Assignment One: AI Solution to a Real-World Problem

CS 370 Current/Emerging Trends in CS

Nicholle Caudy

7/1/2025

A real-world problem that would benefit from the application of AI is deep cleaning a family home. A busy family would benefit from having a smart cleaning system that deep cleans the home such as wiping down walls and base boards, vacuuming and shampooing carpets and rugs, sweeping and mopping floors, and tackling the bathroom cleaning. This could also be useful for elderly individuals or individuals with disabilities who no longer have the capability to complete these strenuous activities.

The AI solution to this problem would be quite extensive as it would require a complex robot and programming to complete all the tasks listed above. To start, the individual who owns this system would need the ability to set up tasks for the AI system to complete the different tasks at the desired times or set up a recurring schedule. The robot would be able to perceive its environment and learn the present obstacles. The system would use supervised learning through sensors and algorithms to navigate and clean the spaces tasked to it. I would like the system to have Natural Language Processing (NPL) so the user can have voice commands to control the system as well. The system would also need Long Short-Term Memory (LSTM) to capture long-term dependences in its data sequences for speech recognition, learning and interacting with its environment. The system must integrate advanced computer vision functionalities to accurately recognize the designated object for cleaning. This functionality would also enable the system to assess the dimensions and contours of various objects, such as toilets and bathtubs or showers, thereby facilitating effective cleaning operations.

The robot intended for these tasks will feature a humanoid design, with its base equipped with integrated floor cleaning mechanisms. This will include wheels, vacuum hose and suction, removable tank to empty debris, scrub brushes, removable and refillable water and detergent tanks, and a fan to assist in drying hard floor surfaces. The bottom of the robot will require sensors to help in navigating and learning its environment throughout its cleaning tasks. Computer vision will be on multiple areas of the robot to allow the robot “see” its surroundings and make decisions on what objects are around it. The robot will have robotic arms that will have interchangeable pieces based on its cleaning task. For instance, the robot will have one detachable extension that will contain a moist/cleaning solution infused pad for cleaning the walls, baseboards, tub/shower, and floors if necessary, and another extension will be a brush for harder surfaces or the toilet. These will be detachable to allow for versatility and maintenance. The arms will also have proximity sensors to guarantee precise and secure positioning of the extensions. The robot will have a voice recognition system to give the user the ability to control the robot with a set of commands. The robot will also need a charging/storage station for the robot to store its attachments and charge until the next task is set. The AI system will be extensive with the ability to process visual data and natural language, store the data gathered during cleaning processes for spatial mapping and find more efficient ways of completing its given tasks using algorithms.

The largest ethical concern for this AI system will be both personal and property safety. The robot will be running throughout the home completing cleaning tasks and the potential for property damage or personal injury is very prominent. Therefore, the AI system will incorporate a range of sensors and advanced computer vision capabilities, enabling it to process environmental data in real time. This is also another reason for adding voice recognition to the system so the user can stop or redirect the system if needed. Privacy is also a large concern as the instances of hacking are becoming more prevalent. The AI system will need to be secure and have safeguards in place to protect the owner with a full system shutdown if unauthorized activity is detected. This is due to the cameras and visual functions that the system will have. Employment is another concern as using this AI system could reduce the need for a contract cleaning service/person.

References:

Roberts, S. (2025, June 2). *Artificial Intelligence Techniques: Explained in Detail*. The Knowledge Academy. Retrieved July 2, 2025, from <https://www.theknowledgeacademy.com/blog/artificial-intelligence-techniques/>

Olson, E. (2024, March 20). *More Robot Responsibility Means More Ethical Concerns*. GlobalSpec. Retrieved July 3, 2025, from

<https://insights.globalspec.com/article/12503/more-robot-responsibility-means-more-ethical-concerns>