Intention Recognition

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Competency Questions (back-end)

Search queries for the researchers.

Date: March 2025

Behavior

1. What are the different workplace behaviors?
    a. What are common “Blue Collar” workplace behaviors?
    b. What are common “White Collar” workplace behaviors?
2. If an human teammate walks away from its robotic teammate without notifying it what will happen?
3. If a human teammate accidentally walks into a robotic teammates area what will happen?
4. A robotic teammate stopped moving after a human teammate got too close to its robotic hand, what should the human teammate do to get the robot to move again?
5. How do we build trust between humans and robots?
    a. Are there certain trust building behaviors the robot can exhibit?
    b. What workplace standards are set to allow humans to collaborate comfortably with their robot teammates?
6. How does robot *x* handle a sudden change?
    a. If scenario *Y* happens what is robot *X*’s response?
    b. How should the robot communicate its response if scenario Y happened?
7. How does robot x handle individualism in human behaviors?

Communication

1. What communication methods are available to robots?
    a. What visual communication methods are used?
    b. What auditory communication methods are used?
2. What is the best way to communicate?
    a. If worker (type blue_collar) in environment (type: e_industry) then what communication method should be used?
3. What user interfaces are being used?
    a. How much training does a person need to learn this interface?

Task-Allocation

1. What skills do the human workers need to have to work with robot agents?
    a. What workers can fix the robotic agent?
    b. Who should be called for *x* error?
2. What are the capabilities of robot *x*?
    a. What are the weight limit that robot *x* can lift*?*
    b. What are the movement capabilities of robot *x*?
3. What is the standard interaction types for human and robot collaboration in an industrial setting?
    a. What are the best types of robots to use in this space?

4. What protocols are in place for choosing the best robotic agent?
    a. What are the environmental restrictions for each robot?
    b. What robots are available to us?

Environment

1. What are the different work environments that utilize human robot collaboration?
2. What is the best environmental layout for a robot and human collaboration.
3. How do we assess the correct robotic agent for specific environments?
    a. Weight capacity?
    b. Lifting capability?
    c. Indoors or outdoors?
        i. Climate tolerance?
4. How many agents will be working together?

Interaction Design

1. How do I customize my work preferences in my robot agents?
2. The production line is overflowing and we need extra help, we have to pull objects off the production line and place them in boxes what is the best way to set this up so that the robot and human can effortlessly collaborate?
3. How do we analyze the collaboration between agents?
4. Can multiple agents work together (+2 or more)?
5. How does the robotic agent and the human agent work around each other?

Safety

1. What kind of training do workers need to have before working with a robotic agent?
    a. What is the safety training that human workers need to take?
    b. What is the protocol for a defective robotic agent?
2. What are the restriction of capability of robot x?
3. What emergency plans are in place when working in a human-robot collaboration?
4. The robot was accidentally bumped into and now it wont work, what should the human teammate do?
5. Is there a trade off in safety and efficiency?
6. What is the safest way for a human agent and a robotic agent to work together?

Cognitive Factors

1. How much responsibility is given to humans in robot human collaboration?
2. What knowledge is in the database about behavior?
3. How does the robot reason about the behaviors of its human agent?
    a. Can the robot reason

Users

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Based off of the input from our stakeholders and current literature of the state of the art we have identified some Users of the ontology that motivate our competency questions.

Types of Users (and what motivates them)

Stakeholders:

1. What robot is best used for environment Y (type: assembly-Line) has the most efficient production Time?
    a. As well as high in safety?
    b. What is the trade-off between efficiency and safety.
2. Does every Robot Agent need to work with a human agent?
    a. Can robot agent work with another robot agent similarly?
    b. What is the value in having a human-in-the-loop?
3. How is the task allocated between robot Agent and Human Agent?
4. How do we optimize production and still have little tradeoff for safety?

Employees:

1. I work in a production line for company XYZ what I would like to know the best robot agents that I can collaborate with in my job?
    a. My workspace is around 150 square feet what robotic agents would be the best to collaborate with?
2. I work in construction, what robotic agent would be best used collaborating with?
    a. We need to lift 50lbs sandbags and are primarily outside in the heat and cold, which robots can aid in this work?
    b. We live in Canada and the winters can get very cold.
3. My robotic agent stopped moving when I entered its space, how to I get it to resume its task?
4. I accidentally bumped into my robotic teammates and now it wont work, what should I do?
5. How do I customize my work preferences in my robot agents?
    a. Does the robot save my preferences?
    b. How does it know its me and not another co-worker?

Enthusiast:

8. When was Robot *X* first introduced?
9. How many collaborative robots are on the market?
    a. Which ones are best for x-type of work?
10.
11. Can the robots learn my behaviors to better collaborate with me?

Academic:

1. How does the robot agent categorize its human co-workers behaviors.
2. What is the underlying structure allowing the robot to navigate the observations?
3.

Investors:

12. I own a construction company that operates primarily outside. I need a robot that can handle the Arizona heat in the summer and can work collaboratively with my crew?
    a. The job will need to include helping people to help lift 80lbs sand bags.
    b. What robots are best for this type of work?
13. I am expanding the production line in my warehouse, what are the best design plans for the inclusion of a robotic agent?
    a. What is the square footage that I need to have in order to have safety and efficiency in collaboration between humans and robot?
14. If one of the robotic agents in my company malfunctions, who should I call?
    a. Is there some malfunctions that my workers can be trained to fix themselves?
15. What kind of training should my workers have to be able to work in these environments with robot agents.
16. How can I communicate to the robot the end goal of the task?
    a. What if everyday there is a different task to be done? How do we let the robotic agent know about that?
17. What is the cost of Robot X?