QuadraVision: Telemetric Reality Bot

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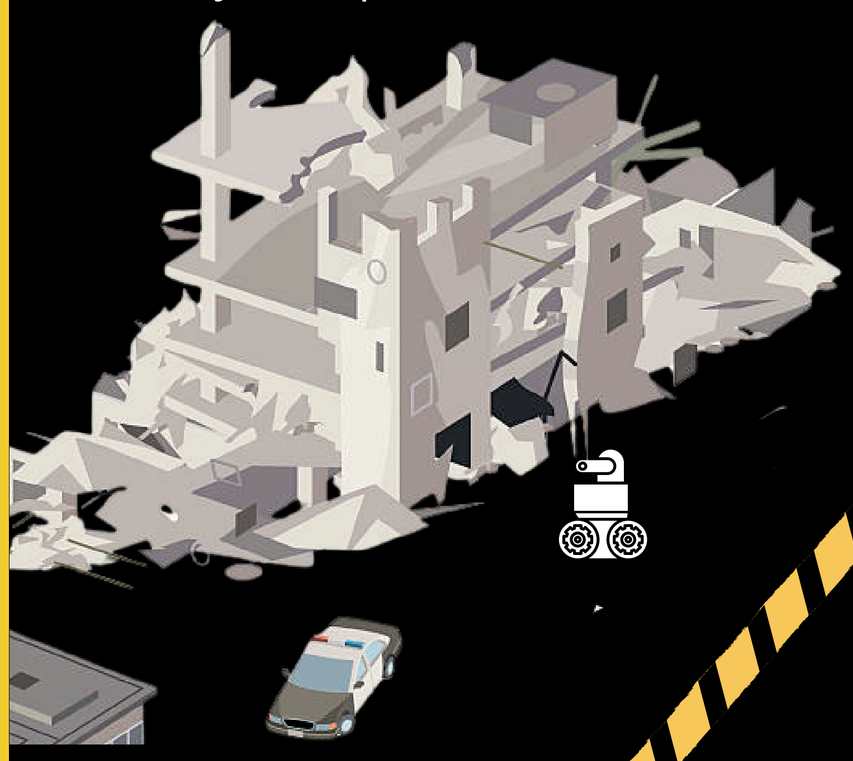
1 PROBLEM STATEMENT

- Amidst rapidly changing environments, advanced monitoring is crucial for both rescue and data collection, emphasizing the need for real-time visuals and data flow.
- Developing a cost-effective and dynamic solution is a major challenge.
- The goal is to achieve a cost effective and detailed environmental surveillance with data analysis capabilities.



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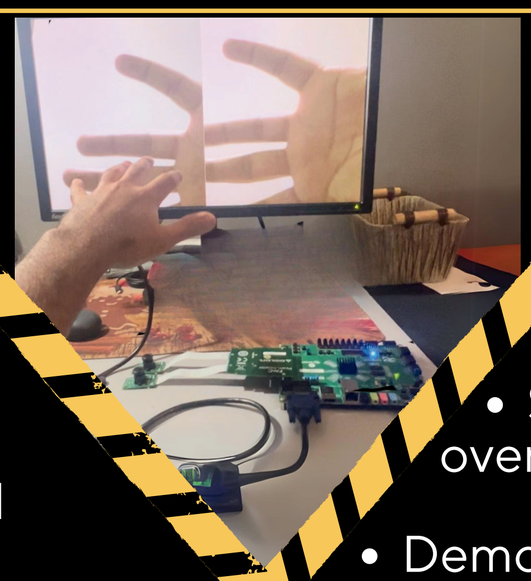
2 APPROACH AND SOLUTIONS

Hardware
- FPGA for parallel processing to achieve enhanced video quality.
- Raspberry Pi to integrate and visualize sensory data

Software
- Develop software to leverage FPGA's parallel processing, from logic design to programming.
- Create software to collect and display telemetry data in a graphical format.

Power
- Designing efficient power management to balance the diverse energy needs of components like FPGA boards and other subsystems.

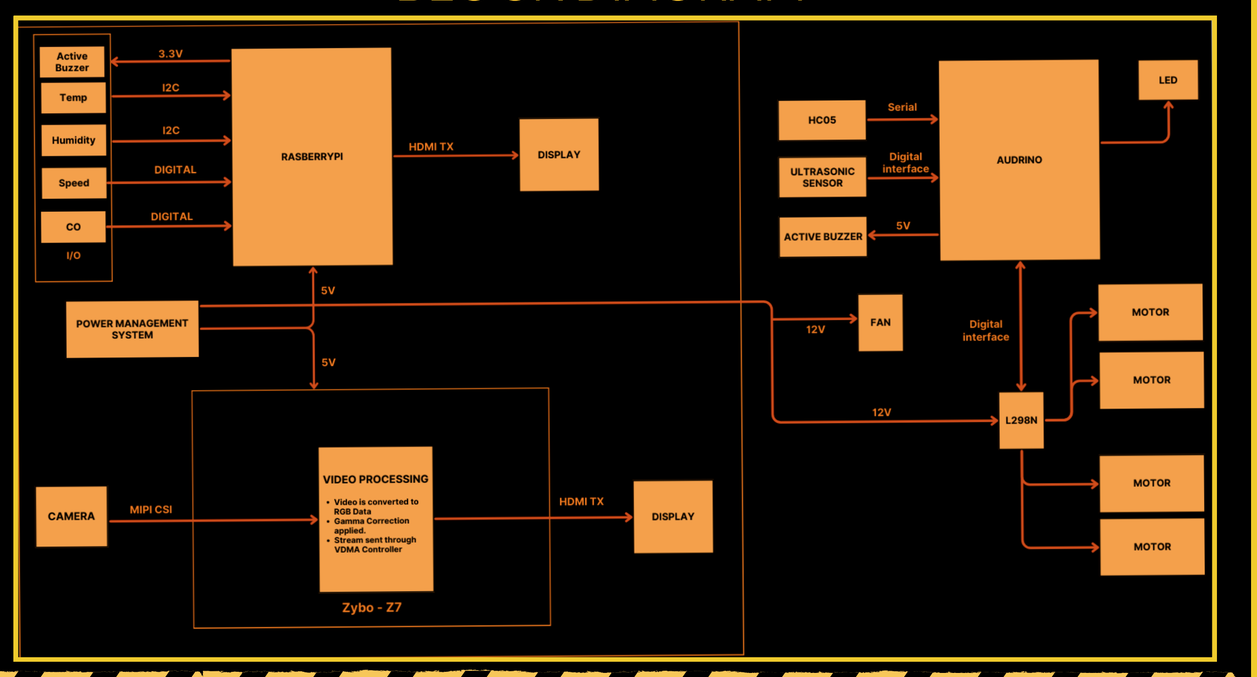
Cost
- Developing cost-effective solution than expensive custom alternatives.



3 RESULTS

- Transmitted a wireless HD camera feed at 60 FPS across a distance of 30 meters .
- Demonstrated wireless telemetry data transmission with minimal delay across a 40 meter range.
- Showcased core functionality excluding overlay, on a custom-built robot chassis.
- Demonstrated overlay on a real-time HDMI stream.

BLOCK DIAGRAM



4 CHALLENGES

- **Integration**: Combining the video and overlay projects while maintaining a high-quality feed.
- **Synchronization**: Managing timing across 3 real-time video streams effectively.
- **Hardware**: Selecting a powerful FPGA board to overcome synchronization and processing challenges.

5 FUTURE IMPROVEMENTS

Comprehensive Monitoring
- Fully achieving overlayed telemetry data and camera feed on single FPGA board.

VR integration
- Real-time VR telemetry & video integration for immersive analysis.

LIVE DEMO! ED114

September 2023 — Design Ideas
October 2023 — Conceptual System design
November 2023 — Ordering Parts and FPGA coding on Zedboard
December 2023 — Base Project Created for vmix and camera on Zedboard
Januray 2024 — Design Robot and switched to Zybo
February 2024 — Robot Design and Zybo base projects
March 2024 — Base project merge issuess
April 2024 — Project day preparations work on Zedboard continued

Project Advised By: Dr Lei Zhang, Doug Wagner, Dr Paul Laforge