Assembly Based DE2Bot for Multiple Object Tagging

Jae Won Cho
Rishab Mokkapati
Stephen Norod
Faith Walker

Georgia Tech

CREATING THE NEXT®

ECE 2031 Digital Design Lab L09

PROJECT OBJECTIVES

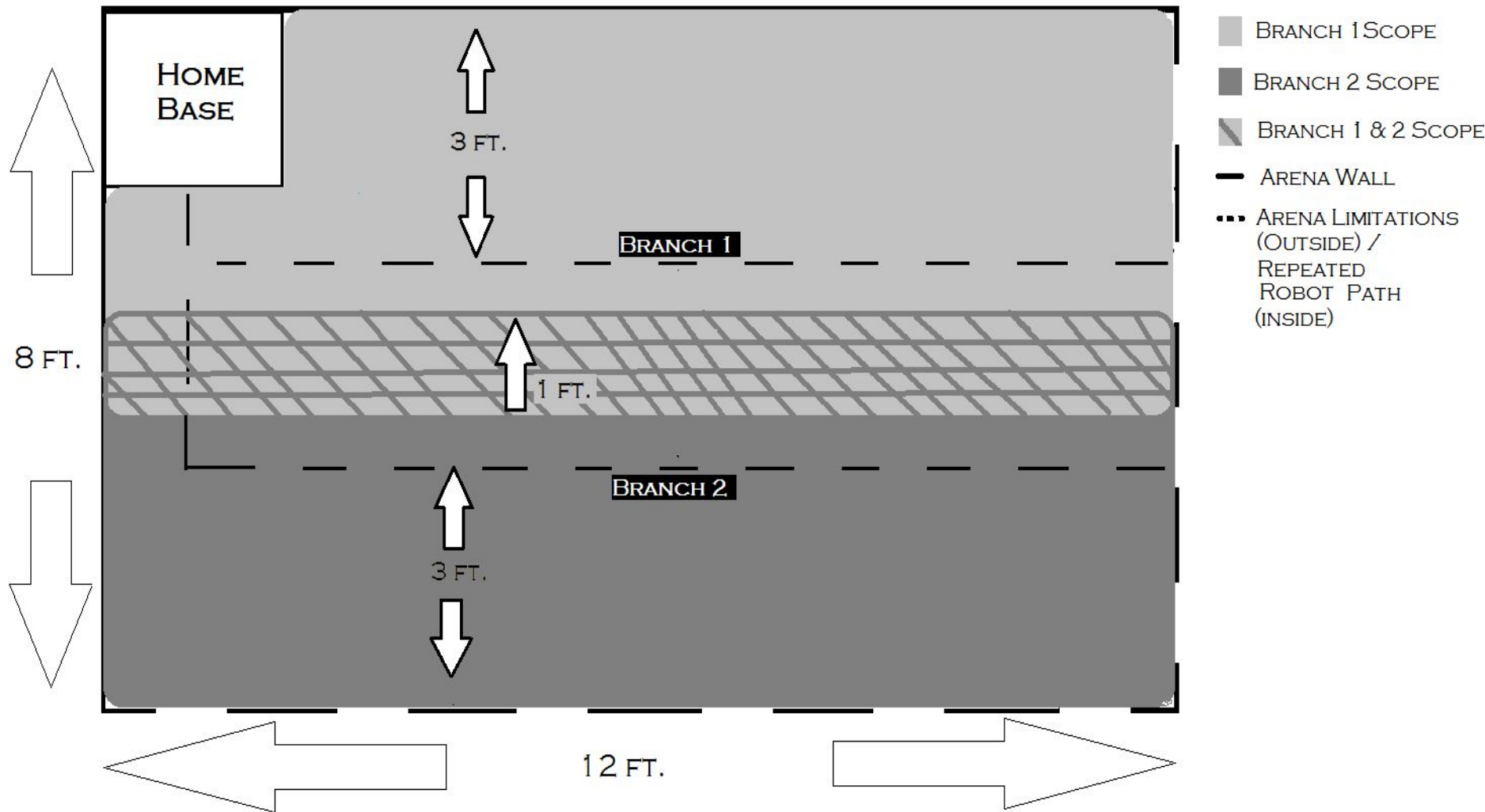- **Scope:**

Locate Object → 'Tag' Object → Return Home

- **Requirements:**
  - robot must avoid any object outside the arena/arena wall

  - 'tagged' objects will be removed when robot returns home

  - robot may only be touched by team at 'home base'

  - no information on objects' locations can be given
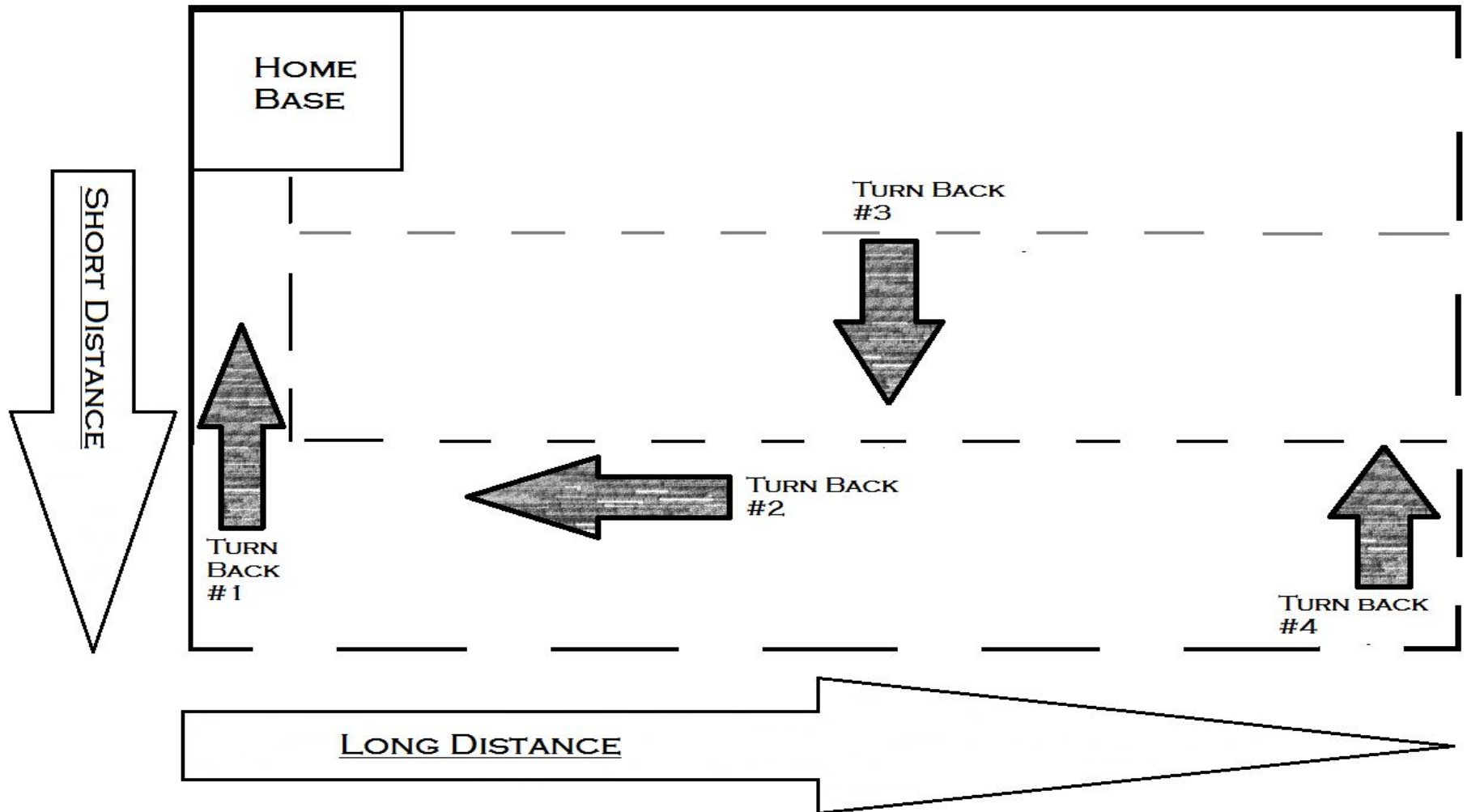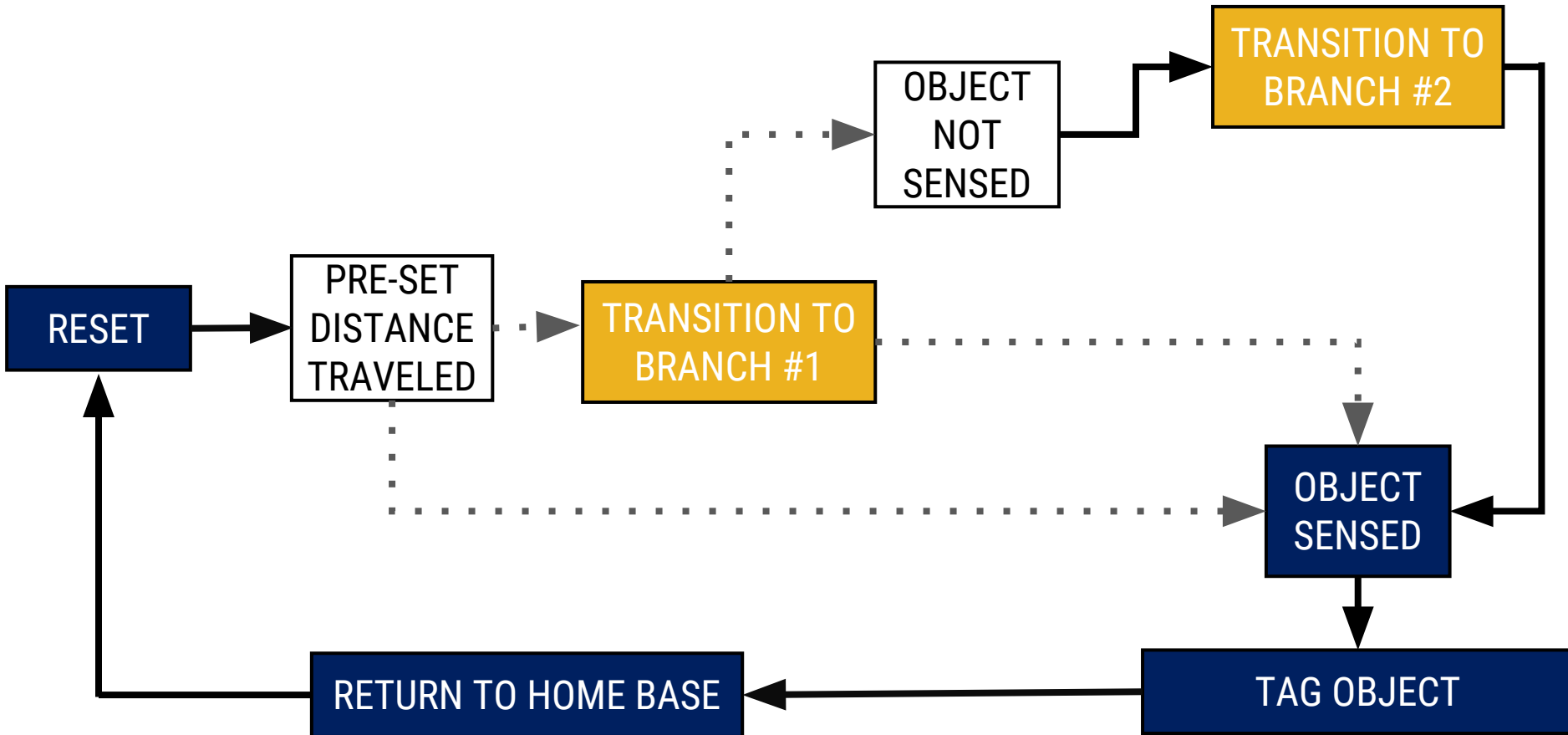
DESIGN SOLUTION

TECHNICAL APPROACH

- **Assembly Subroutines:**
  1) Distance Conditionals

  2) 90° Turn

  3) Sensing & 'Tagging' Object

  4) Returning Home

  5) Branch #1→Branch #2 Transition
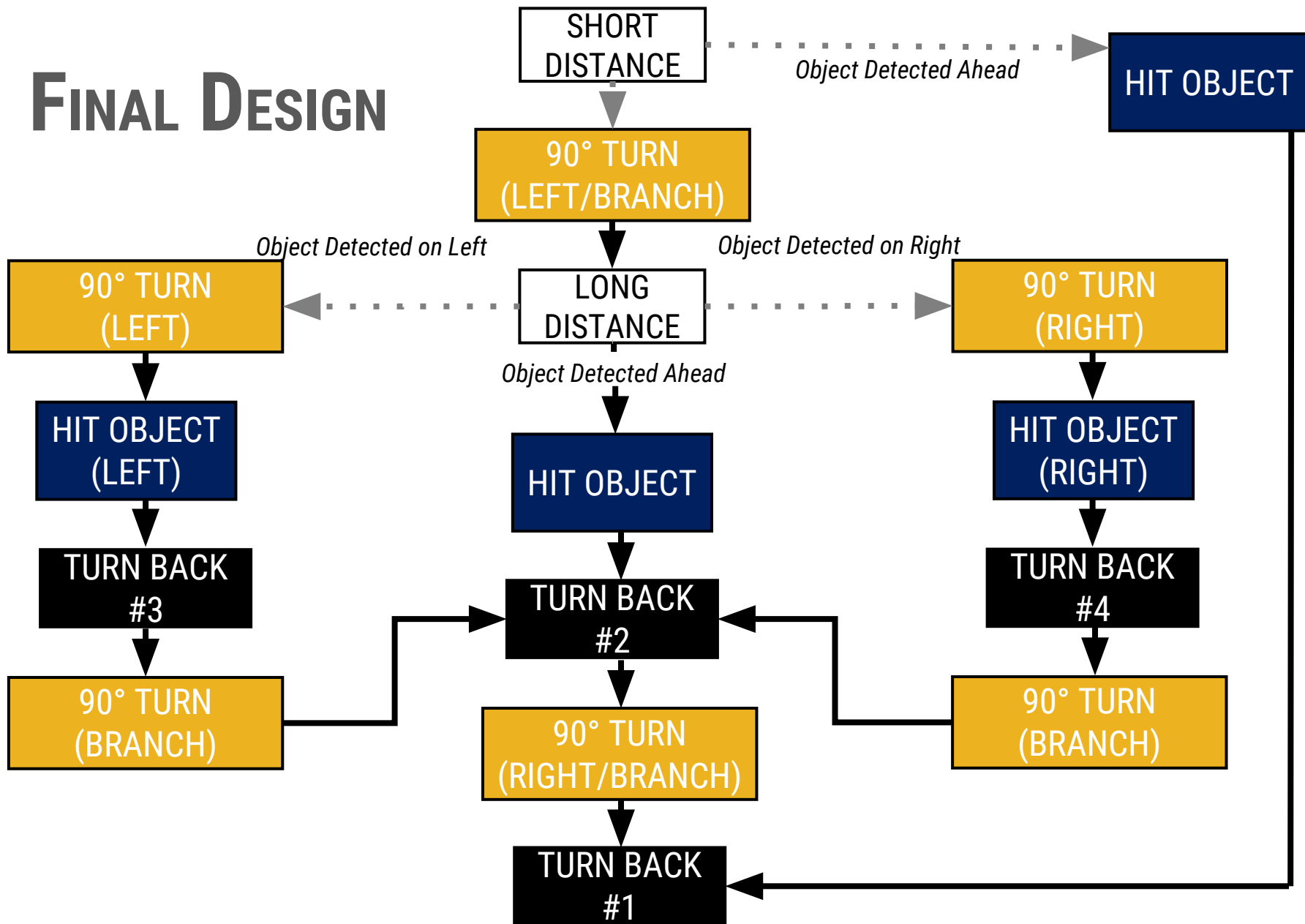
RETURNING HOME & BRANCH TRANSITIONS

Various Circumstances

FINAL DESIGN

SHORT DISTANCE

HIT OBJECT

Object Detected Ahead

90° TURN (LEFT/BRANCH)

Object Detected on Left

LONG DISTANCE

Object Detected on Right

90° TURN (LEFT)

90° TURN (RIGHT)

Object Detected Ahead

HIT OBJECT (LEFT)

HIT OBJECT

HIT OBJECT (RIGHT)

TURN BACK #3

TURN BACK #2

TURN BACK #4

90° TURN (BRANCH)

90° TURN (RIGHT/BRANCH)

90° TURN (BRANCH)

TURN BACK #1

PROBLEMS ENCOUNTERED

- **Pre-Implementation Problems:**
  - rotating exactly 90°
  - branch #1→branch #2 transition

- **Debugging:**
  - returning home after 'tagging' object on right
  - hitting object directly in front of robot
  - overshooting objects

- **Design:**
  - does not travel the shortest distance back to home
  - long and repetitive code

RESULTS

- **Run 1:**
  - Total Objects - 4
  - Objects Hit - 3
  - Return Homes - 2
  - Time Remaining - none

- **Penalties Incurred:**
  - 6 retrievals to home
  - 2 arena collisions

- **Run 2:**
  - Total Objects - 6
  - Objects Hit - 4
  - Return Homes - 3
  - Time Remaining – none

Demonstration Remarks

- **Design Tradeoffs:**
  - Advantages
    - simplicity granted efficient completion
    - robot operated at about max speed
    - utilized sonars and odometry
    - changes granted shorter code and run time

  - Disadvantages
    - sonar limitations
    - clocking speed
    - unexplained operation errors

Future Work

- utilize arctangent for returning home

- utilize more precise figures to find exact values for each situation

- increase clocking speed for more accurate positioning

QUESTIONS?