Understanding Human-Robotic Lawnmowers Interaction in Different Environments

ABOUT HUSQVARNA

Husqvarna Group is a world-leading producer of outdoor power products for garden, park and forest care. Products include chainsaws, trimmers, robotic lawnmowers and ride-on lawnmowers. The Group is also the European leader in garden watering products and a world leader in cutting equipment and diamond tools for the construction and stone industries. Advanced Development & AI Lab consists of about 45 creative colleagues, all specialised within their fields: system engineering, embedded software, sensors and algorithm development, vision and machine learning, data engineering, system testing, and electrical and mechanical engineering. Some examples of technology originated from the team are:
- ADW robotic platform. A robotic mower that looks, behaves, and performs like no other.
- EPOS positioning system and boundary wire free robotic mower.
- A lot of new interesting functionality to be on the market in the near future.

THE PROJECT

The integration of automated machines, such as robotic lawnmowers, into our daily lives, is transforming our interaction with tasks and environments. However, integrating such automated machines into public and private spaces necessitates an in-depth understanding of human perception and interaction with these robots. This project explores how the behaviours of robotics lawnmowers in public spaces, particularly in parks and golf courses, are perceived by pedestrians and other humans in the scene. To approach such studies, prior work in human-computer interaction and human-robot interactions primarily focused on factory floors or autonomous vehicles could be extended to more uncontrolled environments such as parks and golf courses [1, 2]. This study aims to inform what behaviours within the robot movement or external signalling, such as light, could improve the interaction, how safe individuals feel around robotic lawnmowers, and how the robot's efficiency and effectiveness are perceived based on their operational behaviours.

GOALS

- Conduct a rigorous literature review focusing on the interaction between human and robotic lawnmowers or robots with similar characteristics.
- Identify research gaps, especially those related to modes of interaction and human factors in human-machine interaction in uncontrolled environments
- Design and develop user studies using the methodologies in the literature
- Engage in collaborative brainstorming sessions with the team of researchers from Husqvarna and KTH to refine and integrate your findings

REQUIREMENTS

The project requires the following skills and interest:
- Strong mathematical and coding skills, similar to what you'd acquire in the ML or SCR programs at KTH
- Knowledge of Statistical analysis tools, preferably Python or R
- Interest in learning about the Husqvarna platform (add more details)

To apply, submit the following to Elmira Yadollahi (elmiray@kth.se) and Mattias Kamfors (mattias.kamfors@husqvarnagroup.com): CV, Cover letter, and Transcripts.

REFERENCES

[1] Colley, A., Tiitto, M., Pfleging, B., and Häkkilä, J. (2023). Pedestrian interaction with a snow clearing robot. In *IFIP Conference on Human-Computer Interaction*, pages 3–16. Springer.

[2] Coovert, M. D., Lee, T., Shindev, I., and Sun, Y. (2014). Spatial augmented reality as a method for a mobile robot to communicate intended movement. *Computers in Human Behavior*, 34:241–248.