# Research Paper Summaries

## Paper 1: Present and Future Robot Control Development — An Industrial Perspective

\*\*Journal:\*\* Annual Reviews in Control

\*\*Problem or Gap Addressed:\*\* High-cost and complex control systems limit the broader adoption of robotics in various industries.

\*\*Objective:\*\* To improve industrial robot performance, reduce costs, and introduce functionalities like multi-robot control and adaptive systems.

\*\*Focus:\*\* Methods such as model-based control, modular robots, and sensor-based systems for adaptive performance.

\*\*Methodology:\*\* Analysis of existing robot control technologies and proposing future scenarios for industrial applications.

\*\*Components Used:\*\* Model-based controllers, multi-input/output control schemes, and advanced sensors (3D vision, force sensors).

\*\*Disadvantages:\*\* Cost constraints, complexity in programming, and challenges with modular robot installations.

## Paper 2: Economical Modelling and Manufacturing of a Prosthetic Arm

\*\*Journal:\*\* Wireless Personal Communications

\*\*Problem or Gap Addressed:\*\* Prosthetic arms are expensive and inaccessible to many in developing countries.

\*\*Objective:\*\* To develop an affordable robotic prosthetic arm with basic functionalities for amputees.

\*\*Focus:\*\* Utilizing Arduino, Myoware muscle sensors, and servo motors for cost-effective design.

\*\*Methodology:\*\* Integration of PWM control and EMG signals to enable basic hand movements.

\*\*Components Used:\*\* Arduino Uno, Myoware sensors, servo motors, and RF transceivers for wireless control.

\*\*Disadvantages:\*\* Limited to basic functionality and lacks advanced features like sensory feedback.

## Paper 3: A Method to Control Bionic Arm Using Galvanic Skin Response

\*\*Journal:\*\* COMSNETS 2016 - NetHealth Workshop

\*\*Problem or Gap Addressed:\*\* High costs and power consumption hinder the widespread adoption of bionic arms.

\*\*Objective:\*\* To design a low-cost, energy-efficient bionic arm controlled by galvanic skin response (GSR).

\*\*Focus:\*\* Using analog and digital signal processing to interpret GSR signals for controlling actuators.

\*\*Methodology:\*\* Signal acquisition with electrodes, amplification, and digital processing using MSP430 MCU.

\*\*Components Used:\*\* GSR sensors, MSP430 microcontroller, servo motors, and power management circuits.

\*\*Disadvantages:\*\* Limited degrees of freedom and slower response time compared to natural movements.

## Paper 4: 3D Printed Prosthetic Robot Arm with Grasping Detection System for Children

\*\*Journal:\*\* International Journal of Advanced Science, Engineering and Information Technology

\*\*Problem or Gap Addressed:\*\* Lack of affordable and functional prosthetics tailored for children.

\*\*Objective:\*\* To create a 3D-printed prosthetic arm with adaptive grasping capabilities.

\*\*Focus:\*\* Implementing PID control for precise force management and FSR sensors for grasp detection.

\*\*Methodology:\*\* 3D printing with PLA material, integrating Arduino Mega and force-sensitive resistors.

\*\*Components Used:\*\* Arduino Mega, FSR sensors, servo motors, and LiPo batteries.

\*\*Disadvantages:\*\* Limited feedback system and reduced motor efficiency.

## Paper 5: Development of Prosthetic Arm Using Body Actioned SEMG Signals

\*\*Journal:\*\* Journal of Innovative Optical Health Sciences

\*\*Problem or Gap Addressed:\*\* Challenges in achieving intuitive and reliable control for prosthetic arms using SEMG signals.

\*\*Objective:\*\* To design a prosthetic arm that uses SEMG signals for natural and proportional control.

\*\*Focus:\*\* Employing differential amplification and signal filtering for accurate muscle signal processing.

\*\*Methodology:\*\* Electrode-based SEMG signal acquisition, amplification, and microcontroller-based control.

\*\*Components Used:\*\* SEMG electrodes, microcontrollers, DC motors, and relay switching systems.

\*\*Disadvantages:\*\* Limited to basic movements and susceptible to noise interference.