

An aerial photograph of a winding asphalt road that curves through a dense, green forest. The road is light gray and contrasts with the dark green trees. The forest covers a hillside, and the road disappears into the trees in the distance. A semi-transparent brown rectangle is overlaid on the left side of the image, containing the title and names.

Robotic Arm with Computer Vision

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TABLE OF CONTENTS

01

ABOUT THE PROJECT

Concept, Potential Applications,
Why it's Different

02

MAJOR REQUIREMENTS

Key features and requirements

03

END USERS AND MAINTENANCE

Assistive applications, replaceable
parts, and software support

04

WHY THIS PROJECT

Why we chose to pursue this
topic

05

CONCLUSION

Our goal, why it works, and end
result

Project Overview



CONCEPT

- Robotic arm controlled by computer vision
- Uses Raspberry Pi + servo motors to drive the arm
- Camera to guide the arm

POTENTIAL USE CASES

- Sort recyclables from trash
- Assist users with feeding
- Organize items on a desk

WHY IT'S DIFFERENT

- Affordable
 - Low-cost hardware
- Educational
 - Integrating software, hardware, and computer vision



Major Requirements

Key Features

- Object/face recognition (OpenCV, TensorFlow)
- Inverse kinematics for precise arm movement (NumPy)
- Python GPIO control with Raspberry Pi
- Modular design for multiple tasks

Hardware Requirements

- Raspberry Pi
- Servo motors
- Webcam
- 3D-printed Parts (CAD + EDC access)

Software Requirements

- Python
- NumPy
- OpenCV / TensorFlow
- GPIO libraries

END USERS & MAINTENANCE


End Users

- Students and Educators
- Makers and Hobbyists
- Assistive/experimental Applications

Maintenance

- Modular, replaceable parts
- Open-source software support

WHY THIS PROJECT FITS

- 
- Builds on prior learning (AI, OS, Algorithms)
 - Multidisciplinary -> software + hardware integration
 - Challenging but feasible
 - Flexible scope
 - Interesting for us, classmates, and instructor

CONCLUSION

Our Goal:

Robotic arm with vision ->
affordable, versatile,
innovative

Why it works:

Right difficulty, right
scope, right interest

End Result:

Hands-on experience +
real-world impact

A photograph of the Manhattan Bridge, showing its steel structure and suspension cables. The bridge spans a body of water, with city buildings visible on the right side. A semi-transparent, light brown rectangular overlay is centered over the bridge, containing the word "QUESTIONS?" in white, bold, sans-serif capital letters. The background image is in a muted, sepia-like color palette.

QUESTIONS?