Robotic Arm with Computer Vision

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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

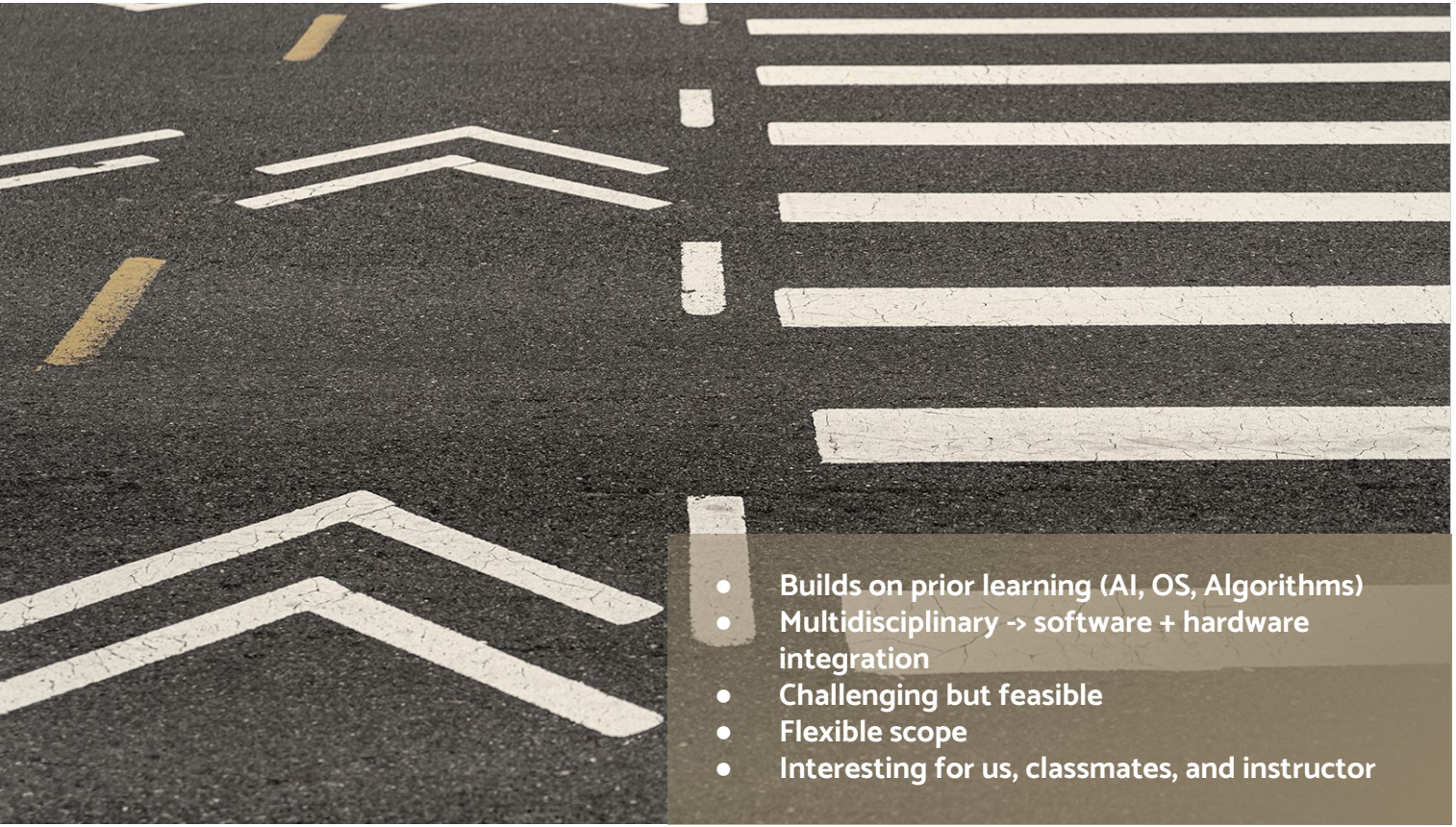
End Users

- 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


QUESTIONS?