Assignment 8/9 Ethical Issues

Week 12

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STEVENS

EE 322 - A

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We pledge our honor that we have abided by the Stevens Honor System

Identify any potential hazards in the proposed design
8.1. Ethical issues, e.g., foreseeable misuses

One ethical issue is that the Roombas may get caught in a feedback loop, in which they may perceive areas as clean when they are not, leading to ineffective cleaning and potentially leaving areas unattended and dirty. The reliability of the Roombas may be questioned. Another issue is failure of the app to report all cleaning issues and coordination issues. Coordination between roombas and their jobs is essential for the success of the system. Without proper oversight or management, tasks may be duplicated which will waste resources (time, energy), or be neglected which will lead to mediocre cleaning. In addition, unexpected collisions may cause damage to the Roombas due to an error in the code. Furthermore, having multiple Roombas means more risk of tripping, thus posing a safety concern, especially for younger children and the elderly. Lastly, excessive noise generated by multiple Roombas operating simultaneously can disrupt daily activities and cause discomfort for people, including disturbances to sleep, work, and overall well-being. Infants and pets, in particular, may be sensitive to noise levels.

Provide solutions to eliminate hazards identified in Assignment 8
9.1. Ethical issues, e.g., foreseeable misuses

One solution may be to implement an algorithm that allows detection and breaking out of feedback loops. Another solution is to enhance the reporting capabilities of the app, which will help detect cleaning issues. In addition, coding the Roombas to synchronize cleaning cycles with durations of minimal activity within rooms will allow people to go on with their days without much disruption. Furthermore, mitigating the complexity of mapping/navigation with other Roombas involved would be beneficial.If in order to create a solution, we are required to "hardwire" a fix, this could lead to potential issues in the future when it comes to the flexibility of our code, however this can be fixed with solid foundational coding practices.

8.2. Product liability: identify any potential hazards in the proposed design, e.g., changes that may occur during the useful lifetime

Some product liabilities are as follows. Our app currently would take private user data, in this case the floorplan of their homes, which if leaked could be used for potential robberies. Another liability would be fire risk, although it is low it is never completely zero, since Roombas use lithium batteries. The final liability would be to software bugs, as future pushed updates could potentially disrupt regular day to day functionality.

9.2. Product liability: provide solutions to eliminate hazards identified in Assignment 8.2, e.g., changes that may occur during the useful lifetime

One way to limit liability would be to hire cybersecurity developers to check the stability and security of the app data. To prevent damage liabilities we can implement a Roomba failsafe that checks for any part or software issues. To prevent updates from breaking day to day function, we can have the Roombas store both the current and previous version of firmware on their systems, if the new patch does not run, then it will default to the previous working version.

8.3. Social impact: identify any potential hazards in the proposed design, e.g., disposal after the useful life has ended

Some social impacts of our product as follows. The technological dependence on cleaning may lead to many people disregarding the importance of cleaning up after themselves, leading to people disregarding messes such as, "Oh the Roomba will get it." Another social impact would be lithium and silicon usage for the technology inside of the actual machines, many of these materials are not always sourced ethically. Poor environmental impact is another social concern, as using technology uses power and therefore adds to fossil fuel/natural gas usage. Another impact are the socio economic factors, as not all families are willing or able to afford a Roomba device, much less more than one. Another concern is privacy, as some people might not like the idea of the Roombas mapping out their floor plan. And the final societal impact would be the disconnect between taking care of a home and just residing in it, as many homeowners take pride in the upkeep of their homes.

9.3. Social impact: provide solutions to eliminate hazards identified in Assignment 8.3, e.g., disposal after the useful life has ended

To address the overdependence on technology, we can give users the option to delegate one day to be Roomba free, by disabling all Roomba cleaning schedules to encourage them to clean on their own. This way they know that they still have the ability to handle their day to day cleaning. To address environmental concerns we can substitute materials or synthetic materials to replace main materials components. To address socio economic concerns we can try to make them more affordable or make cheaper Roombas as efficient as a more expensive one.To address privacy concerns, we can show to customers that all home data will be stored on their devices, with our pathing and efficiency algorithms being data we provide, versus data we collect and then process.To address the disconnect of homeowners versus home dwellers, we can advise different portions of the house that could potentially need cleaning, while emphasizing that we have the floor covered.