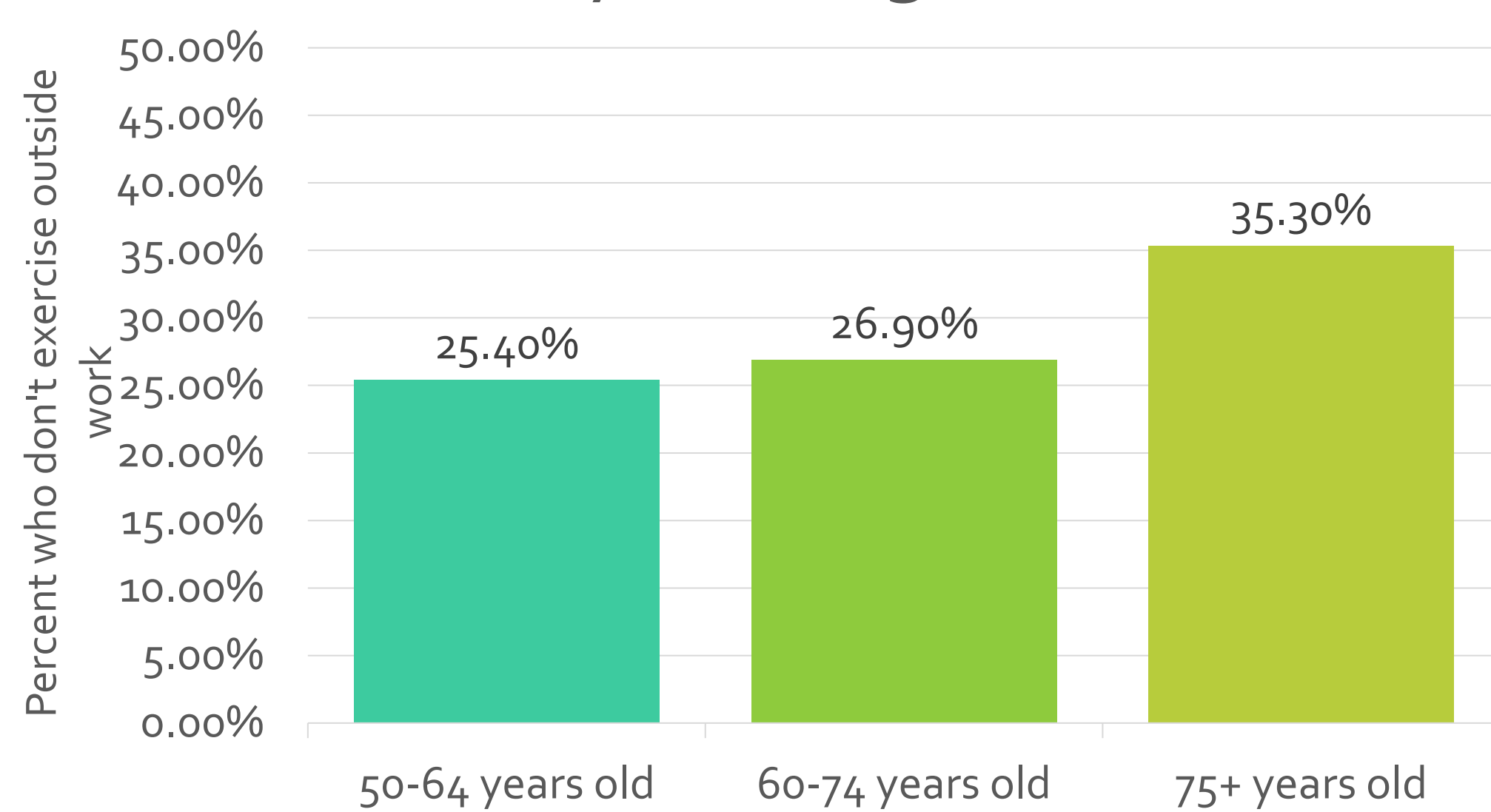# MoveSmart: AI-driven Imaging Turns Motion into Better Health

Team members: Allison T. Li
Mentors: Xiangshang Li and Xiaohui Yuan
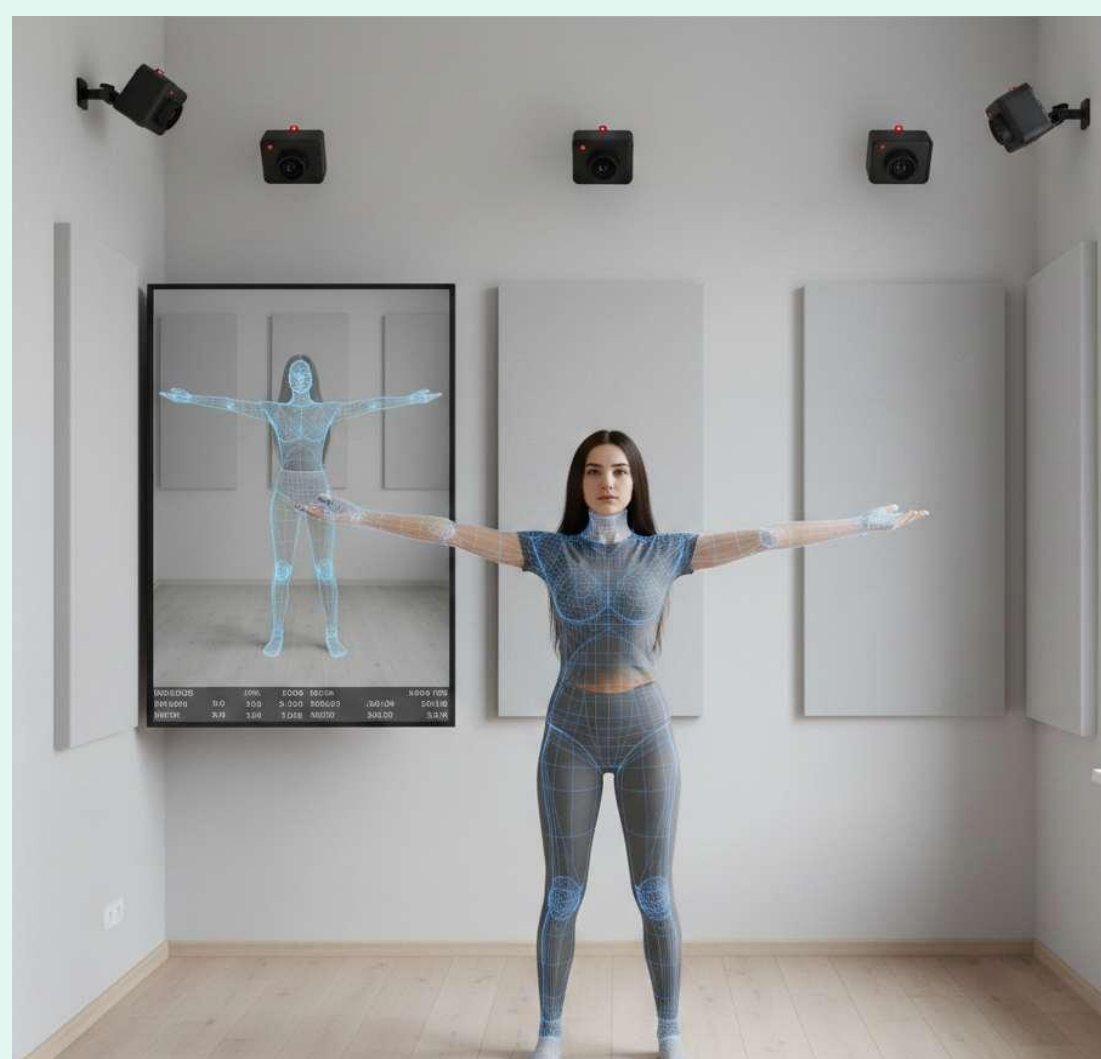**School: Pearland Dawson High School, Pearland, Texas**

Community Problem and Significance

- Many people, old or young, do not engage in enough physical activity
  - brings poor fitness and health issues
  - different age groups have different causes
- An adequate amount of physical activity for these individuals should improve their health
- The activities should also be done properly and efficiently

Inactivity Among Adults[1]

Bar chart — Percent who don't exercise outside work:
- 50-64 years old: 25.40%
- 60-74 years old: 26.90%
- 75+ years old: 35.30%

AI Solutions

An AI-enabled computer system can automatically detect and track body joints and movement patterns from data captured by cameras or sensors

- Customize exercise routines
- Guide exercises to help users perform activities correctly
- Provide objective assessment – help various related people (caregivers, family members, healthcare professionals) understand and better care for the individuals

Technical Development

- Computer vision-based human movement tracking
- Cameras, range sensors, and/or wearables collect data
- Algorithms detect person
- Key points track joints
- Point cloud registration is a cloud of points like a "mesh."
- Interpret agility, strength, and balance from footage
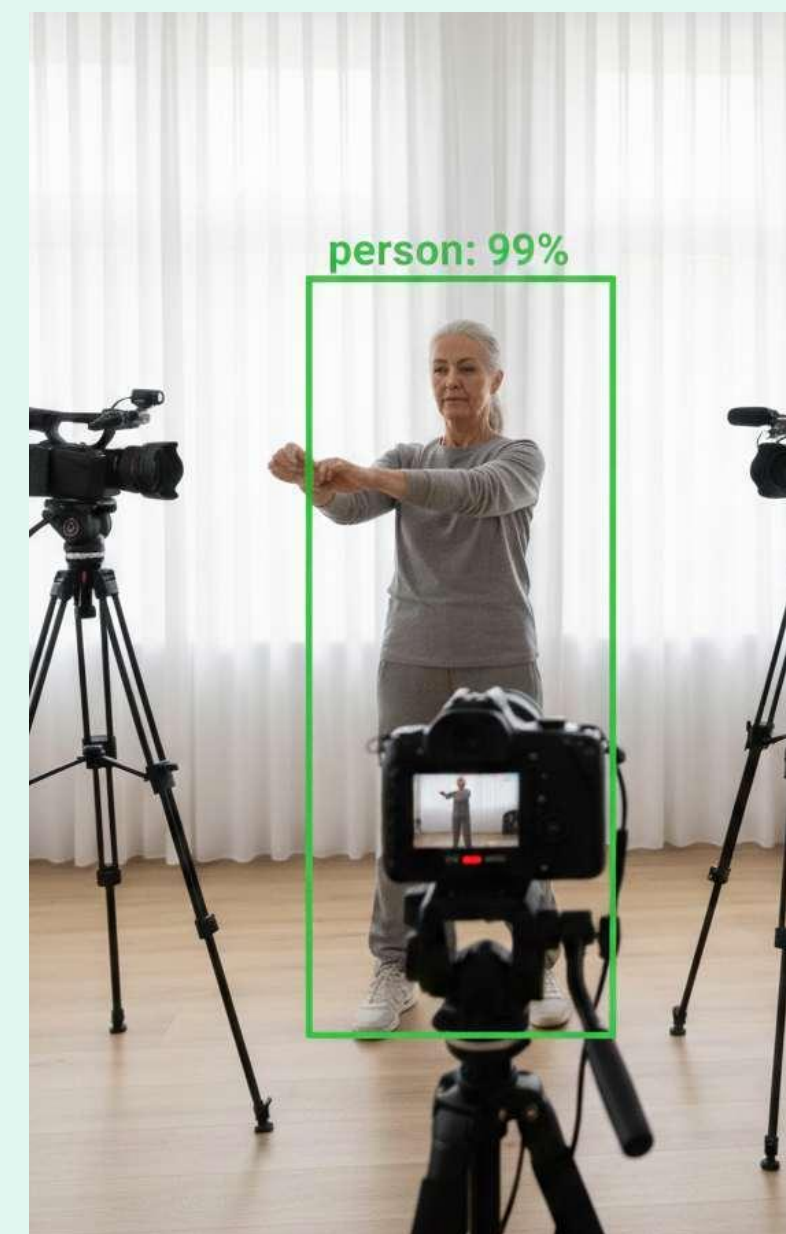- Real-time feedback

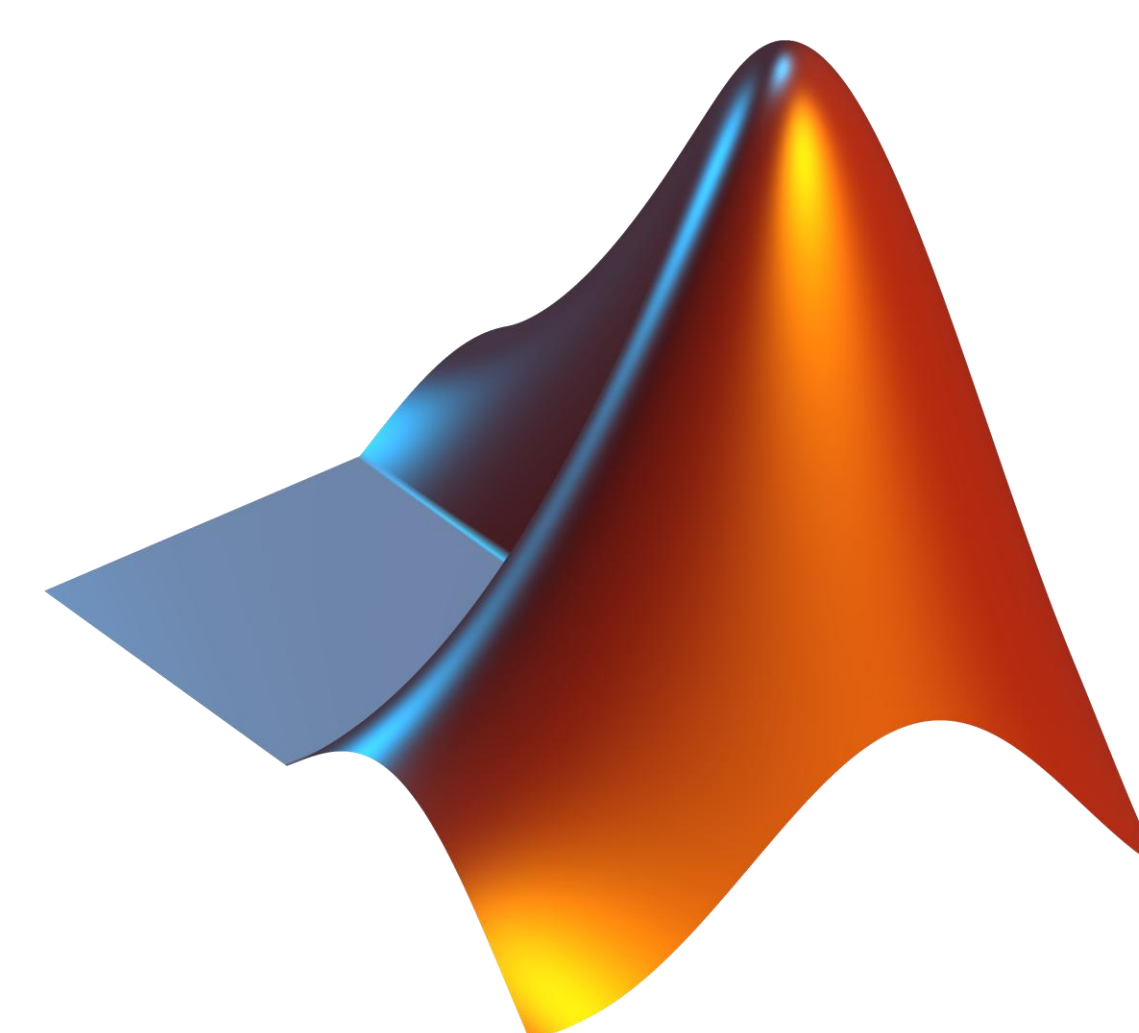Acquire Camera Data → Read Data → Object Detection → Keypoints Extraction → Point Cloud Registration

Technical Challenges and Solutions

- Matlab (Matrix Laboratory) – programming platform for data analysis and algorithm development
- Computer Vision, Deep Learning, Sensor Fusion, and Tracking Toolboxes
  1. VideoReader for reading camera data
  2. HRNet (High-Resolution Net) for object detection and keypoint extraction
  3. Coherent Point Drift (CPD) for point cloud registration

1. Watson KB, Carlson SA, Gunn JP, et al. Physical Inactivity Among Adults Aged 50 Years and Older