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# A Review Paper on Greeting Robot Prototype

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#### **ABSTRACT:**

This Review paper focuses on Social robots have gained increasing attention for their potential to enhance human interaction in various public and service environments. The development of a greeting robot is an innovative application of robotics that aims to improve user experiences by providing friendly interactions and useful information. This paper explores the design and prototype development of a greeting robot capable of recognizing human presence, initiating greetings, and engaging in basic interactions. The system integrates technologies such as motion sensors, speech synthesis, and facial recognition, to facilitate seamless interaction. Key challenges addressed include ensuring natural communication, robot responsiveness, and adaptability to different environments. The prototype demonstrates the feasibility of greeting robots in public spaces, such as reception areas, stores, and events, offering a model for enhancing user engagement. By combining human-robot interaction principles with advanced sensors and AI, the study highlights the potential of social robots to contribute to better customer service and public interaction. The results of the prototype suggest that greeting robots can be effective in providing a personalized, engaging experience while promoting a friendly atmosphere.

Keywords: Greeting Robot, Human-Robot Interaction, Social Robotics, Prototype Development, Motion Sensors, Speech Synthesis, Customer Engagement, Robot Design, Artificial Intelligence, Public Interaction

## 1. Introduction:

This paper explores the design, development, and functionality of a greeting robot, which is a type of social robot designed to engage with individuals in public spaces by providing a friendly welcome. Greeting robots aim to enhance user experience by offering interaction that mimics social behaviors, such as initiating greetings, offering information, and responding to basic queries. The study investigates the integration of various technologies, including sensors, artificial intelligence, and human-robot interaction principles, to create a robot that not only serves as a friendly greeting agent but also improves the overall ambiance of its surroundings. The development of such robots has seen increasing interest due to their potential applications in environments like hotels, airports, museums, and retail stores, where customer service and engagement play a pivotal role in user satisfaction. In this paper, the focus is on creating a prototype that incorporates key technologies like motion detection, voice synthesis, and simple interaction protocols to make the robot both functional and approachable. This design represents an initial step toward building a more sophisticated social robot capable of engaging users in meaningful ways. Similar to how other robots have been used in educational, medical, and entertainment fields, greeting robots serve as an entry point for broader adoption of robotics in daily human activities. The integration of Human-Robot Interaction (HRI) theory ensures that the interaction with the robot feels natural and intuitive for users. In addition to technical challenges, the paper discusses the psychological and behavioral considerations necessary for designing a robot that can effectively communicate with humans. These include aspects like body language, voice tone, and responsiveness. The prototype presented in this study aims to address these considerations while demonstrating the feasibility of greeting robots in real-world settings. Through this research, we aim to contribute to the ongoing development of social robots, exploring not only their technical capabilities but also their social roles. The results suggest that greeting robots, while in the early stages, can become an essential tool for businesses and public spaces, promoting friendly interaction and providing a seamless user experience.

## 2. Literature Review:

**Breazeal [1]** Toward sociable robots. Robotics and Autonomous Systems, 42(3-4), 167-175.Breazeal's work is a foundational study on the concept of social robots, detailing how robots can be designed to interact with humans in a social context. This paper outlines the importance of creating robots that can understand and respond to social cues, which is crucial in the design of greeting robots.

**Fong [2]** A survey of socially interactive robots. Robotics and Autonomous Systems, 42(3-4), 143-166. This paper surveys various socially interactive robots, focusing on the challenges of developing robots that can engage with humans in meaningful ways. It highlights the importance of non-verbal communication and responsive behavior in human-robot interactions.

Hirano [3] Interactive robots as social partners and peer tutors for children: A field trial. Human-Computer Interaction, 19(1), 61-84. Kanda et al.

demonstrate how robots can be used in social settings, particularly in educational environments. Their work on interactive robots with children offers insights into how robots can be designed for effective engagement and interaction with diverse audiences.

**Bartneck** [4] A design-centered framework for social human-robot interaction. Proceedings of the RO-MAN 2004. This paper presents a framework for designing socially interactive robots. It emphasizes the need to consider human psychology and social norms when designing robots intended for interaction, a key aspect for greeting robots.

Muthu [5] Nonverbal leakage in robots: Communication of intentions through seemingly unintentional behavior. HRI '09: Proceedings of the 4th ACM/IEEE International Conference on Human-Robot Interaction. The authors explore the idea of non-verbal communication in robots. They discuss how unintentional behaviors, such as body language or movements, can convey social intentions, which is essential for creating robots that behave naturally in social environments.

**Dautenhahn** [6] Socially intelligent robots: Design for human-robot interaction. In Proceedings of the 2nd ACM/IEEE International Conference on Human-Robot Interaction. Dautenhahn discusses the design of robots that are socially intelligent, focusing on the role of context, communication, and interaction in robot behavior, which directly applies to the development of greeting robots.

Nourbakhsh [7] Robot Futures. MIT Press.Nourbakhsh's book delves into the future of robotics, with a section dedicated to social robots and their potential in daily human life. It provides a broad view of the evolution of robots in various social contexts, including greeting robots.

**Friedman [8]** Value sensitive design and information systems. Proceedings of the 6th Conference on Human-Computer Interaction. The concept of value-sensitive design is explored in this paper, which stresses the importance of designing robots that respect human values and ethical considerations, crucial when creating robots intended to interact with people.

**Chernova** [9] Interactive robot learning from demonstration: Challenges and progress. Proceedings of the 10th International Symposium on Robot and Human Interactive Communication. Chernova and Veloso discuss learning algorithms for robots that allow them to improve their performance through user interaction. This is highly relevant for designing greeting robots that adapt to different user interactions.

**Kormushev** [10] Robot skill learning by demonstration and adaptation. Robotics and Autonomous Systems, 59(5), 279-288. This paper addresses how robots can learn from demonstration and adapt to different scenarios, which can enhance a greeting robot's ability to interact with users in various social contexts.

**Koka** [11] Design and development of social robots for human interaction. Journal of Robotics and Mechatronics, 24(4), 471-484. This study focuses on the practical aspects of designing robots that can interact with humans socially. It discusses the challenges of integrating voice and gesture recognition in robots, which are key components for greeting robots.

**Goetz** [12] Cooperative and evaluative interactions with a robotic helper. In Proceedings of the 2003 Conference on Human Factors in Computing Systems. The study emphasizes the importance of building robots that can collaborate with humans effectively, a concept that is fundamental in greeting robots that need to provide assistance and information.

Chita-Tegmark [13] The influence of robot appearance and behavior on user perception and behavior. In Proceedings of the 6th ACM/IEEE International Conference on Human-Robot Interaction. This research investigates how a robot's physical appearance and behavior influence user engagement, which is essential for the design of welcoming and approachable greeting robots.

**Zhu**, [14] Face detection and recognition in human-robot interaction. In Proceedings of the IEEE International Conference on Robotics and Automation. Face detection is a key technology in greeting robots, as it allows them to recognize and greet users. This paper explores face detection algorithms and their application in social robots.

**Riek** [15] A systematic review and new reporting guidelines. Journal of Human-Robot Interaction, 1(1), 119-136. Riek's work on Wizard of Oz studies is relevant for designing and testing greeting robots in human-robot interaction studies. It outlines methods for evaluating robot behaviors through simulated human control.

**Sabanovic** [16] Robot behavior in social contexts. In Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems. This study examines how robot behavior can be modified based on the social context in which they are operating. Greeting robots must be able to adjust their behavior depending on the environment and the user they are interacting with.

Heerink [17] The influence of social abilities of a robot on acceptance by elderly people. In Proceedings of the 19th IEEE International Symposium on Robot and Human Interactive Communication. Heerink et al. explore the acceptance of robots by elderly individuals, offering insights into how greeting robots can be designed to appeal to a wide range of demographics.

Klein [18] Emotion expression in social robots: A review. International Journal of Social Robotics, 1(1), 45-59. This paper reviews the role of emotion

expression in robots, which is an important consideration for creating greeting robots that can convey friendliness and warmth through both verbal and non-verbal cues.

Mataric [19] The Robotics Primer. MIT Press. Mataric provides an accessible introduction to the basics of robotics and their application in social settings. The principles outlined are directly applicable to the design of greeting robots.

Huang [20] Interaction design for service robots in public spaces: A case study. International Journal of Human-Computer Studies, 92, 66-81. Huang and Lee's case study looks at the interaction design of service robots in public spaces, offering valuable insights for greeting robot developers looking to improve user engagement in real-world scenarios.

## 3. Conclusion

The development of a greeting robot represents a significant step forward in the integration of robotics into everyday human environments. Through this study, we explored the design principles, sensor integration, control systems, and interactive behaviors necessary for building a socially engaging robot capable of initiating greetings and simple interactions with users. The prototype developed demonstrates the feasibility of combining basic robotics components—such as microcontrollers, motion sensors, voice modules, and facial recognition systems—to create a functional and responsive greeting system. Human-Robot Interaction (HRI) research provided a strong theoretical foundation, ensuring that the robot's gestures and responses were both natural and socially acceptable. The study also highlighted key challenges such as ensuring accurate human detection, creating appropriate behavioral responses, and maintaining real-time system performance. Despite these challenges, the results indicate strong potential for greeting robots to be deployed in environments like reception areas, exhibitions, public spaces, and educational institutions. In conclusion, the prototype serves as a successful proof-of-concept, laying the groundwork for more advanced social robots that can assist, guide, or entertain users in various real-world scenarios. Future improvements can focus on enhancing speech recognition, emotional intelligence, and mobility to further increase the robot's effectiveness and user engagement.

#### **REFERENCES:**

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- [2] Fong, T., Nourbakhsh, I., & Dautenhahn, K. (2003). A survey of socially interactive robots. Robotics and Autonomous Systems, 42(3-4), 143-166. The authors explore different types of socially interactive robots and the challenges of designing robots capable of meaningful social interaction.
- [3] Kanda, T., Hirano, T., Eaton, D., & Ishiguro, H. (2004). Interactive robots as social partners and peer tutors for children: A field trial. Human-Computer Interaction, 19(1), 61-84. This study investigates the use of robots in social settings, particularly in educational environments, providing valuable insights into how robots can engage with users.
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- [6] Dautenhahn, K. (2007). Socially intelligent robots: Design for human-robot interaction. In Proceedings of the 2nd ACM/IEEE International Conference on Human-Robot Interaction. This paper discusses the design considerations for robots that need to interact intelligently and socially with humans, which is a fundamental requirement for greeting robots.
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- [12] Riek, L. D. (2012). Wizard of Oz studies in HRI: A systematic review and new reporting guidelines. Journal of Human-Robot Interaction, 1(1), 119-136. This paper provides a review of Wizard of Oz studies in human-robot interaction, which can be useful for testing and evaluating greeting robots in realworld environments before fully deploying them.