

Autonomous Light Beacon Robot

Subsystem Requirements

Zachary Feuerstein
Kevin Hoffman
Xiaolin Zheng

1) Controller Unit

- Must contain all high-level algorithms related to the control and operation of the robotic platform's various functions
 - Must take input from the sensor/communication board in order to effectively communicate with the beacon towers
 - Shall be capable of storing sensory data and performing basic logical and arithmetic operations on said data
 - Shall be capable of taking feedback from obstacle avoidance sensors and interpreting said feedback in order to control the movement and orientation of the platform
- Must possess some method of analog-to-digital and digital-to-analog conversion of input and output signals in order to interface properly with hardware

2) Sensor/Communication Board

- Must detect the location of beacon towers based on the color and/or intensity of radiating light
- Must receive a 38KHz-modulated infrared signal and communicate with the beacon towers via a Universal Asynchronous Receiver/Transmitter (UART) protocol at a baud rate of 300 symbols per second.
 - Must transmit the capture signal, provided by the controller, in order to claim the beacon
 - Must transmit within a one-second window between outgoing data packets from the tower
- Must detect the presence of obstacles on the playing field and provide relevant feedback to the controller based on location

3) Motor Actuation

- Shall receive control signals from controller and output relevant components as actuation signals
 - Shall either restrict or allow the supply of voltage to the motors (e.g. enabled/disabled)
 - Shall determine the direction of movement for the platform by taking control signals and using them to control the spinning direction of the individual motors (e.g. clockwise/counterclockwise)
- Shall provide feedback from the motors' quadrature encoders to the controlling unit as input to

movement algorithm

4) Power Management

- Must provide adequate power for all components on the robotic platform to operate safely
 - Must provide a minimum of 5V for operation of the controller and motor actuation subsystems
 - If necessary, should regulate certain voltage and current levels to allow for operation of certain components

Block Diagram

