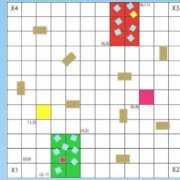


# T-REX

GROUP MEMBERS: ARTHUR FABRE, YUECHUAN CHEN, PETER HENDERSON, ARMEN STEPANIANS, DANAN WICAKSONO, BONAN ZHANG

## OBJECTIVE

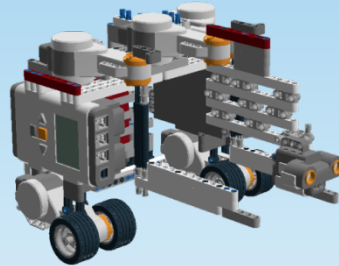
Facing an opponent in a 'capture the flag' competition, the fully automated robot is required to navigate from a corner through a series of obstacles into the end zone where it will search through different colors of blocks. Upon finding the right one, it is required to carry the block into the flag zone, where it has to complete the task before the opponent does.



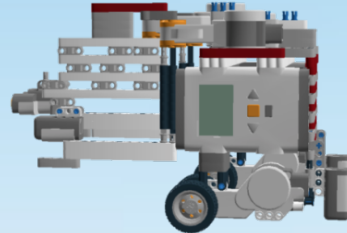
- Rules and Regulations:**
- Coordinates given: one's and opponents end-zone, one's and opponents drop-off-zone.
  - Robot must not enter the opponent's drop-off-zone
  - Task must be completed within 5 minutes

## MECHANICAL DESIGN

**Two Robotic Arms**  
Mechanism to help align the block to the robot to ease the capturing process.



**One Rotating Arm**  
Contains the constantly rotating ultrasonic sensor



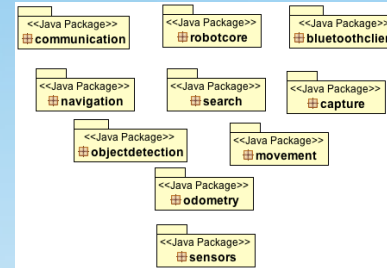
**Sensors**  
Two color sensors for odometry correction; one color sensor to detect blocks; one ultrasonic sensor to scan for obstacles.

**A Two-Wheel Drive Vehicle**  
Controlled by two motors, the wheels ensure a stable base

**A 'box'-type vehicle**  
The objective of the design is to easily fit the block inside the body of the robot by simply advancing towards it without picking it up.

## SOFTWARE ARCHITECTURE

### PACKAGE



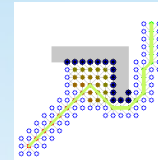
### INTER-BRICK COMMUNICATION



To communicate between the two bricks on the robot, we setup a Bluetooth channel using the RemotenXT class provided by lejos. This allowed us to consolidate all processing onto the Master brick and use the Slave brick only for its motor and sensor ports. Though this does not take advantage of the Slave's processor, it makes the code and processing much simpler and cleaner.

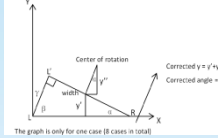
### A\* PATH FINDING

The field of travel is represented by an internal map of nodes. Using A\* search an optimal path is found given nodes blocked off for opponent drop zones and any obstacles encountered. Obstacles are detected on a real time basis and blocked accordingly. In the case where all nodes are blocked, the map is reset, opening any blocked nodes.



### ODOMETER CORRECTION

Two light sensors allow for odometry correction at line crossings. Using trigonometric identities, the difference between the left and right line crossings can be used to correct the angle of the robot and the distance between line crossings can be used to correct the x and y coordinates.

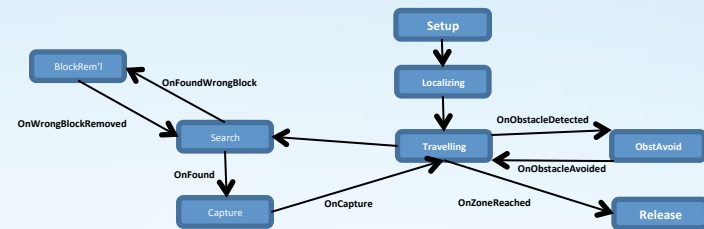


## MATERIALS & TIME BUDGET

MATERIAL	PURPOSE
Plastic Spoon	Help negotiate the divots and reduce friction.
Tape	Because the cables are impeding the movement of the arms tapes are required to tie them together.

WEEK	1	2	3	4	5	6	TOT	AVE
Mike	2	8.5	9.5	13	11	10	54	9.00
Bonan	2	7	10.5	14	9.5	9	52	8.67
Peter	2	7.5	8	15.5	12	9	54	9.00
Armen	2	14	4	6	11.5	14	51.5	8.58
Arthur	2	8	7	3	7	18	45	7.50
Danan	2	6	8	6	7	16	45	7.50

## STATE MACHINE DIAGRAM



## TIMELINE OF EVENTS

