Autonomous Inventory Tracking Using Robotic RFID Scanner

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Introduction

- Mobile robotic system with RFID scanner
- Capable of self-navigating a warehouse and updating inventory database
- Help avoid shrink and excess manual labor

Project Goals

General

- Robot that can operate autonomously based on landmarks
- Target market value is \$3,299.00

Robot Capabilities

- Line detection to control movement
- Transmit data to a remote server
- Arm with vertical movement to accurately scan shelves of different heights **RFID Scanner**
- Detect tags to indicate when inventory is located
- Scan tags to procure pertinent information about the detected inventory
- Record data and send information about the inventory to Raspberry Pi

RF Specifications

Feature	Specification
Bandwidth	865-928 MHz
Transmit Power	+10 - +31.5 dBm
Max Receive Sensitivity	-84 dBm
Power Supply	24Vdc/2.1A

Robotic Platform and Arm Specifications

Feature	Specification
Robotic Arm Vertical Range of Motion	2-5ft
Robotic Arm Repeatability	+/- 1.00mm
Battery Life	4Hrs
Weight	< 30lbs
Dimensions(Length, Width, Height)	0.5m x 0.3m x 1.2m
Power Supply	24 V DC

Design Approach

- Robot will consist of RFID reader, microcontroller, motor control system, and vision system
- A motor controller to power the Raspberry Pi as well as the motors
 - Two DC motors for forward locomotion
 - Stepper motor for vertical motion of the RFID reader
- Pixy 2 camera line tracking program for directing the motion of the robot

Block Diagram of the RFID Robot System



Robot Movement Using Pixy 2 Line Tracking



Solution to Finishing Critical Path



Schedule



TBD

Weight

Type of DC motors to support motion of chassis

Power Requirements

Motor power draw + RFID + RPi

RFID

Tilt/Pan vs Vertical Motion

Link Budget and Scanning Algorithm

Current Status

General

- Jira setup for internal task breakdown and sprint management
- Bitbucket setup for code collaboration
- Gantt chart for timing of deliverables
- Fall semester roles assigned

Raspberry Pi

- Database & HTTP server deployed
- Servo motor moved off of pin call

RF Technology

- Scanner secured from Dr. Durgin
- RF Lab access granted for testing scanner capabilities