INTRODUCTION

Hostage situations, terrorist, enemy battlefields and rescue operations are only some of the scenarios where robots are used. These types of robots need an array of abilities to successfully complete missions, including:

- object recognition and tracking
- mapping and localization

This project endeavored to design and build a set of Unmanned Ground Vehicles (UGVs) to collaboratively work as a team in completing reconnaissance missions.

MAGIC 2010

Light Detection and Ranging (LIDAR)

Primary device for object distance detection. Sends and receives light waves to calculate distances.

Supervisors

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Students

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ULTRASONIC SENSORS

Two ultrasonics optimally positioned to sense the widest range possible. These devices emit and receive silent sound waves to detect objects.

CAMERA

Primary means of object detection. Works collaboratively with the LIDAR to successfully detect objects and determine their proximity.

ANTENNAS

Wireless communication to the Ground Control Station (GCS) and other UGVs.

DRIVE SYSTEM

Six brushless DC motors coupled with encoders and controllers.

E-STOP SWITCH

An emergency push button that suspends all UGV actions when hit.

GLOBAL POSITIONING SYSTEM (GPS)

Localization device that pinpoints the UGV’s position on the field.

FEATURES

- Object detection and tracking abilities through advanced color filtering algorithms.
- Mapping of unknown areas displaying environmental key features and identified objects.
- Pan Tilt Unit (PTU) providing a wide range of orientation for the camera, laser and LIDAR.
- Accurate localization from an amalgamation of a differential Global Positioning System (dGPS), Inertial Measurement Unit (IMU) and wheel encoders.
- Simultaneous Localization and Mapping (SLAM) in the event of loss in GPS signal.
- Waypoint path following commanded by the user at the Ground Control Station (GCS).