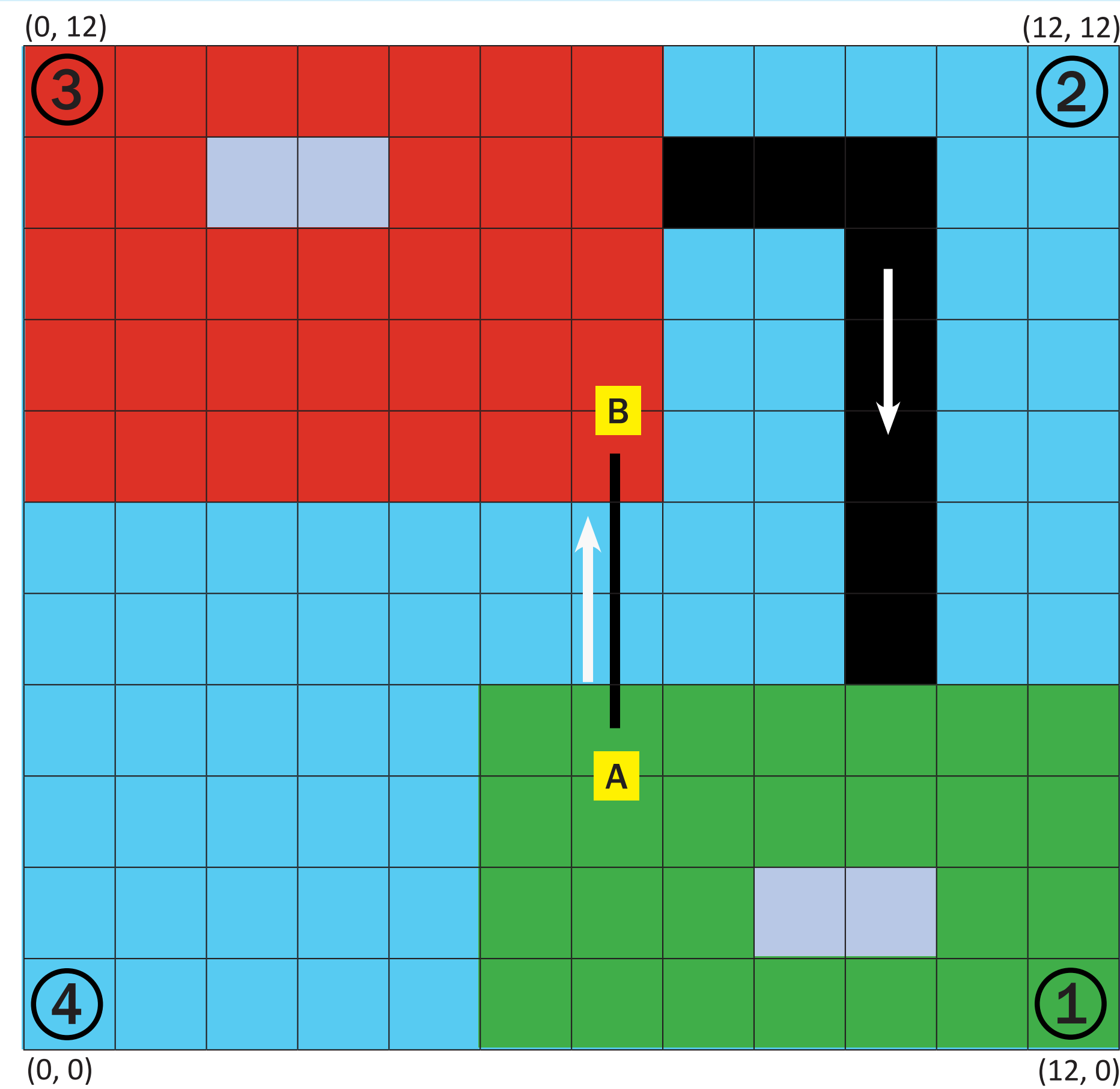


Objective



The goal is to design a robot that is capable of autonomously playing a one-on-one game of capture the flag. At the start of play, the robot must receive the game parameters that describe the position of each element of the playing field. The robot must then navigate to the opponent's zone, find the appropriately coloured flag, and return to its starting zone. Both methods of crossing the water must be used, in the specified order.

Green Team

1. Receive game parameters
2. Localize to (7, 1)
3. Navigate to A and relocalize
4. Mount, cross, dismount zipline
5. Relocalize to B
6. Navigate to red zone and find flag
7. Return to 1 via the bridge

Red Team

1. Receive game parameters
2. Localize to (1, 7)
3. Navigate to green zone via bridge, find flag
4. Navigate to A and relocalize
5. Mount, cross, dismount zipline
6. Relocalize to B
7. Return to 3

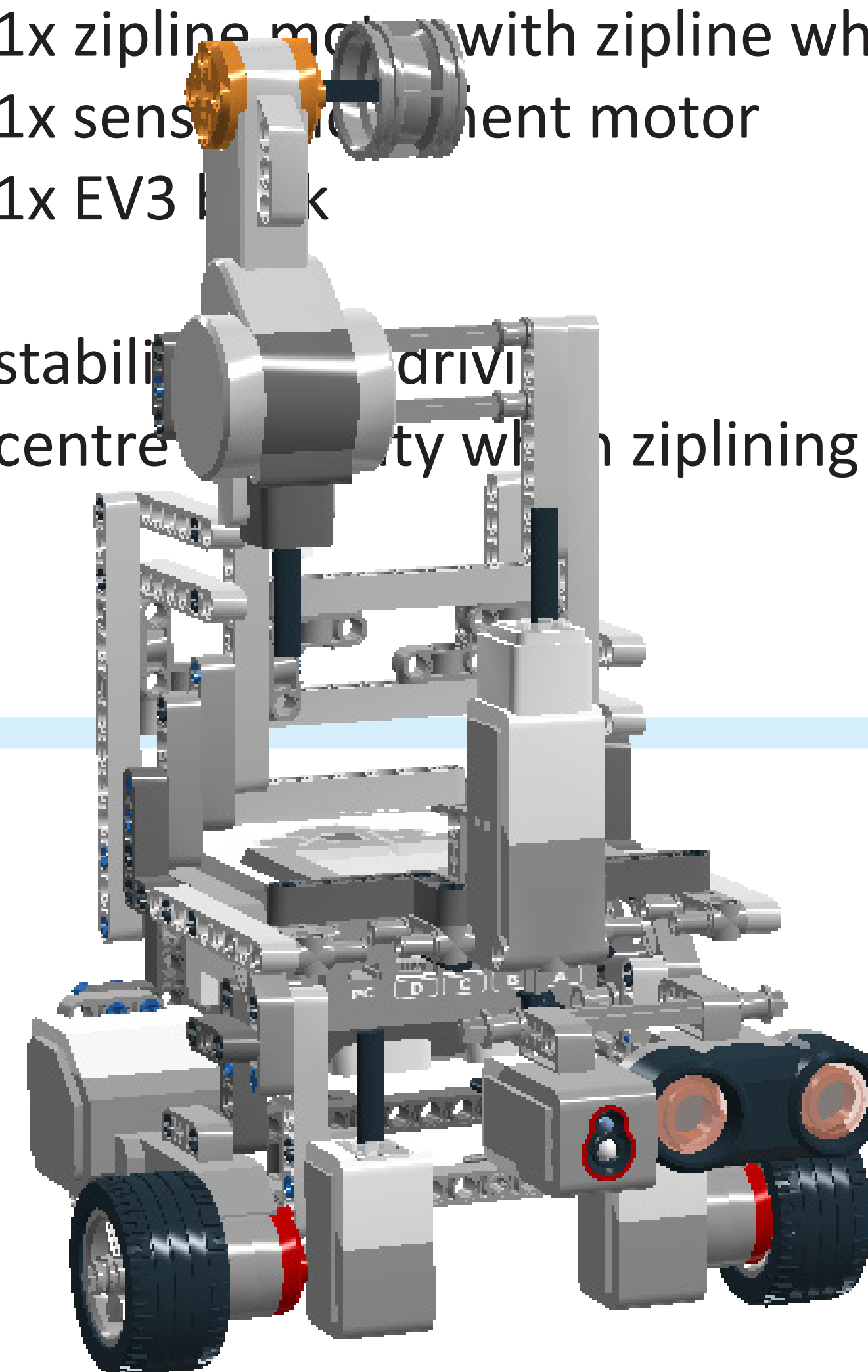
Requirements of Play

- localization clock: 30 seconds
- game clock: 5 minutes
- no contact with ground during zipline crossing
- beep three times upon finding the opponent's flag
- after capture, return to base with the opposite crossing method

Hardware Design

- 3x colour sensors
 - 2 for line detection on the floor
 - 1 for detection of flag colour (pivotal)
 - need to be as close as possible to target
- 1x ultrasonic sensor
 - used to detect obstacles, perform preliminary localization, and find flags
 - precision (accuracy?) is poor - only use for basic work
- 2x driving motors + 1 rolling marble
- 1x zipline motor with zipline wheel
- 1x sensor mount motor
- 1x EV3 brick

- stability of driving
- centre of gravity when ziplining



Testing

Week 1 - 2

- sensor/motor characterization and selection
- hardware stability on the ground
- hardware stability on the zip line

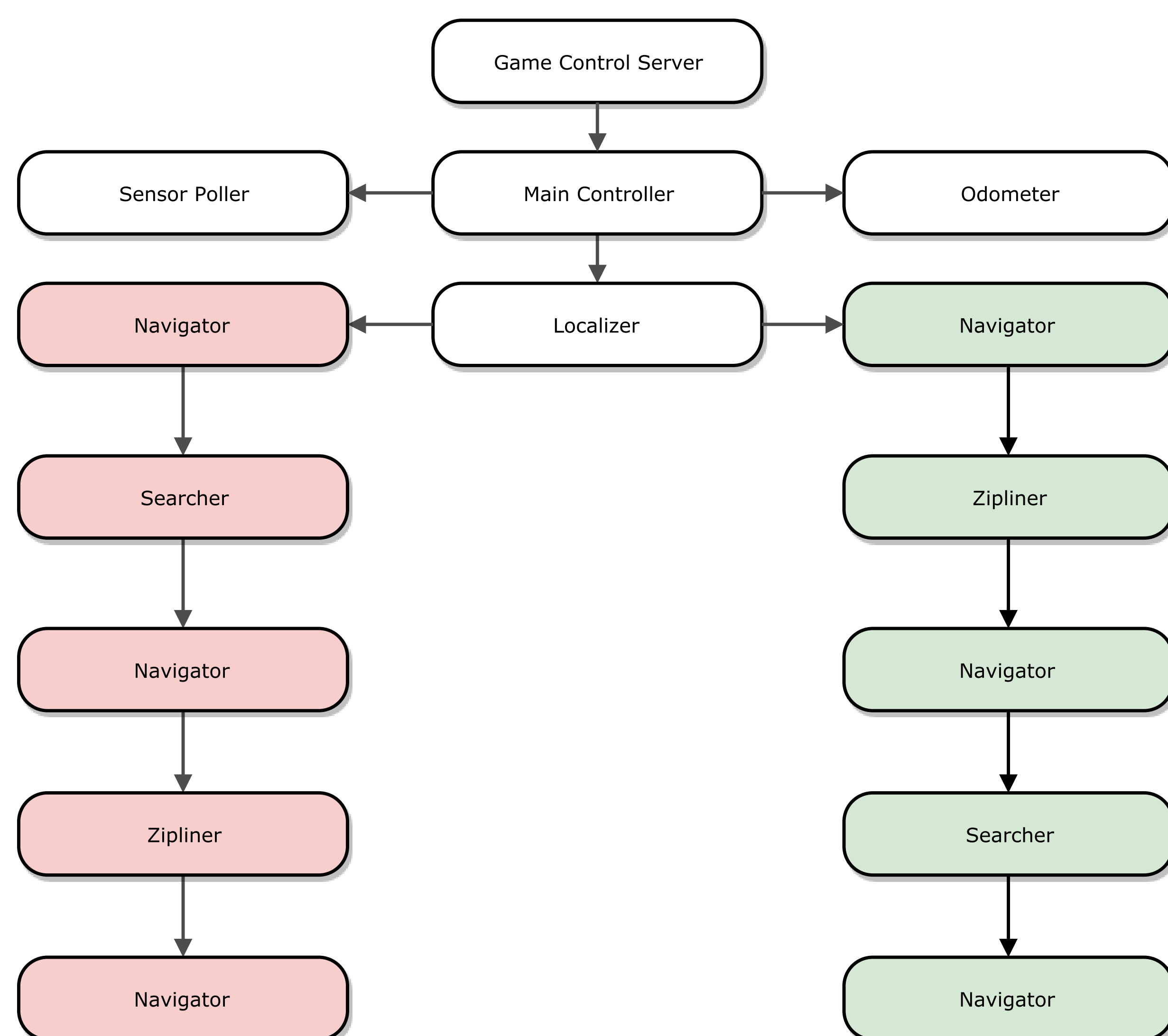
Week 3 - 4

- robot navigation and localization accuracy
- long-term performance (battery depletion? other factors?)
- testing of individual software components (correct performance and reliability)

Week 5 - 6

- full-game testing: which components break most often?
- time-limit testing: localize in 30s, full game in 7min
- encountering opponents or other unexpected conditions

Software Design



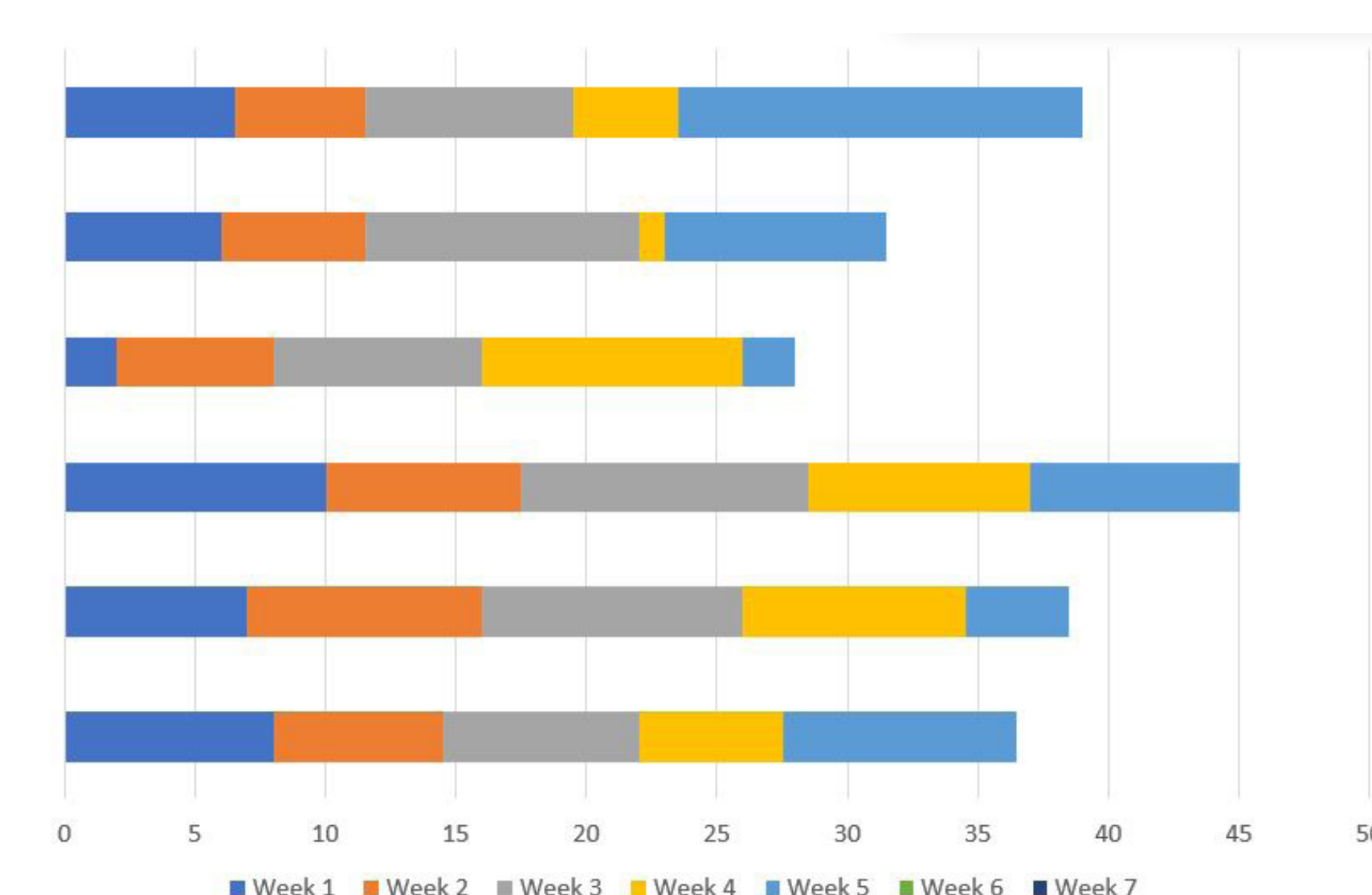
The most important piece of the software is the localization algorithm. Localization runs in between each of the other components of the state machine.

Localization procedure:
// if in a corner
- ultrasonic localization using (---)edge (must be placed along the 45 degree line)
// after US localization, or at any point on the field
- light localization using two US sensors

Team Management

Roles

Project Manager	Josh Inscoc
Documentation Manager	Alex Hale
Hardware Team Leader	Frederic Cyr
Testing Team Leader	Xu Hai
Testing Engineer	Xianyi Zhan
Software Team Leader	Justin Tremblay



Tools

