Gesture Control Robotic Arm

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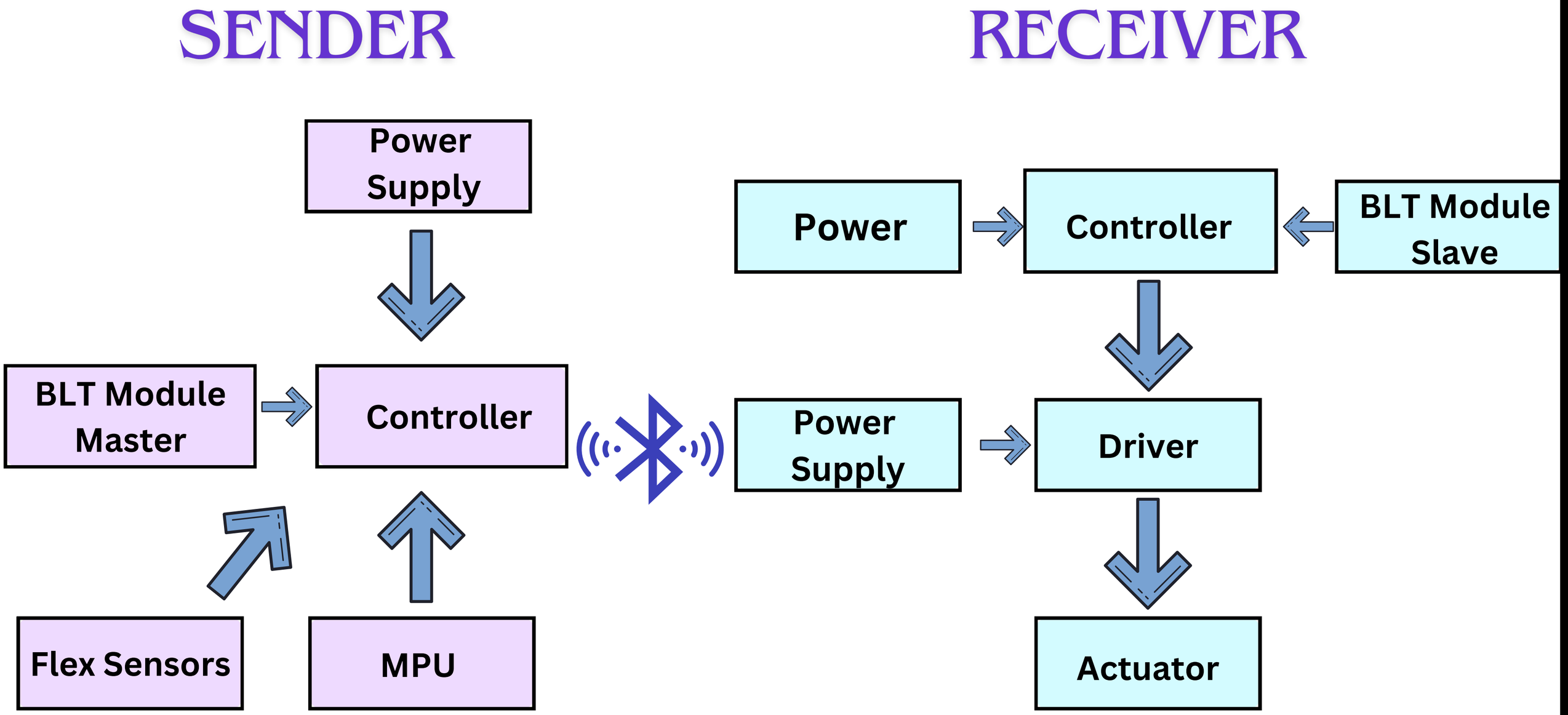
Introduction

1. **Project Overview:** Design and implementation of a 6-DOF robotic arm controlled via intuitive hand gestures.
2. **Control Interface:** Glove-based interface equipped with flex sensors to capture finger movements.
3. **Sensors Used:** The glove integrates flex sensors and an MPU to accurately detect hand gestures and movements for enhanced interaction and control.
4. **Actuators**: Servo Motors for joint control and stepper motor at the base for rotational movement.
5. **Load Capacity:** The robotic arm can handle a load upto 10 kg.

Block Diagram



Litreature Survey

1	Paper/Patent Title or other literature referred	Indexing and Year of Publication/patent No./ISBN No.	Remarks
2.	Gesture-Controlled Robotic Arm	2023 International Conference on Computer Science, Information Technology and Engineering (ICCoSITE)	The project utilizes Arduino Mega, flex sensors, and MPU6050 gyroscope for gesture-based control. Advantages include cost-effectiveness, intuitive user control, precision, and versatile applications with reliable servo-driven movement.
3.	Integration of Home Assistance with a Gesture Controlled Robotic Arm	2020 IEEE Region 10 Symposium (TENSYMP)	The evolution of robotic arms highlights advancements in gesture recognition using Leap Motion sensors, improving control and functionality, particularly for assisting the elderly and disabled in various environments.
4.	Design and Implementation of a Wireless Gesture Controlled Robotic Arm with Vision	International Journal of Computer Applications (0975 – 8887) Volume 79 – No 13, October 2013	This project presents a novel approach to gesture-controlled robotics by employing dual accelerometers, enabling intuitive control, wireless operation, real-time streaming, and simplified programming for diverse applications.

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5.	Gesture-Controlled Robotic Arm Utilizing OpenCV	2021 3rd International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA)	. This survey presents a cost-effective, 3D-printed robotic arm controlled by gesture recognition via computer vision, highlighting efficient design and implementation through Raspberry Pi, OpenCV, and innovative HCI methods.
6.	Efficient and Feasible Gesture Controlled Robotic Arm	2018 Second International Conference on Intelligent Computing and Control Systems (ICICCS)	This paper emphasizes the evolution of robotic arms as advanced alternatives to remote controls, highlighting the integration of computer vision and sensors to enhance efficiency and expand applications across various sectors.

Proposed Method

- **Glove-Based Interface:** Flex sensors capture finger movements and translate them into control signals.
- **Load Capacity:** The robotic arm can lift up to 1 kg, suitable for tasks in automation, healthcare, and manufacturing.
- **User-Friendly Control:** Intuitive control via the glove eliminates the need for traditional controllers.
- **No Machine Learning:** Uses real-time processing for gesture control, providing a simple, cost-effective solution.

Conclusion

This project successfully demonstrates the use of a gesture-controlled 6-DOF robotic arm, offering a practical and user-friendly interface for operating robotic systems. The glove-based control system, powered by flex sensors, enables smooth and responsive operation without the complexity of traditional controllers. With its ability to handle tasks requiring a load capacity of up to 1 kg, the robotic arm shows great potential in industries such as automation, healthcare, and manufacturing. The real-time, non-machine-learning approach highlights the efficiency and cost-effectiveness of the solution, making it a versatile tool for various applications.

References

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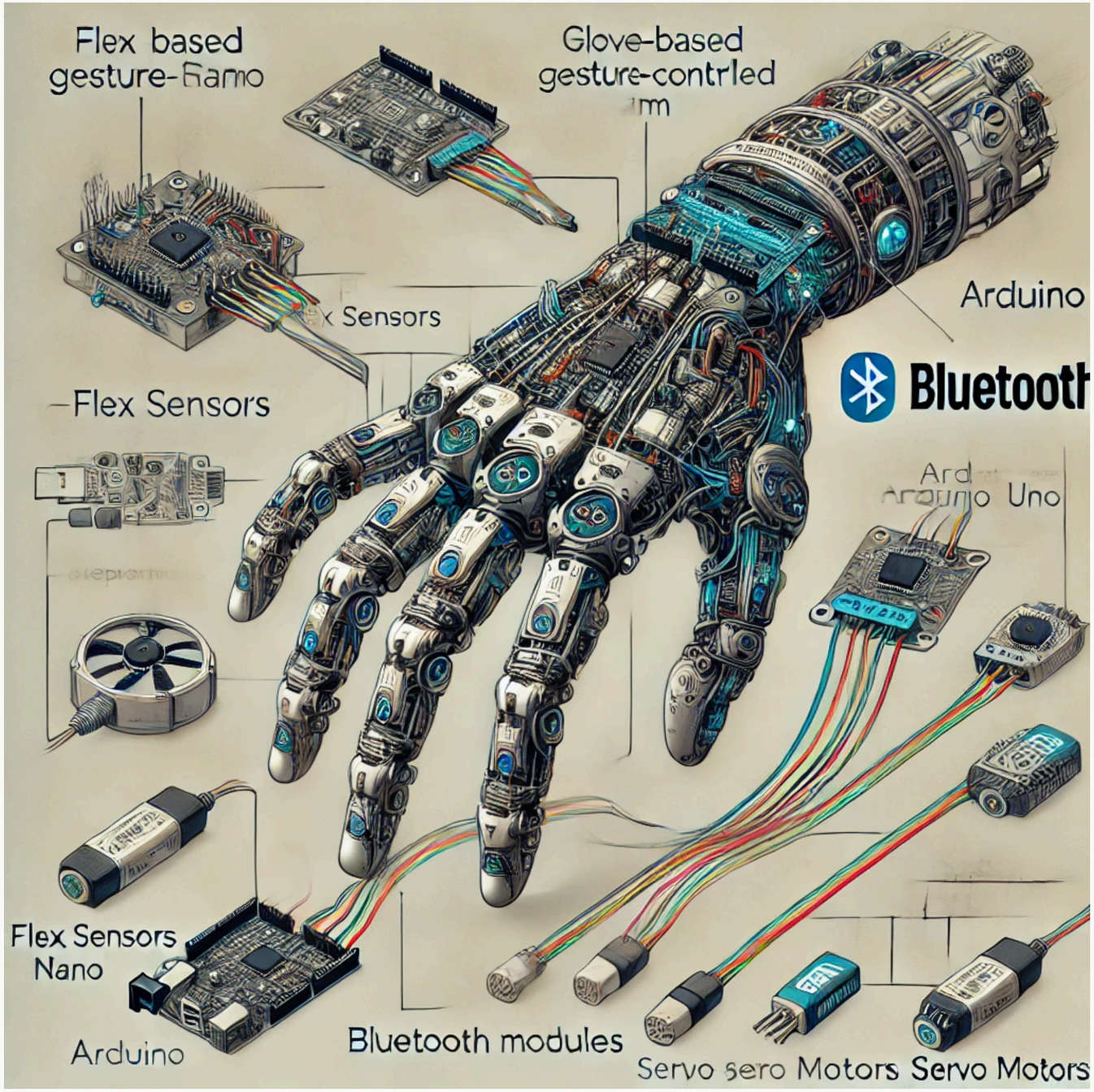
Flex based
gesture-Hamo
Glove-based
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Arduino
Sensors
Flex Sensors
Bluetooth
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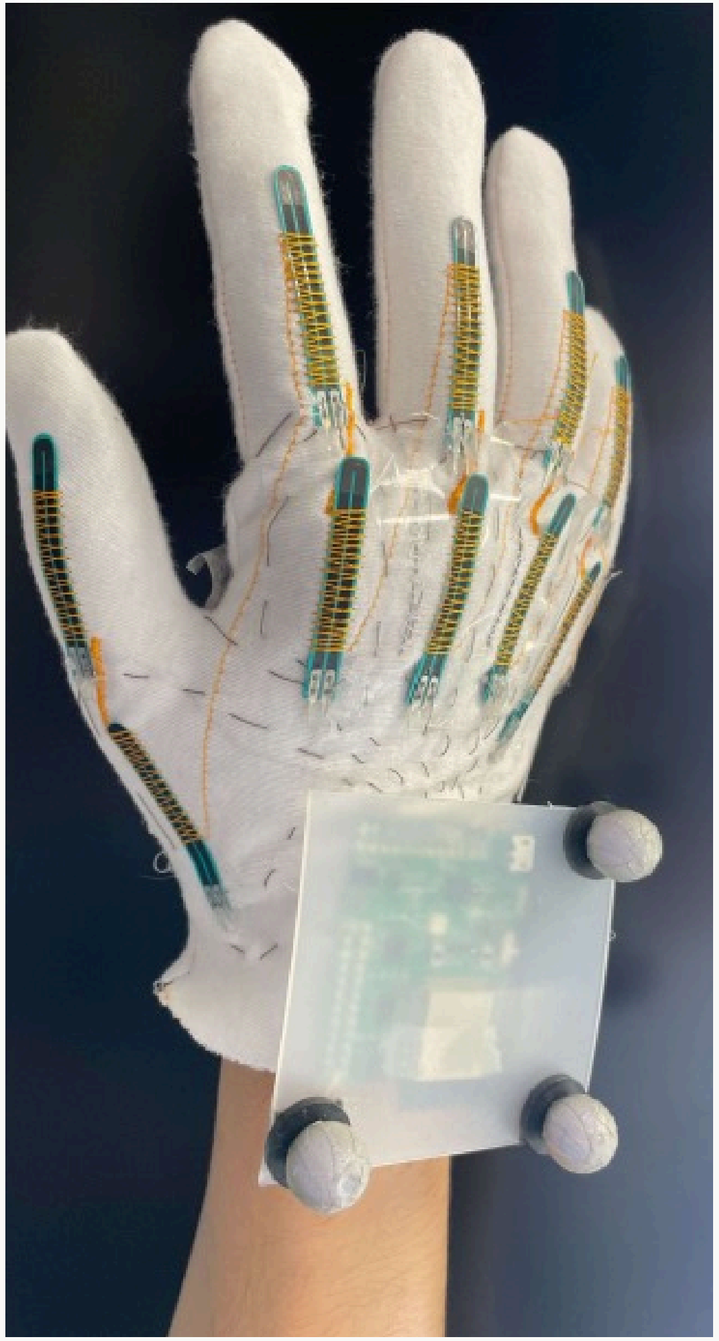
Uno
Flex Sensors
Nano
Arduino
Bluetooth modules
Servo Motors
Servo Motors



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