

Project Abstract (English)

This project presents the design, implementation, and evaluation of a gesture-controlled robotic hand intended to enable intuitive human–machine interaction (HMI) using low-cost and commercially available components. The system integrates wearable sensing, embedded signal processing, wireless communication, and electromechanical actuation.

How it Works:

Sensing: Finger motion is captured using resistive flex sensors mounted on a wearable glove.

Processing: An Arduino Uno microcontroller samples the sensor data through a 10-bit analog-to-digital converter (ADC).

Communication: The digitized data is transmitted wirelessly via HC-05 Bluetooth modules.

Actuation: A receiving microcontroller decodes the data and generates Pulse-Width Modulation (PWM) signals to control servo motors, reproducing the user’s gestures in real time.

Results: The experimental evaluation demonstrated stable operation with an end-to-end latency below 250 ms. The results confirm the feasibility of using simple sensing techniques for effective robotic control, providing a foundation for future applications in assistive robotics and human–robot interaction research.