

Social companion robot that helps stay on a workout goal

Human-robot interactions, interventions to keep human motivated and reward saliency - MDP framework

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Motivation

- ❖ Humans often display seemingly suboptimal behaviour
 - Procrastination
 - Impulsivity
- ❖ Specific focus : Inability to stick to workout goals
 - Can we build a robot that incentivizes people to stick to their own goals for workout?

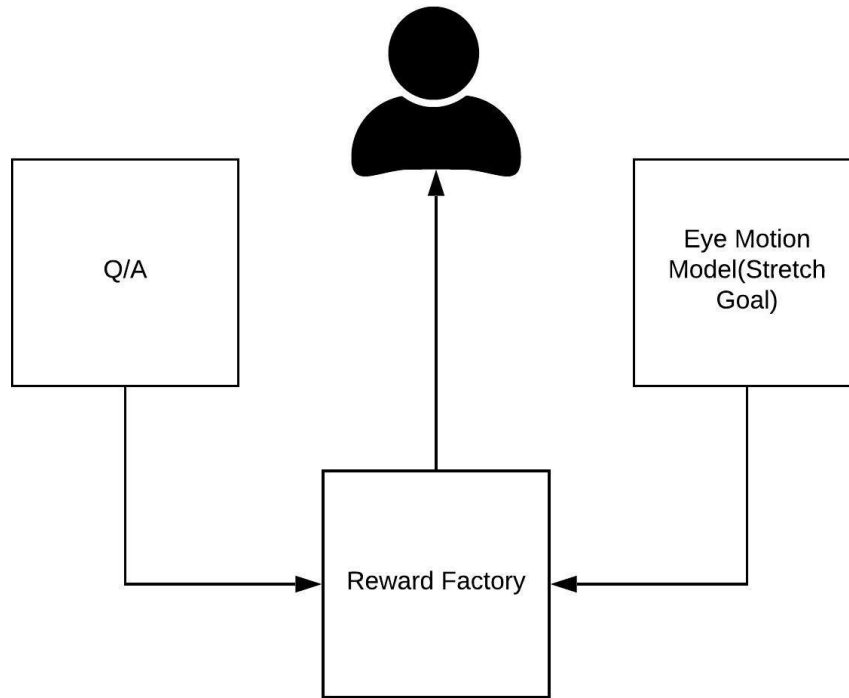
Human-Robot Interaction

- ❖ Human sets a goal for workout
 - E.g.: 2.5 hours every week for 5 weeks.
- ❖ Human comes from work, possibly tired.
- ❖ Robot interacts with the human and finds out how he/she is feeling.
- ❖ Robot provides intervention if human is demotivated from the workout schedule
- ❖ Human can choose to cease interaction with the robot.
 - Robot will further probe humans mood with questions right before interaction ends

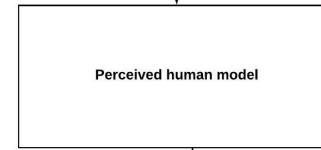
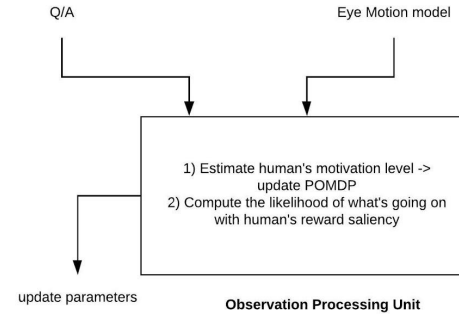
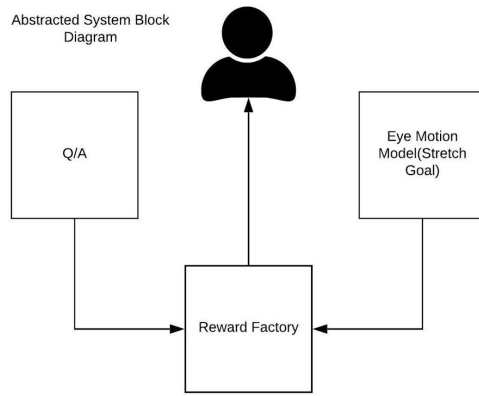
Interventions

- ❖ Here the interventions provided by the robot to increase motivation can be categorized as follows:
 - Arbitrary Interventions
 - E.g., Telling the human a joke or playing pleasant music
 - Goal-specific Interventions
 - E.g., Reminding the human how close they are to achieving the goal or of consequences of deviating from goal
- ❖ These interventions can be seen as modifying either reward or reward saliency for the human

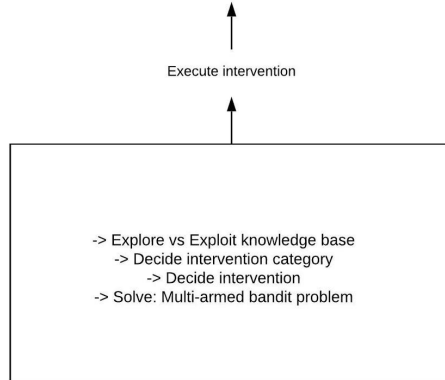
System block diagram - abstracted



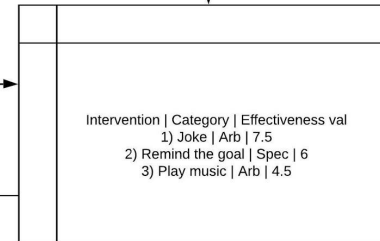
Abstracted System Block Diagram



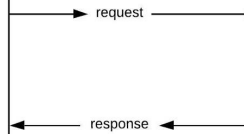
Reward Factory



update intervention effectiveness



Intervention knowledge base



Challenges

- ❖ How do we determine which interventions are more effective and for what scenarios?
- ❖ How do we build a behavioural model that allows the robot to learn and create personalized motivation schemes for different people?

Evaluation on human subjects

- ❖ Pre-survey and post-survey on human subjects before and after workout respectively
- ❖ Quantify or measure how well the behavior coaching worked - Was the goal reached solely because of the motivation robot provided ? If the robot assistance was not there, then was the goal still achieved ?
- ❖ Divide subjects into two groups - one group without any robot companionship (control) , other group with robot companionship (testing)

Stretch goals

- ❖ Can we infer the human's mood by minimum interaction ? Using facial expressions, eye movements, etc.
- ❖ Decide what rewards will work best in the given human's emotional state estimated using the above method that will motivate the human to work towards their goal ?
- ❖ Quantify if the robot's companionship is effective in improving the positive mood of the human ?