# I1.01 Applied Time Study Techniques: MOST-Based Video Analysis of Assembly Operations

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## Problem Statement

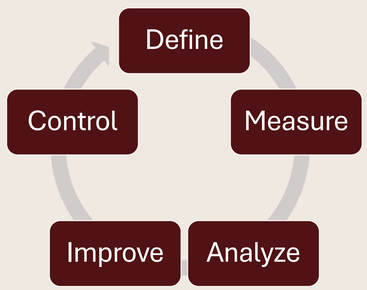
To bridge the gap between classic and modern time study techniques, this project aims to:

- **Integrate classical** time and motion study techniques with **modern** digital video-based tools
- **Compare** accuracy, reproducibility, and practical application in analyzing assembly tasks.
- **Identify** process **inefficiencies**, **reduce** sources of **error**, and **equip future engineers** with the skills to apply time study methods effectively in real-world settings.

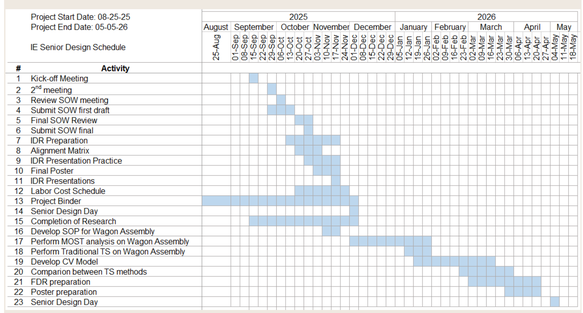
## Objectives

- Critique AI Performance within Time Studies
- Benchmark Traditional Time Study Methods and Provide Comparison Matrix
- Design and Pilot a Teachable Training Module for Time Studies
- Understand AI Model Methodologies in Time Studies

## Problem Solving Approach




## Milestones




## Time Study and Artificial Intelligence Research

| Metric | Stopwatch Method | MOST Analysis | Computer Vision |
|---|---|---|---|
| **Accuracy** | Fair, Depends on observer skill; prone to bias | Good, standardized motion codes | Very Good, 90-98% accuracy in published research |
| **Speed** | Slow (manual timing) | Moderate | Fast, Can be done passively |
| **Cost (Setup and Labor)** | Low setup, High labor | Good, moderate setup, High analyst labor | High setup, Low ongoing labor |
| Training Required | Low | Medium | High setup, Low day to day use |
| Interference | High (Observer Present) | Low | Very Low (passive cameras) |
| Data Richness | Basic cycle time | Motion Sequence Breakdown | Full motion path and Human Factor Elements |
| **Objectivity and Repeatability** | Low, observer bias and inconsistent timing | High, standardized, repeatable coding | Very high, algorithmic consistency, unbiased |
| Real-Time Feedback | None | None | Yes (dashboards and alerts) |
| Privacy | Very Low Risk | Low | Medium/High (camera-based monitoring) |
| Best For: | Simple repetitive timing | Structured, repetitive operations | Complex tasks, ergonomics, automation analysis |
| **Limitations** | Hawthorne effect, Human error and fatigue | Limited motion categories, training time | Lighting, camera placement, ethics, dataset needs |

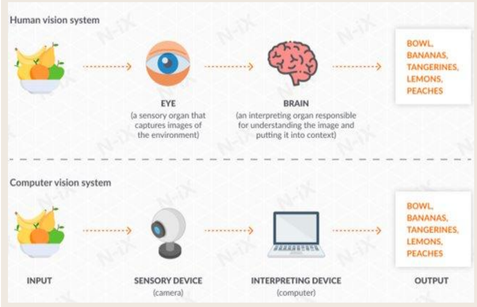



*Figure 1: Human Vision vs. Computer Vision*

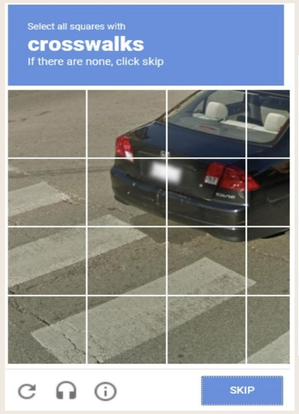
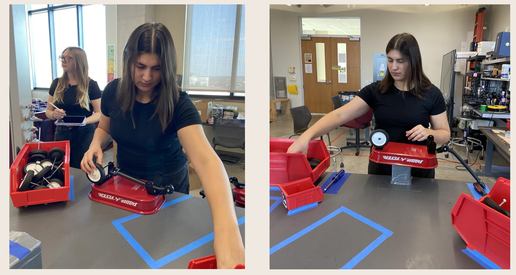



*Figure 2: Example of CAPTCHA*


*Figure 3: Computer Vision Element Breakdown*

## Human Factors

**Traditional Operation** **AI Assisted Operation**



- Human Observation
- AI-Based Time Motion Capture
- Ergonomic Analysis
- Real Time Guidance

## Implementation Phase

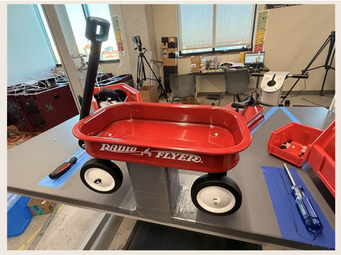



*Figure 4: Wagon for Disassembly*

The implementation phase will involve testing traditional and computer vision time study methods on the disassembly of a wagon.

## Team Members

**Tyler Haug** Team Member
**Kenya Frias Rodriguez** Team Member
**Jade Ong** Team Member
**Claire Pauwels** Project Manager

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