Robotics,
Autonomous systems

Weekly Report N°10 for

School year 2023-2024

RubbleScout,

"Navigating Chaos, Saving Lives"

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Objectives:

- Conduct the first complete LiDAR scan using the ESP32.
- Evaluate the performance and identify areas for improvement.

Activities Undertaken:

1. First Complete LiDAR Scan:
- Successfully executed the initial full-scale LiDAR scan with the ESP32, marking a significant milestone in the project's development.
- The scan results were promising, providing a solid foundation for further optimization. Exemples are available in the github folder.

2. Performance Assessment:
- The LiDAR system achieved a scanning frequency of 50Hz, which, while functional, falls short of the 500Hz capability advertised by the manufacturer, Garmin.
- This discrepancy led to the decision to transition the development framework to ESP-IDF, aiming to harness its lower-level control for enhanced performance.

3. Hardware Troubleshooting:
- Encountered a malfunction in the 5V power rail, necessitating a thorough system check to diagnose and repair the fault, and to assess any potential damage to other components.

Results and Observations:

- LiDAR Scan Quality: The quality of the LiDAR scan was commendable for a first attempt, offering valuable insights into the environmental mapping capabilities of RubbleScout.

- Technical Limitations: The current scanning rate limitation highlights a critical area for technical improvement, necessitating a framework switch to unlock the full potential of the hardware.

- Hardware Reliability: The issue with the 5V rail underscores the importance of robust system design and the need for regular maintenance checks to ensure system integrity.

Next Steps:

- Framework Transition: Initiate the migration to the ESP-IDF framework, focusing on optimizing the code to achieve higher LiDAR scanning frequencies.

- System Repair and Testing: Reconstruct the affected system components, replace the faulty 5V rail, and conduct comprehensive tests to ensure no other parts were compromised.

- Performance Optimization: Analyze the initial scan data to refine the scanning process, aiming for higher accuracy and efficiency in subsequent tests.

Reflections:

This session was a blend of significant achievements and unforeseen challenges. Completing the first LiDAR scan with the ESP32 is a testament to the project's progress, offering a glimpse into its potential capabilities. The shift to ESP-IDF represents a strategic pivot towards leveraging more advanced technical solutions to overcome current limitations. The hardware issue, while a setback, provides a learning opportunity to enhance the system's durability and reliability. As RubbleScout continues to evolve, each session brings us closer to realizing its full potential in real-world applications.