

## **ABSTRACT**

*The development of prosthetic hands for people with disabilities is still constrained by high costs and complex control systems. This research aims to design a prototype prosthetic hand based on ESP32 microcontroller that is able to imitate basic hand movements such as opening, closing and grasping in real-time. The system uses hall effect linear sensor from gas throttle as input and servo motor as actuator, with wireless communication between ESP32 microcontroller and Arduino via Wi-Fi. The prototype was made from simple materials such as cardboard and ice cream sticks and tested for light activities. Test results show the system is able to respond to motion accurately, such as a throttle value of 1387 RPM produced a servo angle of 45°, and a throttle value of 2997 RPM produced an angle of 180°. The system successfully grasped objects up to 12 cm in diameter, lifted objects with a volume of 500 ml from a height of 50 cm in 120 seconds, and reached a distance of 100 cm in 50 seconds. QoS testing for 19,150 seconds recorded a throughput of 1,737.59 kbps, average delay of 4,572 ms, jitter of 4,571 ms, and packet loss of 0%, proving fast and stable communication. Overall, this prototype proved to be responsive and worth developing as an efficient and affordable IoT-based prosthetic solution.*

**Keywords:** ESP32, IoT, Linear Hall Effect Sensor, Prosthetic Hand, Wireless Communication.