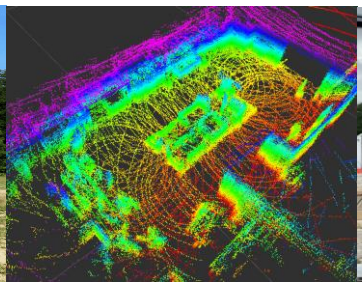
Lidar-Based Safety Curtain for Autonomous Robot-Human Interaction


Company Background:

At Stratom, we are driving the future of automation by developing unmanned ground vehicles and autonomous robotic systems for commercial and defense applications — whether in safe, controlled settings or dynamic and challenging terrain.

Specializing in unmanned cargo movement, autonomous mobile robots (AMR) and robotic refueling, our proven tools, methods, technologies and strategic services continuously meet our customers' unique and evolving needs in logistics and operations. Our solutions enable them to reduce monotonous, difficult or dangerous tasks to optimize uptime and efficiencies, address labor shortages, increase profitability, and keep people safe.

Project Description:

One of the major challenges of human-robot interaction is the risk of accidents and injuries that can occur when humans are operating near autonomous robots during their testing and adoption. In this project, students will work with single scan lidars to create a safety system for use with Stratom's autonomous robots. This "safety curtain" will act as a virtual boundary around the robot, continuously scanning its environment to detect the presence of humans and obstacles.

Establishing a safety curtain using single scan lidar for autonomous robots presents a significant challenge, particularly when the robot is in motion. In stationary scenarios, lidar sensors can be positioned around the robot to create a fixed safety boundary; A moving robot requires a safety system that can adjust dynamically to the robot's changing position in addition to the movements of people and objects in its environment. Stratom's robots often work in close proximity to stationary obstacles, and distinguishing between static and dynamic obstacles and alerting operators to potential collisions with fixed objects or humans will require advanced algorithms for object tracking.

Students will focus their efforts on:

- Designing software to use single scan lidar sensors to create a configurable and robust safety curtain around a robot

- Developing algorithms for object tracking to distinguish between static and dynamic obstacles and alert operators of potential collisions with fixed objects or humans
- Organization of this functionality into ROS nodes to fit into Stratom's autonomy stack
- Developing a visualization for monitoring the safety curtain and receiving alerts using ROS's 3D visualization package
- Conducting testing and evaluation of the system's performance in various environments and scenarios

Students will have the opportunity to run their code on real lidars and in conjunction with the operation of Stratom's fleet of autonomous robots.

Desired Skillset:

- C++
- ROS2
- Linux
- Docker
- Point cloud processing, computer vision, and machine learning techniques

This project is an excellent way for students to leverage their foundation in C++ to develop skills in computer vision and object tracking and gain experience using ROS, an industry standard for robotics work.

Team Size: 3-4 Students

Location:

Meetings will primarily be held remotely using Teams or Zoom. Our office is located in Louisville at 331 South 104th Street, Suite 235, which is the location students will be able to test their code on Stratom's sensors and robots towards completion of the project.

Post-Project Internship Opportunities:

Stratom is looking to hire interns and would be happy to consider students on this team!

Note: All intellectual property developed as part of this project will be owned by Stratom