

# AI-Powered Prosthetics: Enhancing Robotic Arm Functionality

Explore how AI integrates with sensors in robotic arms.  
Transforming lives with advanced prosthetic technology.



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# The Need for Advanced Prosthetic Control

## Traditional Limitations

High cognitive load and unnatural movements hinder users.

## User Challenges

Many abandon prosthetics due to difficulty and discomfort.

## Abandonment Rates

30-50% of users stop using their prosthetic limbs.

# Robotic Arm Sensors: The Foundation of AI Integration

## EMG Sensors

Detect muscle activity with 85-95% accuracy.

## Force Sensors

Measure grip strength and pressure like human touch.

## IMUs

Track position and orientation for spatial awareness.



# AI Algorithms for Prosthetic Control

1

## Supervised Learning

Trains AI with labeled muscle signals and movements.

2

## Reinforcement Learning

Optimizes tasks through trial and error adaptation.

3

## Deep Learning

Uses CNNs and RNNs to recognize complex patterns.

# Benefits of AI-Powered Prosthetic Arms







# Challenges and Future Directions

## Data Acquisition

Need large datasets for robust AI training.

## Ethical Issues

Privacy, security, and fairness concerns.

## Emerging Tech

Brain-computer interfaces and haptic feedback.

## AR Integration

Enhances perception for better prosthetic use.

# Case Studies and Examples

## DEKA Arm

Advanced myoelectric control, 10 degrees of freedom, DARPA funded.

## Hero Arm

Affordable, 3D-printed, customizable with themed designs.

## Research

AI predicts user intent and restores sensory feedback.

# Conclusion: The Future of Prosthetics is Intelligent

## AI Revolution

Transforming prosthetics with natural movement and sensation.

## Ongoing R&D

Driving more intuitive and advanced prosthetic solutions.

## Call to Action

Support AI-powered prosthetic research for amputee well-being.

