**Review of Research Methodology**

1. **Literature Review of Methodologies**

**Several methodologies have been explored using gesture-human-robot-interaction (HRI). Sobhani et al. (2022) [1] conducted a usability study involving the use of a triple-arm mixed-reality robot teleoperation system. Their methodology utilised the use of real-time control using both VR headsets and robotic arms, with quantitative and qualitative analysis in mind, which includes using System Usability Scale (SUS) and head tracking. Nguyan et al. (2022) [2] proposed a real-time hand gesture recognition model using skeleton-based detection and TD-Net, which emphasized gesture spotting through the use of feature extraction and machine learning.**

**Bai et al. (2023) [3] had designed a reach-to-grasp robotic control system using RGB image-based object pose estimation. The methodology used was identified as combination of neural networks and visualization strategies to verify the precision in robotic movement. Gourob et al. (2021) [4] using a simple robotic hand controller implemented a basic vision-based gesture recognition, which focuses on assistive robotics for older adults. Yu et al. (2017) [5] explored the use of controlling UAVs via hand gesture recognition using ROS, showing real-time interaction with drones using computer vision.**

1. **Distinguishing Academic and Non-Academic Sources**

All papers referenced are academic, this is because they are published from IEEE, which ensure rigor, replicability and a well-structured mythologies. Non-academic sources would include blogs and or video demonstrations, these lack peer review and scientific validation, thus are removed from the analysis.

1. **Recommended Peer-Reviewed Articles**
2. M. Sobhani, A. Smith, M. Giuliani and T. Pipe, "Usability Study of a Novel Triple-arm Mixed-Reality Robot Teleoperation System," 2022 IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR), Sevilla, Spain, 2022, pp. 217-223, doi: 10.1109/SSRR56537.2022.10018630. keywords: {Headphones;Atmospheric measurements;Robot vision systems;Virtual reality;Streaming media;Cameras;Manipulators;Teleoperation;Mixed-Reality;Human-Robot Interaction;Remote presence;System Usability},
3. T. -T. Nguyen et al., "A Continuous Real-time Hand Gesture Recognition Method based on Skeleton," 2022 11th International Conference on Control, Automation and Information Sciences (ICCAIS), Hanoi, Vietnam, 2022, pp. 273-278, doi: 10.1109/ICCAIS56082.2022.9990122. keywords: {Automation;Gesture recognition;Feature extraction;Skeleton;Robustness;Real-time systems;Task analysis;hand gesture recognition;skeleton-based hand gesture recognition;continuous hand gesture recognition},
4. S. Bai, J. Guo, Y. Jiang, H. Yokoi and S. Togo, "Automatic Control System for Reach-to-Grasp Movement of a 7-DOF Robotic Arm Using Object Pose Estimation with an RGB Camera," 2023 IEEE International Conference on Robotics and Biomimetics (ROBIO), Koh Samui, Thailand, 2023, pp. 1-6, doi: 10.1109/ROBIO58561.2023.10354531. keywords: {Visualization;Shape;Pose estimation;Robot vision systems;Neural networks;Control systems;End effectors},
5. J. Hossain Gourob, S. Raxit and A. Hasan, "A Robotic Hand: Controlled With Vision Based Hand Gesture Recognition System," 2021 International Conference on Automation, Control and Mechatronics for Industry 4.0 (ACMI), Rajshahi, Bangladesh, 2021, pp. 1-4, doi: 10.1109/ACMI53878.2021.9528192. keywords: {Service robots;Robot vision systems;Input devices;Human-robot interaction;Gesture recognition;Assistive robots;Older adults;Human Robot Interaction;Hand Gesture Recognition;Robotic Hand},
6. Y. Yu, X. Wang, Z. Zhong and Y. Zhang, "ROS-based UAV control using hand gesture recognition," 2017 29th Chinese Control And Decision Conference (CCDC), Chongqing, China, 2017, pp. 6795-6799, doi: 10.1109/CCDC.2017.7978402. keywords: {Gesture recognition;Algorithm design and analysis;Drones;Cameras;Robots;Mechatronics;Automation;ROS;UAV Control;Hand Gesture Recognition},
7. **Contextualization of Literature**

Sobhani et al. [1] conduct their research within high-risk environments such as nuclear decommissioning. Nguyen et al. [2] address gesture recognition for continuous user interaction in real-time systems. Bai et al. [3] present robotic prosthetics and manipulation. Gourob et al. [4] focus on cost-effective assistive technologies, and Yu et al. [5] expand the scope to UAVs, introducing flexibility in remote operations.

1. **Critical Comparison and Knowledge Gaps**

The studies conducted vary in scale, complexity and application. Sobhani et al. [1] and Bai et al. [3] present rich experimental data, but are limited by either the user sample size or the environmental conditions. Nguyen et al. [2] showcase robust gesture recognition models, but no hardware integration. Hourob et al. [4] had simplified systems for accessibility but had shown a lack of performance metrics. Yu et al. [5] demonstrated controlling UAVs with basic gestures, though this has shown some limitations. The main component of this knowledge Gap is the lack of cross-environment validation and long-term performance tests in real-world situations.

1. **Literature Map**

Gesture-based HRI Methodologies

* Vision-based Recognition
  + Skeleton + TD-Net [2]
  + RGB + Pose Estimation [3,4]
* Interface and Integration
  + VR + Robotic Arms + SUS [1]
  + ROS + UAV [5]
* Evaluation Methods
  + Quantitative (Accuracy, Completion Time) [1,2,3]
  + Qualitative (User Feedback, SUS) [1]
* Application Context
  + High-risk Industry & Surgery [1,3]
  + Assistive Robotics [4]
  + UAV Control [5]
* Research Gaps
  + Environment Robustness
  + Hardware Integration in ML Models
  + Longitudinal Performance Testing

1. **References**

M. Sobhani, A. Smith, M. Giuliani and T. Pipe, "Usability Study of a Novel Triple-arm Mixed-Reality Robot Teleoperation System," 2022 IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR), Sevilla, Spain, 2022, pp. 217-223, doi: 10.1109/SSRR56537.2022.10018630. keywords: {Headphones;Atmospheric measurements;Robot vision systems;Virtual reality;Streaming media;Cameras;Manipulators;Teleoperation;Mixed-Reality;Human-Robot Interaction;Remote presence;System Usability},

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T. -T. Nguyen et al., "A Continuous Real-time Hand Gesture Recognition Method based on Skeleton," 2022 11th International Conference on Control, Automation and Information Sciences (ICCAIS), Hanoi, Vietnam, 2022, pp. 273-278, doi: 10.1109/ICCAIS56082.2022.9990122. keywords: {Automation;Gesture recognition;Feature extraction;Skeleton;Robustness;Real-time systems;Task analysis;hand gesture recognition;skeleton-based hand gesture recognition;continuous hand gesture recognition},

J. Hossain Gourob, S. Raxit and A. Hasan, "A Robotic Hand: Controlled With Vision Based Hand Gesture Recognition System," 2021 International Conference on Automation, Control and Mechatronics for Industry 4.0 (ACMI), Rajshahi, Bangladesh, 2021, pp. 1-4, doi: 10.1109/ACMI53878.2021.9528192. keywords: {Service robots;Robot vision systems;Input devices;Human-robot interaction;Gesture recognition;Assistive robots;Older adults;Human Robot Interaction;Hand Gesture Recognition;Robotic Hand},

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