**Collaboration Plan – Integration of 3D Mapping Device onto Autonomous Mobile Robots (AMRs)**1 Introduction

This report covers the main aspects regarding collaborating as a larger group and how we can collectively achieve our goals via collaboration. This report is structured and divided according to the different learning outcomes of the EDR course as indicated in the module outline.

**Team Description:**

Our group consist of two smaller groups one team is making AMR controller and our team is making low cost 3d lidar scanner for that AMR controller.

1.AMR Controller: this subgroup focuses on

2. 3D Mapping with LiDAR: This subgroup focuses on employing Light Detection and Ranging (LiDAR) technology to achieve 3D mapping objectives, adapting this approach for effective use on AMRs for determining the navigation and interaction strategies.

By collaborating our two teams, The AMR controller team aims to harness the low-cost capabilities of our lidar scanner project to enhance the robot navigation capabilities. And also they are planning to identify limitations of lidar project and make strategies for overcome that limitations. The Lidar team is planned to use AMR robot to enhance the capabilities of lidar scanner. For example, lidar team can correctly identify interested field of view of AMR robot. And by reducing the field of view higher frame rates can be achieved

**Collaborative Efforts for Integration LIDAR onto AMRs:**

**Sharing Knowledge and Resources and identify the limitations.**

By working together, the LiDAR mapping team and the AMR Controller team can make big improvements to our 3D mapping device for AMRs. The lidar team can get good idea about AMR controller requirements and make lidar scanner according to those requirements. For example, according to the information from AMR controller group we can reduce the field of view of our lidar scanner. and also we can reduce the distance of our lidar scanner to a AMR requirements and by doing that our lidar scanner error rate will greatly reduce. The AMR group can test our lidar scanner in their project and identify the limitations in our lidar project. By doing so we can improve the overall quality of our both projects. This team effort means we can solve problems faster and make a really good system for guiding robots accurately and efficiently.

**Integration and Interoperability:**

With the focus narrowed to the collaboration between the LiDAR Scanner Group and the AMR Controller Group, it's critical to design the LiDAR-based 3D mapping technology to meet the diverse requirements of autonomous mobile robots (AMRs). This involves a detailed analysis of the LiDAR system's capabilities, including its range, precision, and cost-effectiveness, to match the operational demands of AMRs in different settings. Whether the robots are tasked with navigating vast warehouse environments or maneuvering through tighter spaces, the integration strategy aims to optimize the LiDAR mapping solution to enhance the AMR's navigation and operational efficiency. This collaborative effort is designed to ensure seamless compatibility and superior performance, enabling AMRs to function effectively across a variety of application scenarios.

**Protocol Standardization:**

The collective effort of the LiDAR Scanner Group and the AMR Controller Group to establish a standardized communication protocol is pivotal for smooth integration. This initiative seeks to guarantee that the AMR can effectively understand and apply the 3D mapping data produced by the LiDAR system, fostering uniform and dependable navigation and operational performance. By aligning the communication methods and data formats, this strategy emphasizes the importance of interoperability and efficiency, ensuring the AMR's capabilities are fully optimized for a broad range of tasks and environments.

**Design product enclosures complying with industry standards**

By collaborating with other teams. Lidar team can make the lidar scanner enclosures according to the AMR controller’s needs. Designing compact, cost effective, lightweight enclosures that can used in AMR project steadily is a main goal of lidar team. by collaborating with AMR controller group we can identify the approximate size, weight and holding mechanism for our lidar project. Also AMR group can get good idea about lidar scanner size and use that information to make good enclosure for navigation robots. As part of the projects, both our groups are required to design enclosures complying with industry standards. We would be able to share ideas and thoughts with regard to how we can make the designed enclosures compliant with industry standards

Prepare proper documentation for projects.

Through working together as a larger team, we can leverage a wide range of expertise and viewpoints. This collaboration enables us to tap into diverse skills, knowledge, and experiences from each member. As a result, our documentation becomes more thorough, precise, and insightful, incorporating multiple facets of the projects.

**Regular Communication and Progress Updates:**

Maintaining open lines of communication and frequent progress reports among all subgroups is essential for timely issue resolution and alignment with the project’s overarching goals. This practice will ensure that all team members are informed of developments and challenges, fostering a collaborative and supportive project environment.

**conclusion**

By adopting these collaborative strategies, we aim to leverage the collective expertise and resources of subgroups, encouraging a organized effort towards achieving our goal of effectively integrating 3D mapping device onto AMRs. This project not only aims to enhance the navigational and operational capabilities of AMRs but also contributes to the broader objective of advancing robotics technology for practical and innovative applications.