm |
| 1. Shall not extend perpendicularly above backplate more then 120 mm |
| 1. Must be made from 3 different materials; each material is to be used in a functional capacity |
| 1. Must be able to be attached or detached within 10 seconds |
| 1. Entire payload shall be contained inside backpack |
| 7. Must hold payload while robot is leaning forwards / backwards & during transport |
| 8. Must be open source with all documentation publicly available |
| 9. Backpack must be aesthetically pleasing |

**Objective – Securely accept and transport payload**

* + - **The backpack will be functional as a backpack**
    - **It will meet functional requirements**

**Objective – Unique Design**

* + - **Backpack will have functional design aspects not in use by other ENGG 160 teams**

**Objective – Widely Applicable**

* + - **Backpack will be design will be elegant and not utilize complex manufacture techniques in order to make it modular / modifiable such that others can append its design for there own androids**

**Objective – Is aesthetically pleasing**

* + - **The backpack will have a aesthetic design based on informal-surveyed opinion**

### Deliverables

<Identify and define what the project must deliver (deliverable) in order to achieve the objectives stated in section 2.1.1.

There must be a way to confirm the deliverable is complete. This is often called the deliverable’s acceptance criteria. Each deliverable is measureable, is tangible. Acceptance criteria may be things like,

* Documented test plans and results
* Design documents
* Presentations
* Physical artefacts like prototypes, scale systems, products, etc.
* Demonstrations, such as field trials

A deliverable can address multiple objectives, which are listed in Table 2 above. If it addresses the whole project, just say “All”.

The acceptance criteria can be things like documentation, test results in a report, prototypes, models, and so on. Usually the client/customer or management must sign off.

Do not have more than 20 deliverables.

Add rows as required.>

The project’s key deliverables are listed in Table 5.

Table 5 Project Scope : Key Deliverables

|  |  |
| --- | --- |
| Project Deliverable 1 : <deliverable name> | |
| Objective #s : |  |
| Deliverable Description: |  |
| Acceptance Criteria : |  |
| Project Deliverable 2 : <deliverable name> | |
| Objective #s : |  |
| Deliverable Description: |  |
| Acceptance Criteria : |  |

<Later in the project during planning, the deliverables section can be used to build the project’s high-level work breakdown structure, breaking the major deliverables into smaller, more manageable parts. >

## Milestones

< Identify the significant points or events in the project (e.g., stages, phases, control point approval gates, etc.). Use the table, which can also represent a high-level project schedule.>

The main project milestones are defined in Table 6.

Table 6 Project Milestones

|  |  |  |
| --- | --- | --- |
| Project Milestone | Description | Expected Date |
| Complete Project Charter | Finish our outline / plan for the future of the project | 2024-02-16 |
|  | The first prototype has been made and is ready to test |  |
| Prototype has been modified and works | After multiple tests and changes made to the backpack, the backpack works as required |  |
| Final Design is made and presented | We redesigned the prototype to make it more appealing to the consumer |  |

## High-Level Project Plan

<Based on known or assumed high-level requirements, milestones, and deliverables, create a high-level project plan and express as a Gantt chart as showin in Figure 1.

There is no need at this point to add resources, but the deliverables should have tasks associated with them and there must be start dates and durations.

This was created using ProjectLibre, see eClass >

A high-level project plan is shown in Figure 1. Task details are shown in Figure 2.

A screenshot of a computer

Description automatically generated

Figure 1 High-level Project Timeline

A screenshot of a computer

Description automatically generated

Figure 2 Project Plan Task Details

## Project Risks and Constraints

In this section, the main project risks and constraints known at the time of the Charter are identified. Where possible, mitigation strategies and plans are outlined.

### Risks

< This initial risk assessment does not replace the full risk assessment conducted during the planning phase. The following table records strategic risks that have been identified at the start of a project. For each risk, list both the level of impact and the degree of probability (i.e., high, medium, low). Identify the possible responses needed during the project to lessen the impact or lower the probability of the risk. Enter the top five or fewer risks. There must be at least three risks identified>

The main project risks and mitigation plans are defined in Table 7.

Table 7 Project Risks and Management Plans

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Risk Description | Probability (H/M/L) | Impact (H/M/L) | Risk Management Plan |
| 1 | **Design is incompatible with the resources we we’re given** | M | M |  |
| 2 | **The prototype weights more than the allowed weight** | M | L | Lower the weight by removing other parts which the prototype does not need |
| 3 |  |  |  |  |

### Constraints

<Identify the specific constraints or restrictions that limit or place conditions on the project, especially those associated with the project scope (e.g., a hard deadline, a predetermined budget, a set milestone, contract provisions, privacy or security considerations, etc.). Categorize the constraints as either related to Time, Cost, or Resource Availability (Resources). If unsure, state “TBD”.

ENGG 160 imposes constraints on all projects in terms of duration and available student time.

Add rows as required.>

The main project constraints are defined in Table 8.

Table 8 Project Constraints

|  |  |  |
| --- | --- | --- |
| No. | Category | Constraints |
| 1 | Resources | We are limited in the use of resources for our project as we have only the choices between Cardboard, wood, and plastic (3D printing) |
| 2 | Resources | We need a PuppyPi to take accurate measurements for the development of the design of the backpack |
| 3 |  |  |

# Project Organization

<A Team Charter should have already been created, so in this section we show only the Project Team Structure as per the next section. Here, make sure the following statement is properly referenced. That is, change the “n”s to the correct numerals for your team and project numbers>

The project organization is defined in the “Team Charter for Tnnn\_Pnn” [<insert the correct reference number from Table 10>].

## Project Team Structure

<Use an organizational chart to show the structure of the project team as well as the relationships between team members. Use any drawing tool you like to create it.>

The organization chart for Tnnn\_Pnn is shown in Figure 2.

Figure 3 Organization Chart for Tnnn\_Pnn

**Vinny Gatto, Sergio Ara Del Olmo, and Sam**

# Project References

<In this section, identify and describe the location of the key documents and online references.

There must be at least two references, which are the Project Proposal and the Team Charter

To reference a document in the text of the Project Charter, use square bracked around the reference number in Table 10, e.g [2] refers to the “Team Charter for Tnnn Pnn”

All references listed in Table 10 must be used in the body of this charter>

More information concerning this project can be found in the documents and sites listed in Table 10.

Table 9 Project References

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Ref # | Document Title | Pub. Date | Author | Location (link or path) |
| 1 | PuppyPi Backpack | 2024-01-05 | ENGG 160 Instructional Team | https://eclass.srv.ualberta.ca/mod/resource/view.php?id=7721322 |
| 2 | Team Charter for | 2024-02-09 | **Luke Squire, Vinny Gatto, Sergio Ara Del Olmo, and Sam** | https://eclass.srv.ualberta.ca/pluginfile.php/10813495/assignsubmission\_file/submission\_files/8952009/B1\_28-P03-Team-Charter.docx?forcedownload=1 & |
| 3 |  |  |  |  |

# Glossary and Acronyms

<Define all terms and acronyms required to interpret the project charter properly.

If there are none, make an entry in the table saying so. **Note, it is very unlikely either table will be empty**>

Table 10 Project Terms and Definitions

|  |  |
| --- | --- |
| Term | Definition |
| PuppyPi | Mechanical Robot that is designed to have 4 robotic legs and walk using a remote control. |
|  |  |
|  |  |

Table 11 Project Acronyms and Definitions

|  |  |
| --- | --- |
| Acronyms | Name in Full |
|  |  |
|  |  |
|  |  |

***Checklist for reviewing your project charter:***

*After you have completed filling in the template for your project charter, use the list below to review the different sections to make sure you have included all the information required.*

* *The executive summary demonstrates a clear alignment between the project, the Departmental Investment Plan, and the Program Activity Architecture.*
* *There are specific and measurable project objectives and business outcomes that are linked to project goals.*
* *The scope of the project is clearly stated; the reader can easily understand what product, service, or result will be delivered by the project and what high-level activities will be performed.*
* *The deliverables are spread over the duration of the project, following a phased approach composed of decision gates.*
* *Summary cost estimates and source of funding to produce internal and external deliverables are provided, including the project management and administrative effort as well as any equipment required (e.g., hardware, software, floor space, etc.).*
* *Strategic risks are identified and assessed.*
* *Authority relationships between team members are clearly presented.*
* *Project roles and responsibilities are defined and assigned to individuals or groups.*

*If all of these are checked as complete, then delete this checklist, update the Table of Contents, Table of Figures, and List of Tables, and save the document to file.*

# Appendix A — Project Charter Rubric

<Remove this appendix from your final version.

The rubric for this assignment is effectively in two documents, this template and the marking guide.

Instructions and expectations for each section of the report above are provided in the light blue text, which is to be removed in the submitted version.

The number of marks for each section and the criteria for mark deduction is provided in the marking guide. The minimum mark for a pass is given in the guide and is cumulative over all sections; that is, it is possible to get zero in a section (for example, section 2.1) and still pass the assignment.

In Table A.1 below, an overview of the rubric is provided. More details are in the relevant sections in this document and the marking guide.

Table A.1 Project Charter Rubric Overview

|  |  |  |
| --- | --- | --- |
| Project Charter Section | Criteria and Expectations | Available Marks |
| 1 Charter Introduction | This is a heading with no text immediately following. | 0 |
| 1.1 Document Change Control | All versions of the charter are identified here including the initial. | 4 |
| 1.2 Executive Summary | The reader should have a good understanding of the project if all they read is this. All key pieces of information are identified in the template. The summary must be consistent with the remainder of the charter. | 15 |
| 2 Project Overview | This is a heading with no text immediately following. | 0 |
| 2.1 Project Summary | A high-level, simple, and succinct statement of the main (one) goal of the project is provided. Examples are referenced in this template and in the lecture. | 6 |
| 2.1.1 Project Objectives | Several high-level project objectives that support the “One Goal” are provided. They should be derived from the project proposal, team research, and discussion with the project client/sponsor. At this point in the project, they are expected to high-level and not necessarily completely defined. | 6 |
| 2.2 Project Scope | Text for this section is provided. | 0 |
| 2.2.1 Key Activities | All projects in ENGG 160 will generally follow the ENGG 160 Design Process and, thus, have similar activities (see the example Project Charter and lecture notes). However, there will be some activities unique to the specific project and project team. | 6 |
| 2.2.2 Key Requirements | There should be 5 functional requirements. These are not the same as constraints. A functional requirement describes what the solution (product, system, etc.) of for the project does, how it works, and its main characteristics (size, weight, power, structure, ergonomics, etc.). Do not confuse functional requirements with system requirements or constraints. At least 5 fucntional requirements are expected. Indicate using the appropriate verbs which requirements must be met and which would be good to meet. | 6 |
| 2.2.3 Deliverables | Deliverables are the result of developing, prototyping, and delivering the solution. A single deliverable may fully or partially satisify more than one objective. Each deliverable must have acceptance criteria. There must be at least 2 deliverables. | 6 |
| 2.3 Milestones | Key events or points in time for a project are called “milestones”. The ENGG 160 Design Process describes several phases, the end of each should be considered a milestone. Each project and project team will have unique milestones, for example based on the specific tasks determined in the planning of the project.  At the very least there should be milesones that match the ENGG 160 Design Process. | 3 |
| 2.4 High-level Project Plan | A project plan as captured in a Gantt Chart is required. All major project tasks and milestones must be included. Task start dates, durations, and dependencies must be included. | 6 |
| 2.5 Project Risks and Constraints | This section has black text that does not need to be altered. | 0 |
| 2.5.1 Risks | At this stage of the project only high-level, strategic risks can be identified. Once a risk is identified, there must be a mitigation plan; it must be addressed.  A project constraint is not a risk, but it may induce a risk (e.g., a failure to obtain bulding permits required by a jurisdiction may lead to time and cost risk).  Risk probability and impact are similarly hard to guage at this stage, but are important as they help with decision making. | 4 |
| 2.5.2 Constraints | These are imposed on a project by the client/sponsor, circumstance, and other mechanisms. They are not the same as requirements and are not necessarily risks, but they may induce a risk (see 2.5.1 Risks criteria above). There are constraints inherent in all ENGG 160 projects. | 4 |
| 3 Project Organization | The black text is provided, but the correct project reference must be added. | 2 |
| 3.1 Project Team Structure | The black text is provided, but the correct project reference must be added. The organization chart should come from the Team Charter | 3 |
| 4 Project References | All relevant and appropriate references must tbe included in the Charter. The Team Charter will be the first reference in all ENGG 160 projects. | 6 |
| 5 Glossary and Acronyms | All specialized or unique terms and acronyms must be defined adequately. | 4 |

APPENDED TEXT

The project consists of creating a puppypi backpack which can store a certain amount of balls. These balls will be required to be dropped at specific areas that will be determined during test runs and follow general guidelines on how much distance each drop off point must be and other rules stated in the project requirements file. The backpack must also survive certain conditions such as heavy motion or specific angles. The backpack should also be designed to be easily detachable and retachable. Benefits of this project will include those who are looking for a backpack or similar device that can carry objects on a puppypi and deliver them to specific positions.

|  |
| --- |
| Key Project Activities |
| 1. Brainstorming possible ideas for the backpack |
| 1. Develop requirements document |
| 1. Make a design for the protoptype that will theoretically work |
| 1. Create the prototype, doesn’t have to be perfect just follow the guidelines for the project |
| 1. Test the prototype |
| 1. Take notes on issues on the prototype and redesign till it works |
| 1. Create a final design that works and satisfies the end-user |
| 1. Submit our final design |