**1. A concise introduction to your team and the project.**

**2. A brief discussion of the importance of the problem definition design phase.**

**3. A justification of the quality of your team’s problem statement.**

**4. A justification of the quality of your team’s requirements matrix**

**5. A brief discussion of the importance of the conceptual design phase.**

**6. A discussion of the concepts generated by your team, including the concept generation tools used and annotated sketches.**

**7. A concise conclusion, including your team’s next steps for the project.**

Constraints

• Size and weight

• Operating system

• Construction

Functionality

• Manoeuvre

• Tasks

• Operation

**Olivia-Draft**

Inspired by the international Robocup competition, the aim of this project is to create a remotely operated vehicle that can travel through a (dimensions/more info) maze in order to locate a ‘victim’ presented as a standard tennis ball. The robot must be able to travel up stairs, manoeuvrer through a maze, and collect and retrieve the tennis ball whilst being controlled by a team member remotely. Smooth handling of the ‘victim’ is emphasised, this metric may be measured through.... In addition, this robot should be efficient in finding and securing the tennis ball, and be reliable in retrieving it. To measure this, we will do multiple attempts and time them, as well as ensuring that the ball is retrieved at least 4/5 times, and the higher this percentage the better the outcome. Aesthetics and innovation may be measured through conducting surveys of higher ups, to see what they rate it and creating an average of this information. Price... Size/weight...



**Selina - Drafts**



In emergency situations such as natural disasters, industrial accidents, or urban search and rescue operations, there is a critical need for robots capable of navigating hazardous environments with rough terrain to locate and rescue survivors. This project aims to design and construct a rescue robot that shall be capable of safely and efficiently manoeuvring through a maze with rough terrain to replicate challenging terrains including debris and obstacles while under operator control through an Arduino operating system to rescue and retrieve a tennis ball. We shall adhere to soft constraints under budget limitation of $120 with a user-friendly interface and the aesthetics of the build while ensuring the rescue robot satisfies the hard constraint of weight limit under 1000gm and dimensions within a cylinder 250mm in diameter and 250mm high when it is in fully extended position using a Arduino board that receives instructions and feedback via a laptop keyboard. The project will undergo tests, demonstration, analysis and inspections to ensure it meets objects and adhere within constraints.

**Michael – Draft**

Build a remotely controlled robot operated by an Arduino microcontroller that relays sensor information about the surrounding environment. This will enable the operator to navigate the robot through complex environments (e.g. maze, uneven terrain, uneven ceiling height) to identify and locate a single victim represented by a tennis ball. This robot will then carry said victim (i.e. the victim should not have contact with the ground) to the starting point. The robot shall locate the victim within 5 minutes, weigh less than 5 kg, and have a dimension limited by 300mmx300mm.

**Adam - Draft**

The aim of the project is to design a robot that is required to successfully identify and rescue a victim represented by a tennis ball. In order to do this the robot must be able to manoeuvre in tight spaces (420mm long) through a maze while being remotely operated via a laptop keyboard. Furthermore, the robot is required to fit in a cylinder that is 250mm in diameter and height and weigh less than 1000 gm. The ability to negotiate rough terrain is essential as the robot must ascend and descend stairs ranging from 6mm to 36mm. This must be achieved with a cost of less than $120 and be visually appealing.

**Arya – Draft**

Design a rescue robot capable of navigating through a complex environment and rough terrain to locate and extract survivors.

The rescue robot must navigate through a maze whilst avoiding collisions with the walls. The aim is to design a tele-operated maze-solving robot powered by an arduino uno microcontroller that allows an operator to remotely control the robot's movements and actions via a usb cable in order to rescue the survivor (tennis ball).

The robot must be able to scan and find the victim and report back to the operator and transport it back to the starting location.

In the fully extended position, the robot must be able to fit inside a cylinder 250mm diameter and 250mm height and must weigh less than 1000gm (including batteries). The build in its entirety must cost under $120.

Introduction statement – Robocup and actual objectives

shall

* Ascending and descend a maze with rough terrain, avoiding collisions with the walls
* Controlled by operator remotely using Arduino interface
* Retrieving of victim (tennis ball) in most efficient, safe and smooth handling
* Soft contraint – aesthetics, innovation, interface
* Hard constraint – budget, size, weight, power supply, Operating system Arduino Uno microcontroller, materials from scratch
* Testing and improvement – test, demonstration, analysis, inspection

|  |  |  |
| --- | --- | --- |
| **Objectives/constraints** | **Key issues** | **Action** |
| * fit inside a cylinder 250mm in diameter and 250mm high * Weigh less than 1000 gm * Cost less than $120 * Os to be developed on an Arduino Uno microcontroller. * Manoeuvre through a complex maze * Be able to traverse through rough terrain (stairs) * Locate and retrieve the victim (tennis ball) | * . * . * The cost of the aduino microcontroller is included in the budget * . * Penalties for knocking down the walls * . * Object identification using ML |  |

**Project Statements**

***Final Project Statement***

Inspired by the RoboCup competition, the project aims to design a tele-operated rescue robot that shall be capable of navigating through a complex environment of rough terrains, maze walls, and stairs ranging from 6mm to 36mm to locate and extract a single survivor represented by a tennis ball. Furthermore, the robot is required to fit in a cylinder that is 250mm in diameter and height, weigh less than 1000 gm and constructed from scratch within a $120 budget. The robot shall be powered by an Arduino Uno microcontroller

(THERE IS ALSO A TIME CONSTRAINT FOR THE PROJECT AS WELL)

to report and locate the find to the remote operator before safely transport to robot starting position.

**Updated Problem Statement:**

Inspired by the RoboCup competition, the project aims to design a tele-operated rescue robot that shall be capable of navigation through a complex environment of rough terrains, maze walls, and stairs ranging from 6mm to 36mm whilst avoiding collisions to locate and extract a single survivor represented by a tennis ball. The robot must locate the victim and report back to the operator before transporting it back to the starting location. The Robot will be powered by an Arduino uno microcontroller that allows the operator to remotely control the robot’s actions. Furthermore, (in the fully extended position) the robot must be able to fit inside a cylinder 250mm diameter and 250mm height and must weigh less than 1000gm (including batteries). The build in its entirety must cost under $120 and comply with the time constraints.

**Speed**

**Innovation**

**Aesthetics**

**Testing and improvements**