



Hochschule
Bonn-Rhein-Sieg
University of Applied Sciences



General Solution To Find Objects

D2: Revised Initial Presentation

May 8, 2022

Priya Chaudhary

Ragini Mishra

Sathwik Panchangam

Advisors

Minh Nguyen

Alex Mitrevski

Contents

1. Problem Statement
2. Project Goals
3. User Stories
4. Minimum Viable Prototype
5. Project Progress
6. Planned Steps
7. Means of Collaboration
8. Technologies Used
9. Timeline and Release Plan

Problem Statement

The problem being addressed is described as follows:-

- Navigate through multiple coordinates in knowledge base based on ontology to find specified object
- Perceive the required object
- Fetch the user specified object and navigate back to user

Project Goals

- Implement a general strategy to find object
 - Navigate through “storage locations”
 - Perceive scenes to look for specified object(s)
 - Move to next location if object not found
- Fetch object and bring back to original location

User Stories

Priority: High	[US01]: Detecting objects	Estimation: 3 weeks
Requirements: As a user of robot, We want to detect objects, So that the robot can pick up the user-specified object and bring it back to the user.		Acceptance Criteria: Given a location with multiple objects, the robot has to detect different objects present in the location using the embedding calculation.
Risk: High	Real Effort:	

User Stories

Priority: High	[US02]: Find objects	Estimation: 2 weeks
Requirements: As a user of robot, We want the robot to find a particular object from the set of detected objects, so that the robot can fetch the object to the user.		Acceptance Criteria: Given a set of detected objects the robot has to find the user-specified object by comparing the detected objects with the input data.
Risk: High	Real Effort:	

User Stories

Priority: High	[US03]: Navigation	Estimation: 2 weeks
Requirements: As a user of robot, We want the robot to navigate through different given locations, So that the robot can perceive for different objects.		Acceptance Criteria: Given a set of locations in the knowledge base the robot has to navigate through all the locations to find the user specified object.
Risk: Medium		Real Effort:

User Stories

Priority: High	[US04]:Move to next location	Estimation: 2 week
Requirements: As a user of robot, we want the robot to move to the next unvisited locations in the knowledge base, if the user specified object is not detected.		Acceptance Criteria: Given a set of detected objects, if the user specified object is not found, then the robot shall move to the next unvisited location in the knowledge base.
Risk: Medium	Real Effort:	

User Stories

Priority: Low	[US05]: Fetch object (Optional)	Estimation:3 weeks
Requirements: As a user of robot, we want the robot to pick the user-specified object so that the item can be brought back to the user.		Acceptance Criteria: The robot shall be able to estimate the pose of the detected user-specified object.
Risk: High		Real Effort:

User Stories

Priority: Low	[US06]: Bring object back to user (Optional)	Estimation:2 weeks
Requirements: As a user of robot, we want the robot to bring the picked item to the user so that the request of the user can be fulfilled.		Acceptance Criteria: The robot must know the location of the user.
Risk: High		Real Effort:

Minimum Viable Prototype

- Given a user specified choice(string), the software shall return all the default locations (strings) relative to the specified item based on the ontology structure.
- We have to interpret the default location in the knowledge base to the natural location in the ontology.
- After obtaining the co-ordinates of the respective locations the robot shall navigate through all of the respective returned locations.

Minimum Viable Prototype

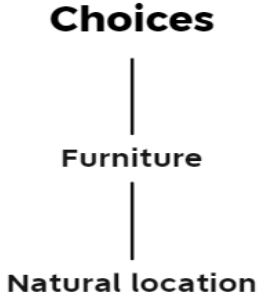


Figure 1: General structure

Minimum Viable Prototype

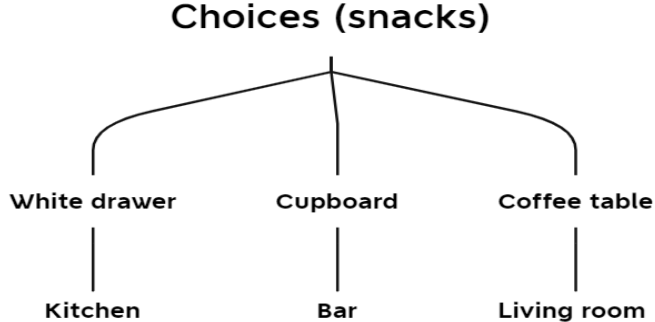


Figure 2: Example structure

Minimum Viable Prototype

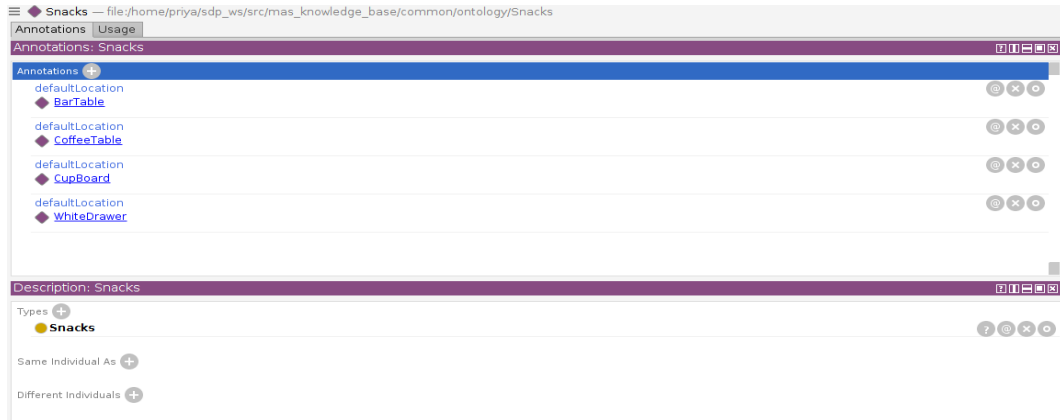


Figure 3: Item default locations

Minimum Viable Prototype

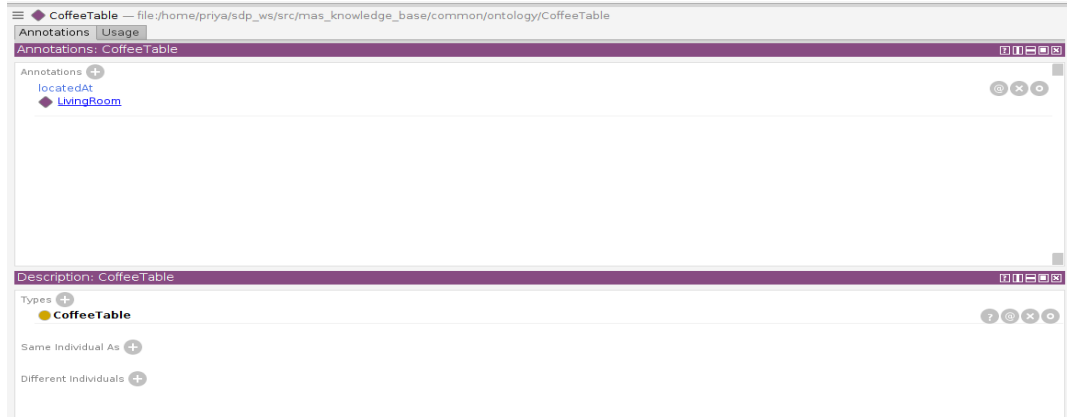


Figure 4: Object-location relation

Project Progress

```

[ER] /home/ragi/sdp_ws/src/mas_domestic_robotics/mdr_planning/mdr_actions/mdr_perception_actions/m
* /roslint: noetic
* /rosversion: 1.15.14

NODES
/
  find_object_client (mdr_find_object_action/find_object_client)

ROS_MASTER_URI=http://localhost:11311

process[find_object_client-1]: started with pid [366960]
[INFO] [1651248387.470511]: [kb_interface] Creating a domain predicate retrieva
l client
[INFO] [1651248387.477945]: [kb_interface] Creating a knowledge base update cli
ent
[INFO] [1651248387.485756]: [kb_interface] Creating a knowledge base query cli
ent
[INFO] [1651248387.510273]: [kb_interface] Creating a message store client
[INFO] [1651248439.129403]: [FIND_OBJECT] Sending action lib goal to find_object
_server
[INFO] [1651248440.582307]: [FIND_OBJECT] CoffeeTable in

[ER] /home/ragi/sdp_ws/src/mas_domestic_robotics/mdr_planning/mdr_rosplan_interface/ros/launch/rospl
process[rosplan_problem_interface-8]: started with pid [364364]
process[rosplan_planner_interface-9]: started with pid [364371]
[INFO] [1651248206.920364403]: KCL: (/rosplan_problem_interface) Ready to rece
ive
process[rosplan_parsing_interface-10]: started with pid [364379]
[INFO] [1651248206.977943187]: KCL: (/rosplan_planner_interface) Ready to rece
ive
process[rosplan_plan_dispatcher-11]: started with pid [364415]
[INFO] [1651248207.097732027]: KCL: (/rosplan_parsing_interface) Ready to rece
ive
process[clear_message_store-12]: started with pid [364447]
[INFO] [1651248207.170256587]: KCL: (/rosplan_plan_dispatcher) Ready to receiv
e
[clear_message_store-12] process has finished cleanly
log file: /home/ragi/.ros/log/e6bf5456-c7d5-11ec-8397-65cca06c4c83/clear_messag
e_store-12*.log
[INFO] [1651248440.583931683]: KCL: (/rosplan_plan_dispatcher) Feedback receiv
ed [0, 2]
[WARN] [1651248440.583962581]: KCL: (/rosplan_plan_dispatcher) Action not yet
dispatched, ignoring feedback

ragi@ragi-HP-Pavilion-x360-Convertible-14-cd0xxx:~/sdp_ws/src/lama_planner$
tkin build --this --jobs=8
ragi@ragi-HP-Pavilion-x360-Convertible-14-cd0xxx:~/sdp_ws/src/lama_planner$ ros
topic pub /kcl_rosplan/action_dispatch rosplan_dispatch_msgs/ActionDispatch "ac
tion_id: 0
> plan_id: 0
> name: 'find_object'
> parameters:
> - (key: 'obj_name', value: 'Snacks')
> duration: 0.0
> dispatch_time: 0.0" -1^C
ragi@ragi-HP-Pavilion-x360-Convertible-14-cd0xxx:~/sdp_ws/src/lama_planner$ ros
topic pub /kcl_rosplan/action_dispatch rosplan_dispatch_msgs/ActionDispatch "ac
tion_id: 0
> plan_id: 0
> name: 'find_object'
> parameters:
> - (key: 'obj_name', value: 'Snacks')
> duration: 0.0
> dispatch_time: 0.0" -1
publishing and latching message for 3.0 seconds
ragi@ragi-HP-Pavilion-x360-Convertible-14-cd0xxx:~/sdp_ws/src/lama_planner$

[ER] /home/ragi/sdp_ws/src/mas_domestic_robotics/mdr_planning/mdr_actions/mdr_perception_actions/m
log file:///home/ragi/sdp_ws/src/mas_knowledge_base/common/ontology/apartment_
go.2019.owl
[INFO] [1651248362.468441]: [find_object] Creating a knowledge base interface c
lient
[INFO] [1651248362.469514]: [kb_interface] Creating a domain predicate retrieva
l client
[INFO] [1651248362.471609]: [kb_interface] Creating a knowledge base update cli
ent
[INFO] [1651248362.474019]: [kb_interface] Creating a knowledge base query cli
ent
[INFO] [1651248362.479674]: [kb_interface] Creating a message store client
[FindObject] State machine transitioning: init -> configuring
Configuring FindObject; attempt number 1
[FindObject] State machine transitioning: configuring -> ready
[INFO] [1651248439.135119]: [find_object] Received an action request
[FindObject] State machine transitioning: ready -> running
[INFO] [1651248439.480508]: [find_object] Snacks not found in the knowledge bas
e; querying the ontology
[INFO] [1651248440.577101]: [find_object] Snacks is usually in CoffeeTable
[FindObject] State machine transitioning: running -> ready

```


Project Progress

```
ragi@ragi-HP-Pavilion-x360-Convertible-14-cd0xxx: ~/sdp_ws/src/lama_planner 79x21
tkin build --this --jobs=8
ragi@ragi-HP-Pavilion-x360-Convertible-14-cd0xxx:~/sdp_ws/src/lama_planner$ ros
topic pub /kcl_rosplan/action_dispatch rosplan_dispatch_msgs/ActionDispatch "ac
tion_id: 0
> plan_id: 0
> name: 'find_object'
> parameters:
> - {key: 'obj_name', value: 'Snacks'}
> duration: 0.0
> dispatch_time: 0.0" -1^C
ragi@ragi-HP-Pavilion-x360-Convertible-14-cd0xxx:~/sdp_ws/src/lama_planner$ ros
topic pub /kcl_rosplan/action_dispatch rosplan_dispatch_msgs/ActionDispatch "ac
tion_id: 0
> plan_id: 0
> name: 'find_object'
> parameters:
> - {key: 'obj_name', value: 'Snacks'}
> duration: 0.0
> dispatch_time: 0.0" -1
publishing and latching message for 3.0 seconds
ragi@ragi-HP-Pavilion-x360-Convertible-14-cd0xxx:~/sdp_ws/src/lama_planner$
```

Project Progress

```
/home/ragi/sdp_ws/src/mas_domestic_robotics/mdr_planning/mdr_actions/mdr_perception_actions/r
* /rostdistro: noetic
* /rosversion: 1.15.14

NODES
/
  find_object_client (mdr_find_object_action/find_object_client)

ROS_MASTER_URI=http://localhost:11311

process[find_object_client-1]: started with pid [366960]
[INFO] [1651248387.470511]: [kb_interface] Creating a domain predicate retrieval client
[INFO] [1651248387.477945]: [kb_interface] Creating a knowledge base update client
[INFO] [1651248387.485756]: [kb_interface] Creating a knowledge base query client
[INFO] [1651248387.510273]: [kb_interface] Creating a message store client
[INFO] [1651248439.129403]: [FIND_OBJECT] Sending action lib goal to find_object_server
[INFO] [1651248440.582307]: [FIND_OBJECT] CoffeeTable in
```

Project Progress

```
BP /home/ragi/sdp_ws/src/mas_domestic_robotics/mdr_planning/mdr_actions/mdr_perception_actions/n
logy file:///home/ragi/sdp_ws/src/mas_knowledge_base/common/ontology/apartment_
go_2019.owl
[INFO] [1651248362.468441]: [find_object] Creating a knowledge base interface c
lient
[INFO] [1651248362.469514]: [kb_interface] Creating a domain predicate retrieva
l client
[INFO] [1651248362.471609]: [kb_interface] Creating a knowledge base update cli
ent
[INFO] [1651248362.474019]: [kb_interface] Creating a knowledge base query cli
ent
[INFO] [1651248362.479674]: [kb_interface] Creating a message store client
[FindObject] State machine transitioning: init -> configuring
Configuring FindObject; attempt number 1
[FindObject] State machine transitioning: configuring -> ready
[INFO] [1651248439.135119]: [find_object] Received an action request
[FindObject] State machine transitioning: ready -> running
[INFO] [1651248439.480508]: [find_object] Snacks not found in the knowledge bas
e; querying the ontology
[INFO] [1651248440.577101]: [find_object] Snacks is usually in CoffeeTable
[FindObject] State machine transitioning: running -> ready
```

Planned Steps

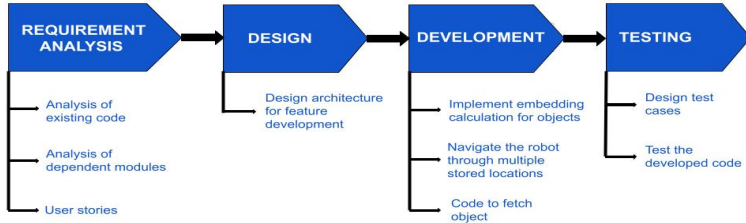


Figure 5: Workflow

Means of Collaboration

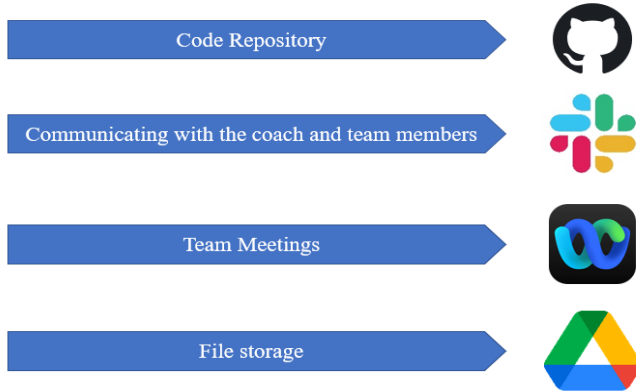


Figure 6: Means of collaboration

Technologies Used

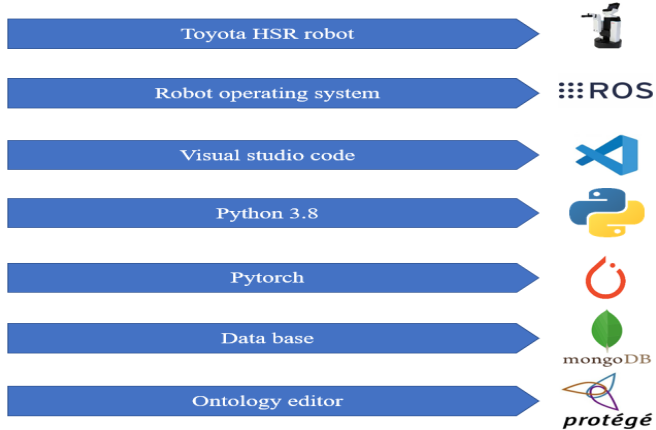


Figure 7: Technologies used

Timeline and Release Plan

TASK	ASSIGNED TO	PROGRESS	START	END
Requirement Analysis				
Task 1	Analyse the existing code	70%	4-19-22	5-7-22
Task 2	Analyse the dependent module	60%	4-22-22	4-24-22
Task 3	Prepared Deliverables	75%	4-19-22	4-25-22
Task 4	Understanding ontology structure	30%	5-6-22	5-16-22
Design				
Task 1	Design structural architecture for dependant module	0%	5-7-22	5-20-22
Development				
Task 1	Ontology Structure	0%	5-2-22	5-17-22
Task 2	Run object detection pipeline	0%	6-10-22	7-20-22
Task 3	Add navigation to mdr_find_object	0%	5-10-22	6-13-22
Task 4	Run knowledge base to get locations	0%	5-15-22	6-10-22
Task 5	Implement embedding calculations for object detection	0%	6-1-22	8-15-22
Task 6	Fetch the object	0%	6-1-22	7-15-22
Task 7	Navigate back to user	0%	7-15-22	8-15-22
Testing				
Task 1	Test for ontological structure	0%	5-15-22	6-16-22
Task 2	Test to check natural location	0%	6-1-22	6-20-22
Task 3	Testing Navigation	0%	5-9-22	6-16-22
Task 4	Testing Fetching	0%	7-15-22	9-12-22
Task 5	Run the code on lucy	0%	7-15-22	9-12-22

Figure 8: Decided Dates and Tasks

Timeline and Release Plan

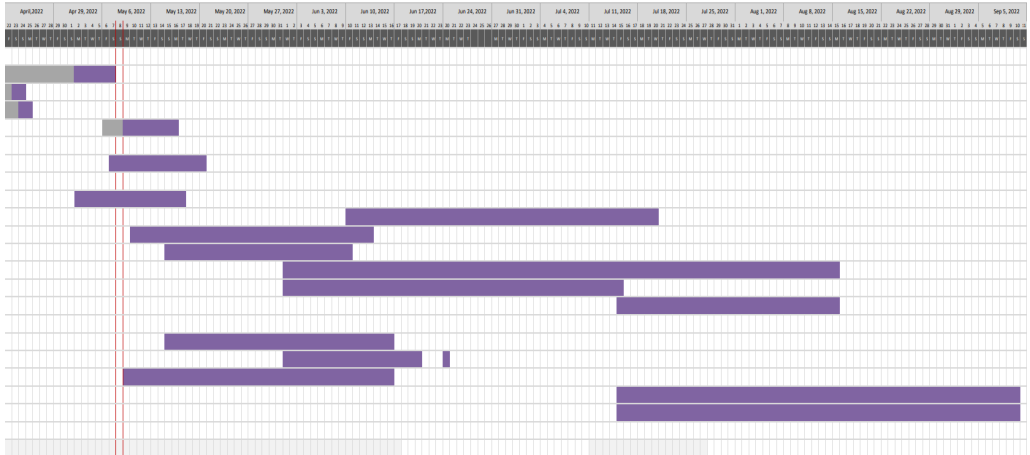


Figure 9: Gantt Chart

Thank You!

