

BLOCK : TASK MANAGER

ESCAPE ROOM CHALLENGE

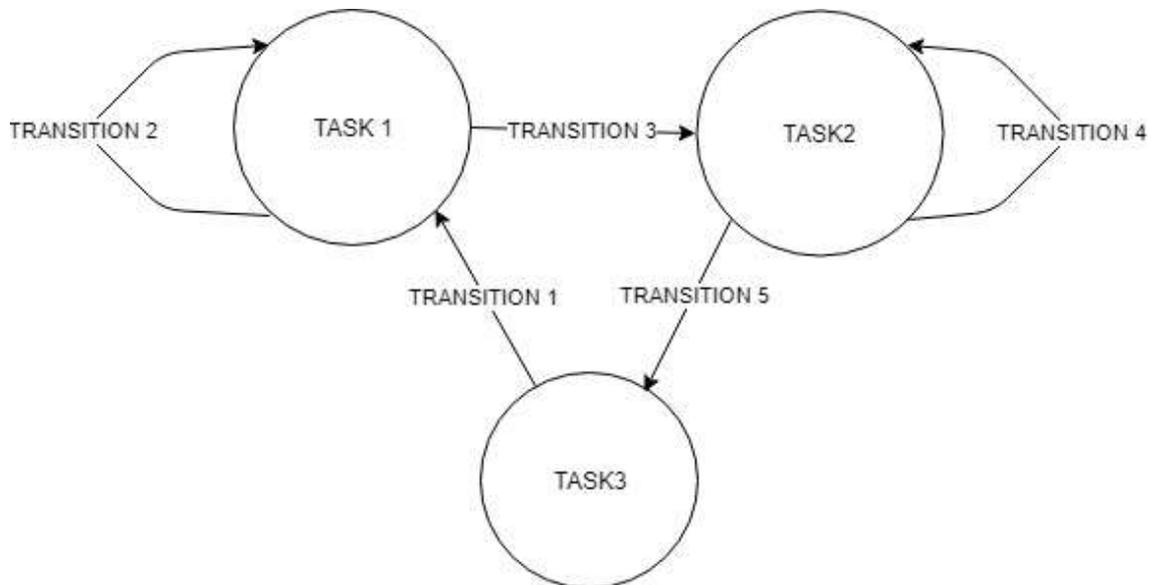
The task manager functions as a finite state machine which switches between different tasks/states. It is used to send commands to specific blocks to perform a certain task based on the status sent in by that block. It communicates with the other blocks via the World model.

INITIALIZATION:

The path planner is given a command "Drive_to_door" while the drive controller and the preceptor are given a command "Execute" as a part of the initialization process.

EXECUTION:

The high-level tasks "Drive_to_door", "Drive_to_exit", "Execute", "Idle" and "Disable" were given to appropriate blocks as shown below:



KEY :

TASKS/STATES	TASK DESCRIPTION/BLOCK MODES
TASK 1	Initialize : (PathPlanner_Drive_to_Door) and (DriveController_Execute) and (Perceptor_Execute)
TASK 2	(PathPlanner_Drive_to_Finish) and (DriveController_Execute) and (Perceptor_Execute)
TASK 3	(PathPlanner_Idle) and (DriveController_Disable) and (Perceptor_Disable)

TRANSITIONS	TRANSITION CONDITIONS BASED ON BLOCK STATES:
TRANSITION 1	Initial condition (While booting the PICO)
TRANSITION 2	If (PathPlanner_Driving_to_PossibleDoor) or (PathPlanner_Searching_for_door)
TRANSITION 3	If (PathPlanner_Driving_to_FoundDoor) and (Drivecontroller_Done)
TRANSITION 4	If ((PathPlanner_Driving_to_Finish) and (DriveController_Busy)) or (PathPlanner_Searching_finish)

TRANSITION 5	If (PathPlanner_Driving_to_Finish) and (DriveController_Done)
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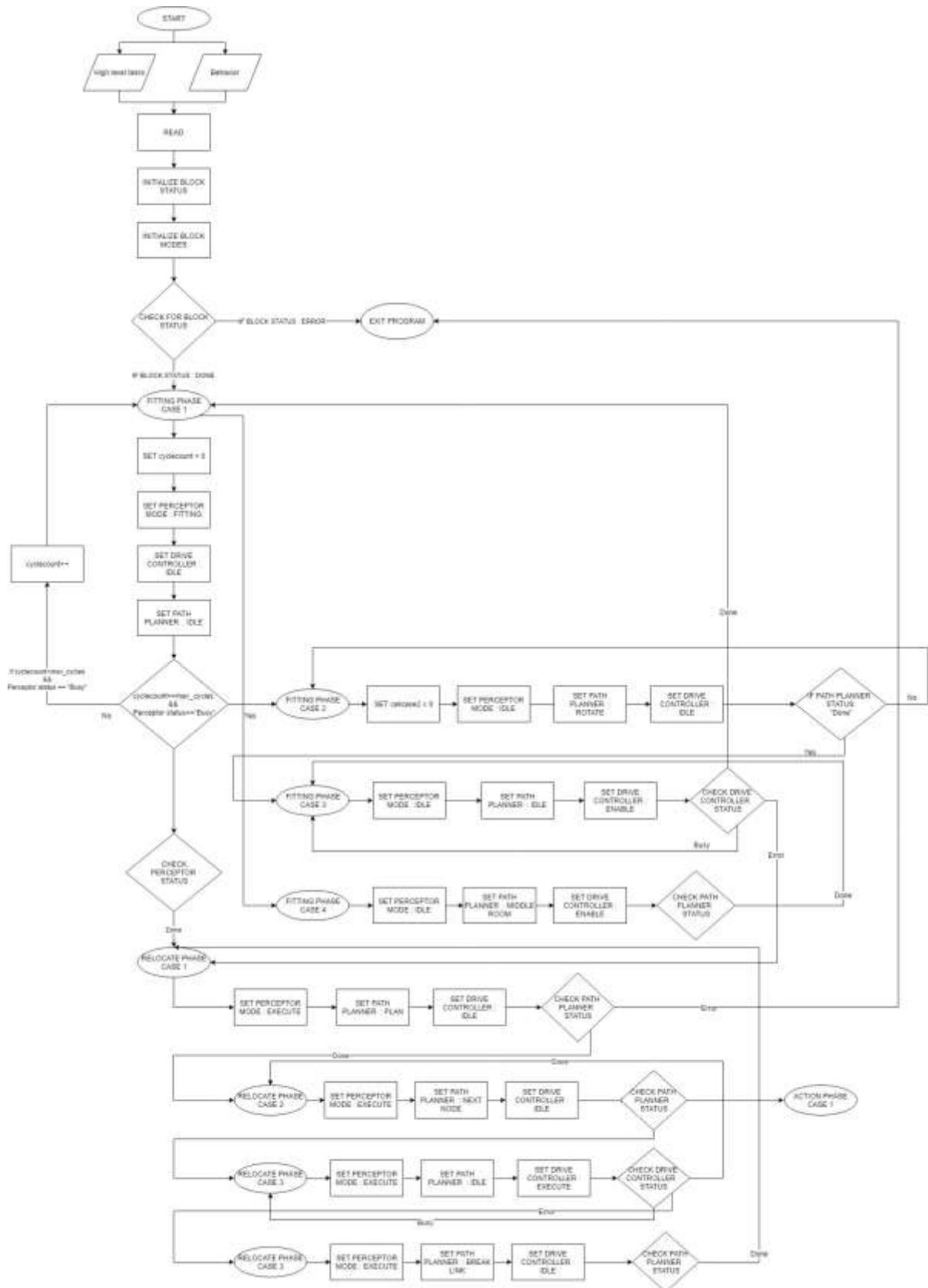
TASK MANAGER FUNCTIONALITY :

INPUTS	Drive Controller status, Perceptor status, Path Planner status.
OUTPUTS	Drive Controller modes, Perceptor modes, Path Planner modes.

FUNCTION	FUNCTION DESCRIPTION
Init()	To initialize the DriveController to 'Execute', Path planner to 'Drive_to_door' and Perceptor to 'Execute'
Execute()	<ol style="list-style-type: none"> 1) If (PathPlanner_Driving_to_PossibleDoor) or (PathPlanner_Searching_for_door) then, the blocks are set to (PathPlanner_Drive_to_Door) and (DriveController_Execute) and (Perceptor_Execute). 2) If (PathPlanner_Driving_to_FoundDoor) and (Drivecontroller_Done) then, the blocks are set to (PathPlanner_Drive_to_Finish) and (DriveController_Execute) and (Perceptor_Execute). 3) If ((PathPlanner_Driving_to_Finish) and (DriveController_Busy)) or (PathPlanner_Searching_finish) then the blocks are set to (PathPlanner_Drive_to_Finish) and (DriveController_Execute) and (Perceptor_Execute). 4) If (PathPlanner_Driving_to_Finish) and (DriveController_Done) then the blocks are set to (PathPlanner_Idle) and (DriveController_Disable) and (Perceptor_Disable).

HOSPITAL ROOM CHALLENGE

TASK MANAGER FLOW CHART :



PHASES/TASKS :

1. Initialize
2. Fitting
3. Relocate
4. Action

CASES UNDER EACH PHASE :

1. INITIALIZE

Case 1 :

- Init blockmodes of init values for all blocks
- Set blockstatusses to init values for all blocks
- Read and store high level tasks
- Read taskplanner behavior from file and store

2. FITTING

Case 1 :

- Fit map at current position.

Case 2 :

- Set desired position of robot to rotate robot for fixed (configurable) angle.

Case 3 :

- Drive to location

Case 4 :

- Set desired position to middle of the room (optional, lower priority)

3. RELOCATE

Case 1 :

- Calculate path to goal

Case 2 :

- Proceed along path, set new desired position

Case 3 :

- Drive to next node

Case 4 :

- Brake link between nodes

4. ACTION

DESCRIPTION OF CASES :

- INITIALIZE PHASE :**

Case 1:	Goal:	Initialize all blocks	
	Entry:	From start of program	
	Perceptor mode:	Init	
	Path planner mode:	Init	
	Drive controller status:	Init	
	Exit condition 1:	All blockstatus = "Done"	Go to fitting phase, case 1
	Exit condition 2:	One or more blockstatus = "Error"	Exit program

- FITTING PHASE :**

Case 1:	Goal:	Fit map at current position	
	Entry:	From init phase, set "cyclecounter" to zero	
	Perceptor mode:	Fitting	
	Path planner mode:	Idle	
	Drive controller status:	Idle	
	Exit condition 1:	("cyclecounter" < max_cycles) && Perceptor status = "Busy"	Stick to case 1, "cyclecounter"++
	Exit condition 2:	("cyclecounter" = max_cycles) && Perceptor status = "Busy"	Switch to case 2
	Exit condition 3:	Perceptor status = "Done"	Switch to "relocate phase"

Case 2:	Goal:	Set desired position of robot to rotate robot for fixed (configurable) angle	
	Entry:	From "case 1", Keep track of number of calls for this case	
	Perceptor mode:	Idle	
	Path planner mode:	Rotate	
	Drive controller status:	Idle	
	Exit condition 1:	Path planner status = "Done"	Move to case 3

Case 3:	Goal:	Drive to location	
	Entry:	From "case 2"	
	Perceptor mode:	Idle	
	Path planner mode:	Idle	

	Drive controller status:	Enable	
	Exit condition 1:	DriveController = "Busy"	Stick to case 3
	Exit condition 2:	Drivecontroller = "Done"	Switch to case 1
	Exit condition 3:	Drivecontroller = "Error"	Switch to "relocate phase"

Case 4:	Goal:	Set desired position to middle of the room (optional, lower priority)	
	Entry:	From "case 1"	
	Perceptor mode:	Idle	
	Path planner mode:	"Middle room"	
	Drive controller status:	Idle	
	Exit condition 1:	Path planner status = "Done"	Move to case 3

- **RELOCATE PHASE :**

Case 1:	Goal:	Calculate path to goal	
	Entry:	From "Fitting" phase or "Relocate:Case 4"	
	Perceptor mode:	"Execute"	
	Path planner mode:	"Plan"	
	Drive controller status:	"Idle"	
	Exit condition 1:	Path planner status = "Done"	Move to case 2
	Exit condition 2:	Plan planner status = "Error"	Move to error phase

Case 2:	Goal:	Proceed along path, set new desired position	
	Entry:	From "relocate:Case 1" or From "relocate:Case 3"	
	Perceptor mode:	"Execute"	
	Path planner mode:	"Next_node"	
	Drive controller status:	"Idle"	
	Exit condition 1:	Path planner status = "Busy"	Move to case 2
	Exit condition 2:	Path planner status = "Done"	Move to phase "Action"

Case 3:	Goal:	Drive to next node	
	Entry:	From "relocate:Case 2"	
	Perceptor mode:	"Execute"	
	Path planner mode:	"Idle"	
	Drive controller status:	"Execute"	
	Exit condition 1:	Drive controller status = "Busy"	Stay in case 3
	Exit condition 2:	Drive controller status = "Done"	Move to case 2
	Exit condition 3:	Drive controller status = "Error"	Move to case 4

Case 4:	Goal:	Brake link between nodes	
	Entry:	From "relocate:Case 3"	
	Perceptor mode:	"Execute"	
	Path planner mode:	"Break_link"	
	Drive controller status:	"Idle"	
	Exit condition 1:	Path planner status = "Done"	Move to case 1

- **ACTION PHASE :**