Depth Perception for Obstacle Avoidance using Robust Artificial Intelligence-based Defense Electro Robot (RAIDER)

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Introduction

The Vision Lab has many image processing projects that can assist a robot in navigation and surveillance. In the past, the Vision Lab worked on the development of the RAIDER which possessed its own image processing algorithms written in C/C++. However, since then, the C++ libraries are no longer supported and the robot model's company strictly uses the Robot Operation System (ROS) for all robot interfacing and control. The greatest strength of these changes is the strict use of ROS. The new Robotics System toolbox available to Matlab which bridges a development tool used commonly in the Vision Lab with ROS. Now, we can implement the 3D reconstruction method developed in the lab to avoid obstacles and detect changes in the environment.

Methodology/RAIDER

What is the RAIDER?

The Robust Artificial Intelligence-based Defense Electro Robot is an autonomous Unmanned Ground Vehicle (UGV).

Robot Base Model: Husky A200 by Clearpath Robotics

Base Equipment:
- Belkin Network Router
- Network Switch
- 2 Axis PTZ Base Cameras
- Microsoft Kinect
- ASUS Laptop

System Hardware Design

- Offboard Control Processing
  - Automatic Detection, Recognition, and Tracking
  - Implementation of Vision Lab projects
  - Access to IP camera networks
- Robot Onboard Processing
  - Network Trafficicking and Communication
  - Robot Operating System (ROS)
  - Sensor Data Streaming

3D Scene Reconstruction and Change Detection using RGB-D Sensor

Input Data

Point Cloud Registration

Staggered Model

Change Detection

Robot Model Images

Future Plans

The Vision Lab has many image processing projects that can assist a robot in navigation and surveillance. In the past, the Vision Lab worked on the development of the RAIDER which possessed its own image processing algorithms written in C/C++. However, since then, the C++ libraries are no longer supported and the robot model's company strictly uses the Robot Operation System (ROS) for all robot interfacing and control. The greatest strength of these changes is the strict use of ROS.

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