# McGill UNIVERSITY

# TEAM 01
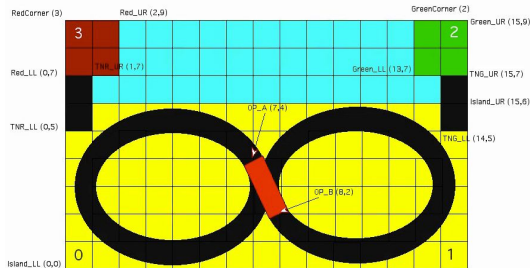
# RobotExpress

## TEAM MEMBER

- ❖ Yutong Wang-Hardware Team Lead
- ❖ Junjian Chen-Testing Team Lead
- ❖ Lide Cui-Software Engineer
- ❖ Angelina Duan-Project Manager
- ❖ Shichang Zhang-Software Team Lead
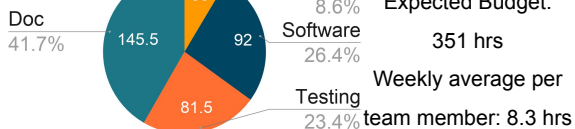- ❖ Dominic Chan-Documentation Manager

## Objective

**TASKS:**
- ➤ Receive game parameters from the Wi-Fi class
- ➤ Pass the tunnel
- ➤ Traverse through given waypoints
- ➤ Avoid any obstacles
- ➤ Go over/under the overpass
- ➤ Return to its starting point
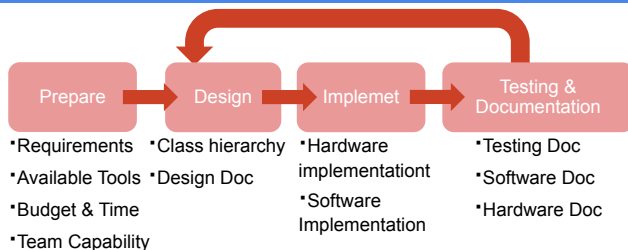- ➤ Finish all tasks within 5 min



## Management



Team Budget

Hardware 8.6%
Doc 41.7%
Software 26.4%
Testing 23.4%

30
145.5
92
81.5

Total Budget: 349 hrs

Expected Budget: 351 hrs

Weekly average per team member: 8.3 hrs

## Tools



eclipse   GitHub   Webots robot simulation   Microsoft Teams

## Design Process



Prepare → Design → Implemet → Testing & Documentation

- Requirements
- Available Tools
- Budget & Time
- Team Capability

- Class hierarchy
- Design Doc

- Hardware implementationt
- Software Implementation

- Testing Doc
- Software Doc
- Hardware Doc

## Hardware Design



**EV3 Brick** x1

**Ultrasonic Sensor (Localization, Obstacle avoidance)** x1

**Color Sensor (Localisation)** x2

**Large EV3 Motor (Wheel rotations)** x2

**Ball Caster (Improve Stability)** x2
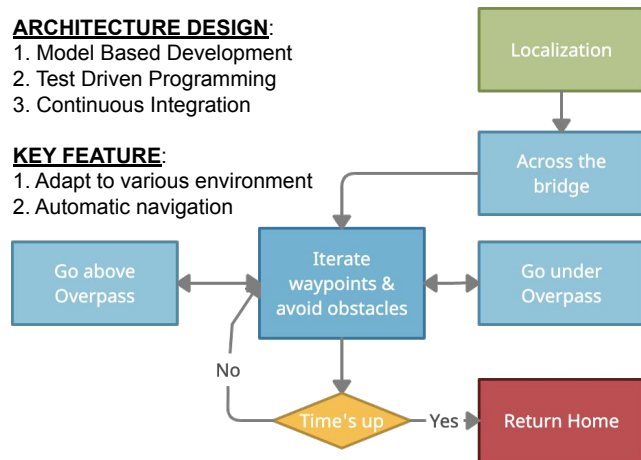
## Software Design

**ARCHITECTURE DESIGN:**
1. Model Based Development
2. Test Driven Programming
3. Continuous Integration

**KEY FEATURE:**
1. Adapt to various environment
2. Automatic navigation



Localization → Across the bridge

Go above Overpass ← Iterate waypoints & avoid obstacles → Go under Overpass

Time's up — No / Yes → Return Home

## Testing



| Sensor Test | Unit Test | Integration Test | Complete Test |
|---|---|---|---|
| •Sensor Accuracy | •Odometer | •Pre-Beta Demo Test | •Beta Demo Test |
| | •Localization | •Pre-Final Test | •Complete Test |
| | •Navigation Related | | |
| | •Avoid Obstacle | | |