Cocktail Bot

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Motivation

In today's tech-driven era, autonomous systems are transforming industries for the better. One prevalent issue faced by bars is the extended waiting time for intricate cocktails.

Cocktail Bot - the autonomous cocktail robot, aims to revolutionize the cocktail-making process. By automating and accelerating it, we minimize wait times, optimizing both operations and costs.

Goal of this project

Main goal: Autonomous robot capable of crafting a diverse range of cocktails.

Sub-Goals:

- **Knowledge Creation:** Autonomous gathering of knowledge about the environment (object classification and mapping).
- **Reasoning:** Enable the cocktail bot to associate common locations with specific objects. If an object is not found, explore alternative places within the environment.
- **Collision Avoidance:** Enhance the robot's safety features by incorporating dimension characteristics into its object recognition system, ensuring efficient collision avoidance during movement.

Goal of this project

Expected Results:

1. **Cocktail Production:** Automate the cocktail-making process, by finding the necessary objects and moving back to the bar counter.
2. **Diverse Cocktail Portfolio:** Successful craft of a wide array of cocktails (3 to 5) from known recipes.
3. **Enhanced Safety and Navigation:** Achieve a high level of safety through collision avoidance features.

Problem definition

Main problem: Extended waiting times for intricate cocktails causing customer dissatisfaction and operational bottlenecks.

Sub-Tasks: [3]

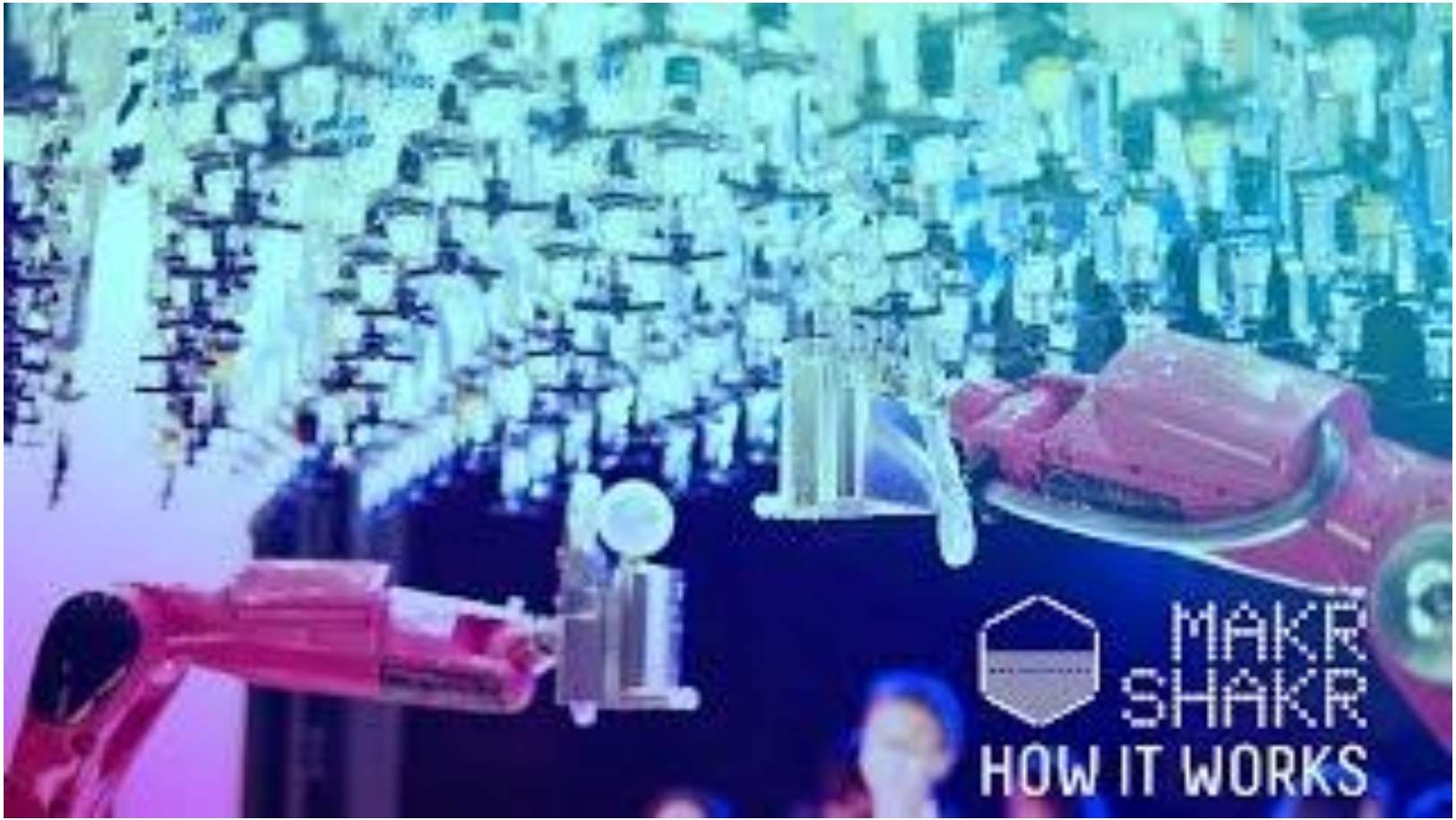
Previous approaches (Makr Shakr):

- Pioneering company in the field of automated bartending systems.
- Present worldwide having already served more than 1.7 million cocktails.

Problem relevancy:

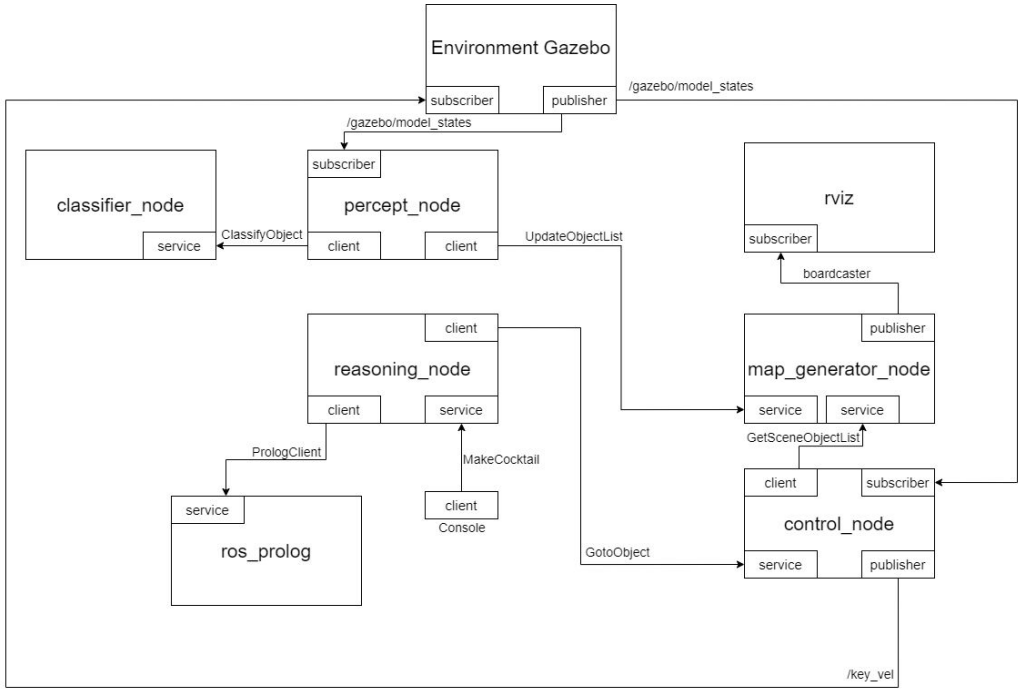
- Reduced human contact, speed up in the ordering process and reduced queues.

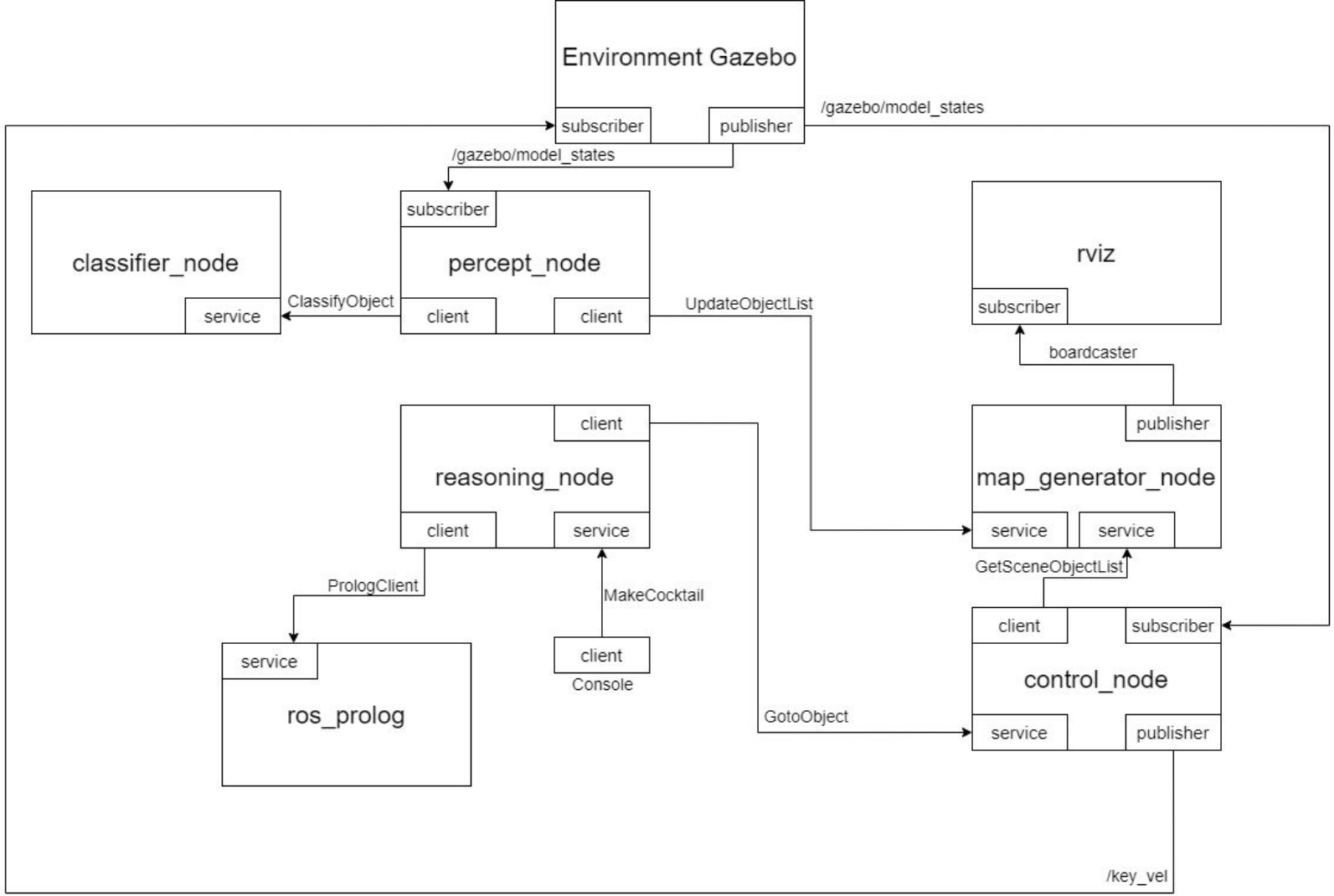
Average time to make a cocktail.



https://www.youtube.com/watch?v=EivBxP3kqWs

Method and implementation
(Architecture)




Environment Gazebo
subscriber
publisher
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classifier_node
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ClassifyObject
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client
client
UpdateObjectList
rviz
subscriber
boardcaster
client
reasoning_node
client
service
publisher
map_generator_node
service
service
ProlgClient
MakeCocktail
GetSceneObjectList
client
subscriber
control_node
service
publisher
service
ros_prolog
client
Console
GotoObject
/key_vel

Method and implementation
(Modules)

Perception:

- **Gazebo Subscriber:** Gathering knowledge about the nearby objects.
- **Classifier Client:** Object classification.
- **Update Client**: Update object mapping.

Classification: Decision Tree

- **Classifier Service:** Classifies objects based on their characteristics.

Method and implementation
(Modules)

Reasoning:

- **Cocktail Service:** Responsible to process the cocktail request.
- **Prolog Client:** Interacts with prolog knowledge base.
- **Goto Client:** Informs the controller which object to move to.

Mapping:

- **Rviz Publisher:** Broadcast object position to rviz node.
- **Get Object Service:** Provides the requested object(s) poses.
- **Update Service:** Updates the map with the new object and respective pose.

Method and implementation
(Modules)

Controller:

- **Goto Service:** Responsible for updating the actions in order to move to the given object.
- **Client Get Object:** Requests information about the object pose.
- **Gazebo Subscriber:** Receives information about the current robot position.
- **Action Publisher:** Send movement commands to the robot.

Method and implementation
(Performance Measure)

Success Criteria: Autonomous craft of the request cocktails.

Measures:

- Number of ingredients found.
- Correct classification of objects.
- Speed of the process.

Boundaries

Assumptions:

- Availability of Ingredients
- Recipe Standardization
- Environment:
  - Partially observable
  - Stochastic
  - Sequential
  - Static
  - Continuous
  - Single Agent

Boundaries

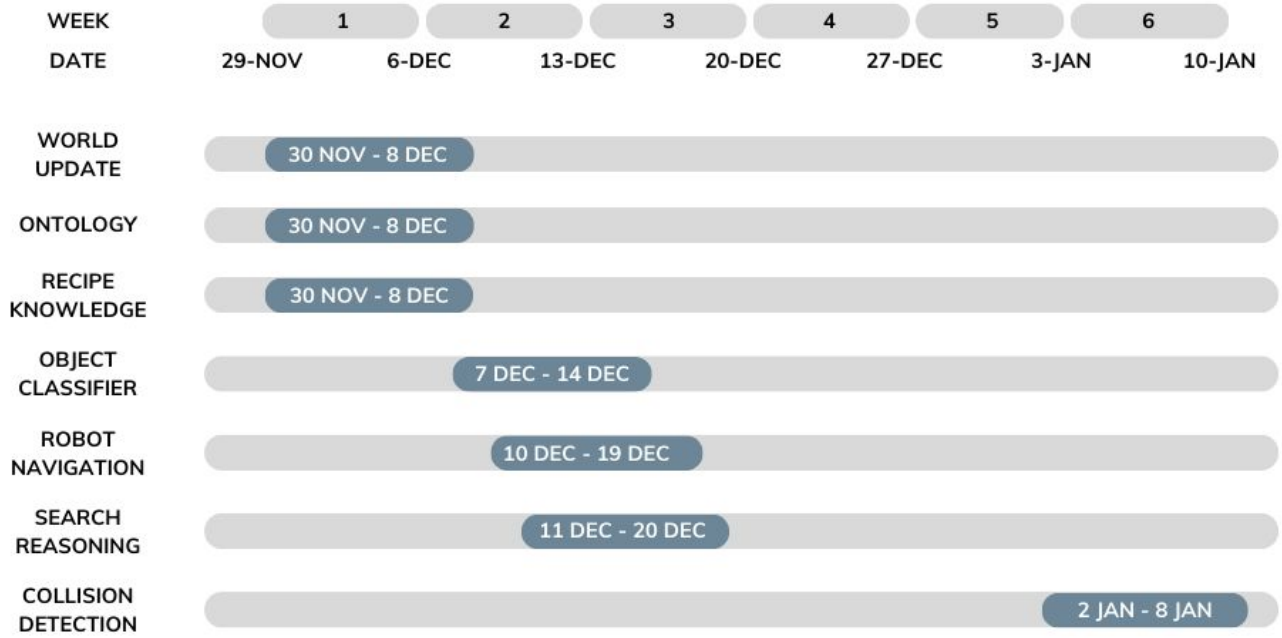
Scope:

- Autonomous navigation
- Object identification and mapping (only by proximity)
- Ingredient search (reasoning)

Out of Scope:

- Grasping objects
- Image processing

Timetable


WEEK
1
2
3
4
5
6
DATE
29-NOV
6-DEC
13-DEC
20-DEC
27-DEC
3-JAN
10-JAN
WORLD UPDATE
30 NOV - 8 DEC
ONTOLOGY
30 NOV - 8 DEC
RECIPE KNOWLEDGE
30 NOV - 8 DEC
OBJECT CLASSIFIER
7 DEC - 14 DEC
ROBOT NAVIGATION
10 DEC - 19 DEC
SEARCH REASONING
11 DEC - 20 DEC
COLLISION DETECTION
2 JAN - 8 JAN

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