McGill TEAM 11

OBJECTIVE

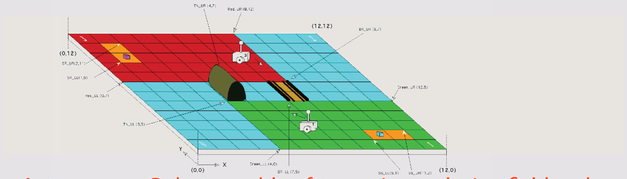
Design and Construct a fully functioning autonomous robot that can navigate itself through a series of obstacles within a defined playing grid, capture an "enemy" flag and finally, return that flag to its area of the grid.

REQUIREMENTS

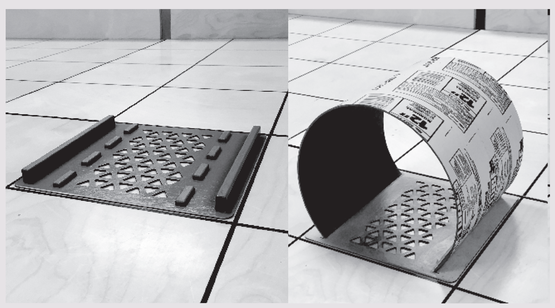
HOW TO WIN

1)Receive parameters from game controller correctly
2) Localize under 30 seconds
3) Navigate to tunnel/bridge
4) Traverse river to the opposite side
5) Search for opposition flag
6) Indicate capture
7) Navigate back to the start
8) Stop
9) Time limit of 10 minutes

SPECIFICATIONS



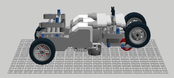
Autonomous Robot capable of traversing a playing field and capturing an enemy flag
The playing field measures 12 x 12 feet, with the origin located in the lower left hand corner, (0,0), as shown in Figure 1
Blue zones indicate a river and they cannot be traversed.
2 key obstacles within the playing field: Tunnel and Bridge.
The Tunnel has a width of 22.07cm and a height of 25.75cm.
The bridge has a width of 26.01.



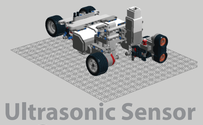
Game Parameters and Instructions received by Wi-Fi
Once the parameters are received each player must complete the requirements to achieve victory

HARDWARE

Full Design

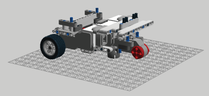


Landing Gear Component



Ultrasonic Sensor Component

Light sensor



Chassis Feature

COMPONENTS USED

KEY DESIGN FEATURES

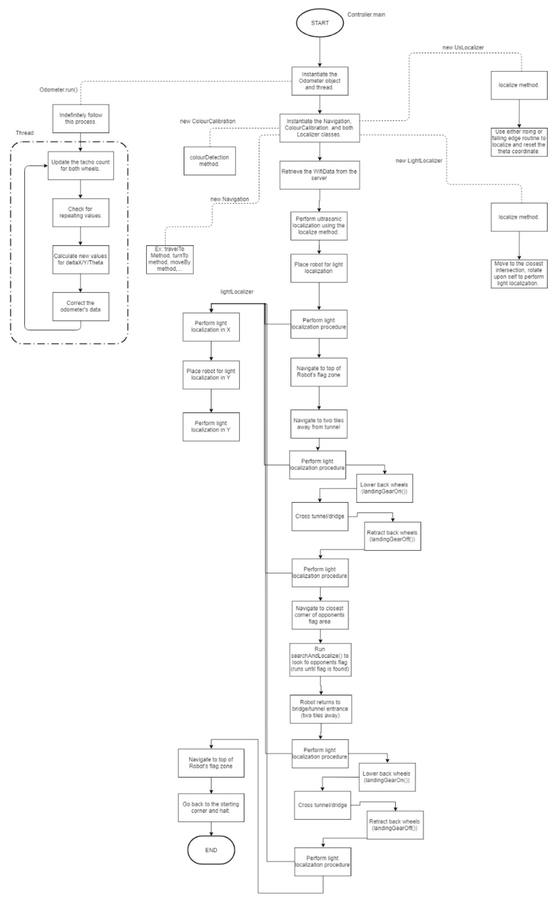
HIGHLIGHTS

Variable rear wheel Landing Gear System
Two real wheels are ejected to support bridge traversal
Stored back into position after traversal
Unique design that adds excellent stability

SOLID CHASSIS

Large and Solid Chassis ensures weight distribution
Easy access to brick's ports and batteries

SOFTWARE FLOWCHART



TOOLS USED

GANTT project
GitHub
slack
LEGO
Google Drive
eclipse

TESTING PHASE

PHASE 1- HARDWARE COMPONENTS

Ultrasonic Sensor
Light Sensor
Wheel and Track optimization

PHASE 2- SOFTWARE COMPONENTS

Localization
Variable Back Wheel Functionality
Navigation and Traversal
Searching
Capture
Phase 3- System Integration
WiFi Integration
Complete System Component Integration

DESIGN PROCESS

RESEARCH

Component reuse from development
Understanding Client Requirements
Preliminary Designs

BUILDING PROCESS

Hardware Prototypes
Software Architecture
Testing Plan

TESTING AND IMPLEMENTATION

Final Design Implementation
Modular Testing technique
API development

OPTIMIZATION AND INTEGRATION

Integration of Hardware and Software
Perfection of Software
Presentation preparation

TEST RESULTS

AND POTENTIAL IMPROVEMENT

Landing Gear
Traversal Stability
Design Niche
Superior Weight Distribution

Navigation
Excellent Precision
Odometer exhibits high accuracy

ROLES

Bryan Jay- Project Manager
Luka Jurisic- Documentation Manager
Volen Mihaylov- Software Lead
Enan Ashaduzzaman – Hardware Lead
Tianyi Zou- Testing Lead
Patrick Ghazal – multidisciplinary Engineer

BUDGET

Total Budget- 351
Project Management-
Hardware-
Software –
Testing -
Documentation-