Robotics 204: Introduction to Human-Robot Systems
Fall 2024

Lab Title: Non-verbal communication using gestures

Submission Type: Individual submission. _Each individual in your group should copy this document and record their answers._ Check the rubric to make sure you have submitted all that is required.

Week 1

Part 1: Setup

Deliverable: None

Part 2: Three State Exploration

Deliverable: Briefly describe your specific method for using the morse code embodiment.

Part 3: Implementation

Deliverable: Fill out the below table and section

Group Member Behind Screen	Actual Word	Interpreted Word	Success or Fail?

Please describe updates made between iterations:

Part 4: Three State Reflection Questions

Deliverable: Answer the questions below

1. What was easy and challenging about this method of non-verbal communication? Reflect on your group's capability to communicate and decipher the words. Did your system for addressing edge cases work or did you have to adjust your methods?

2. Beyond the movement of the robotic arm, were there other communication channels that your team used when receiving or providing the coded words? If so, how did those communication channels help? If not, what other communication channels would have made communication more efficient?

3. Create a hypothetical scenario where this Morse code embodiment would be useful. Think about the limitations of this setup and explain how they would be addressed in your scenario.

4. Consider the design of this non-verbal communication embodiment. Do you think using head-tracking as the main method to translate non-verbal cues worked? Why or why not? Provide examples to support your conclusions.

5. What additional human senses and/or behaviors could be used to non-verbally communicate information when audio is not available? Describe how you would use these additional sources of information.

Week 2

Part 5: Setup

Deliverable: None

Part 6: Five State Exploration

Deliverable: Copy paste your new process_rotation function. Describe your new communication system and what your team discussed when creating it. Paste an image of your new setup.

def process_rotation():
        [insert your code here]

Brief description of the intent of above function & initial method:

Paste an image of your new setup below.

Part 7: Iterate and Evaluate

Deliverable: Describe the outcome of your task.

Brief description of the iterations made to method:

Brief description of the method used for your evaluation trial:

Communication Task
Generated Alphanumeric sequence:
Guessed Alphanumeric sequence:

Part 8: Five State Reflection

Deliverable: Answer the below questions

1. Describe briefly how your new method of communication works. What symbols, signals or methods or moving the arm did you employ?

2. If it worked, explain why. If not, explain what challenges your group faced.

3. If you were able to extend the algorithm to permit more degrees of freedom of robot motion (e.g., moving up and down), how would you modify your communication mapping design to improve ease of use?

4. If you were able to add display modalities for the person receiving information (e.g., LED displays) and/or decoding automation, how would you incorporate these capabilities in your design? Provide the pros and cons of making these design changes. Describe two potential system errors or edge cases that could influence your new design.

Grading Rubric

The following rubric will be used to grade your submission.

Week 1

Lab Part	Required Deliverables	Points
Part 1	NA	0 pts
Part 2	Brief description	4 pts: Includes details of concept including placement of symbols and mapping of head movement information (1 pt), how to repeat a symbol (1 pt), indicate a new letter (1 pt), and communicate when the word is done (1 pt)
Part 3	Filled out table Describes updates between interactions	3 pts for table 3 pts: Updates provided on the mapping and plan between each implementation
Part 4	4.1: Reflection on non-verbal communication. 4.2: Discussion of other communication channels. Explains how other communication channels may help. 4.3: Describes a hypothetical scenario. Provides limitations and solutions.	4.1: 2 pts: Reflection on what was easy 2 pts: Reflection on what was challenging 3 pts: Description for why adjustments were made to the mapping implementation 4.2 2 pts: Description of other communication channels that were used by the team and why 2 pts: Reflection on what additional communication channels would be helpful and why. 4.3: 2 pts: Scenario has sufficient detail 4 pts: Limitations of the current set up for the proposed scenario are described. (2 pts each) 4 pts: Updates to enable the new scenario are detailed. (2 pts each)

	4.4: Describes alternative non-verbal communication strategies.	4.4: 2 pts: Relevant sense/behavior provided 2 pts: Example connected to the scenario from 4.3
	Total Points Available	35 pts

Week 2

Lab Part	Required Deliverables	Points
Part 5	NA	0 pts
Part 6	Process rotation function & photo	2 pts for function, 4 pts for description, 1 pts for photo
Part 7	State exploration description and task results	4 pts for description of iterations 3 pts for description of the final method pts for description of evaluation results
Part 8	8.1: Explains why communication worked or did not. 8.2: Discusses modifications of communication mapping. Provides illustrations or examples 8.3: Discusses alternative display modalities. Provides examples and potential error/edge cases.	8.1: 3 pts: Description provided interpreting results 8.2: 4 pts: Description of updated mapping 4 pts: Reasoning for proposed updates 8.3: 3 pts for discussion of additional display modality for the receiver of information 3 pts for potential pros/cons 4 pts for examples of edge cases (2 pts each)
	Total Points Available	35 pts