

# 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 realworld settings.

## Objectives



Critique Al Performance within Time Studies



Benchmark Traditional Time Study Methods and Provide Comparison Matrix

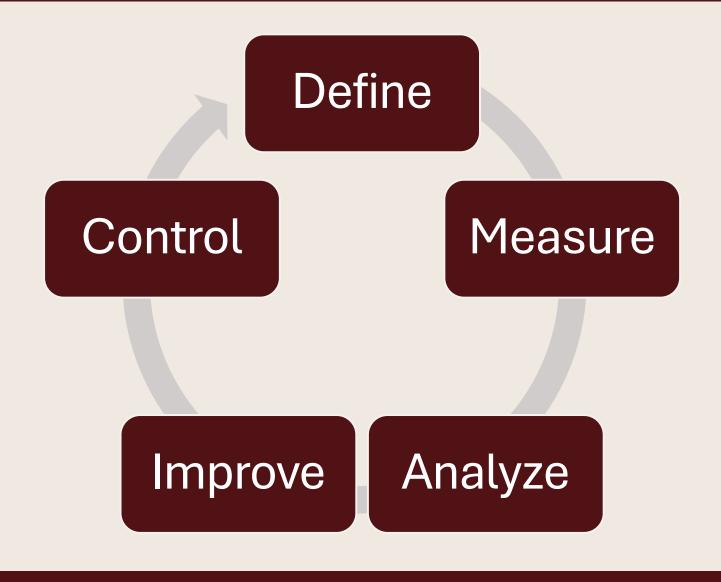


Design and Pilot a Teachable Training Module for Time Studies



Understand Al Model Methodologies in Time Studies

# Problem Solving Approach

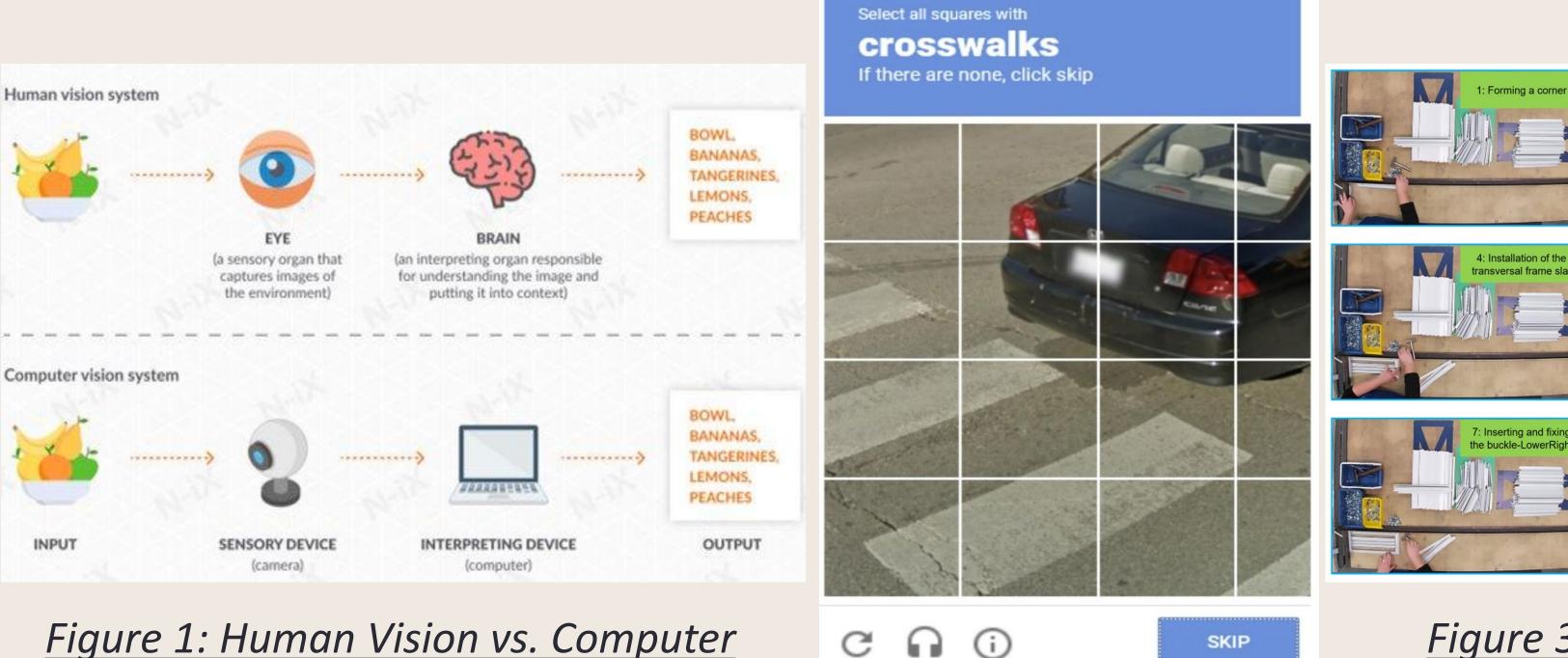


#### Milestones

	Project Start Date: 08-25-25						202	25																202	26						
	Project End Date: 05-05-26	August						oer										ary			rua				arch			Apı			Мау
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#	Activity																														
1	Kick-off Meeting																														
2	2 <sup>nd</sup> meeting																														
3	Review SOW meeting																														
4	Submit SOW first draft																														
5	Final SOW Review																														
6	Submit SOW final																														
7	IDR Preparation																														
8	Alignment Matrix																										Ш				
9	IDR Presentation Practice																										Ш				
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11	IDR Presentations																_	$\perp$	$\perp$	$\perp$					$\perp$	$\perp$	Ш	Ш	_	$\perp$	$\perp \perp$
12	Labor Cost Schedule																_	$\perp$	$\perp$	$\perp$					$\perp$	$\perp$	Ш	Ш	_	$\perp$	$\perp \perp$
13	Project Binder																_	$\perp$	$\perp$	$\perp$					$\perp$	$\perp$	Ш	Ш		$\perp$	$\perp \perp$
14	Senior Design Day																		_	1					$\perp$	$\perp$	Ш	Ш	_	$\perp$	$\perp$
15	Completion of Research																		_	_					$\perp$	_	$\sqcup$	Ш	_	_	$\perp \perp$
16	Develop SOP for Wagon Assembly						_													_	_				$\perp$	_	Ш	Ш	_	_	$\perp \perp \perp$
17	Perform MOST analysis on Wagon Assembly						_		_	_	_							4		_	_				$\perp$	_	Ш	Ш	_	_	$\perp \perp \perp$
18	Perform Traditional TS on Wagon Assembly						_		_	_	_			_	_			4							_	_	Ш	Н	_	$\perp$	$\perp \perp \perp$
19	Develop CV Model						_		_	_	_			_	-												Ш	Ш	_	_	$\perp$
20	Comparion between TS methods						_		_	_	_			_	_		_	_	+	-	-				4	4			_	_	$\perp$
21	FDR preparation						_		_	_							_	_	+	-	_				4	4		Ш	4	_	$\perp$
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# 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				



Vision



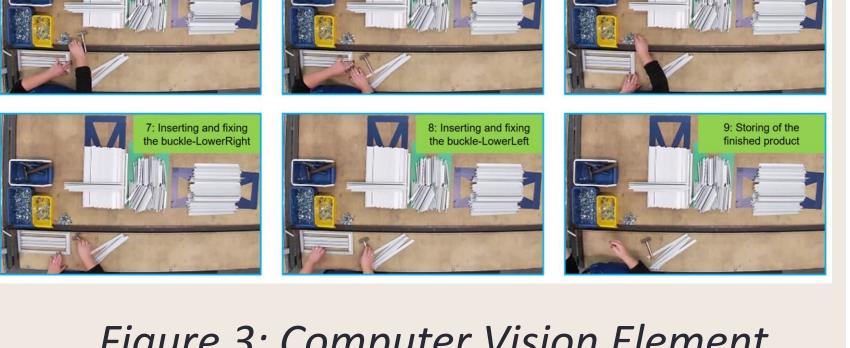
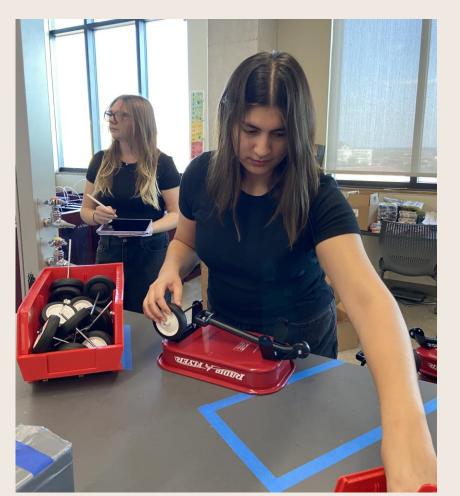
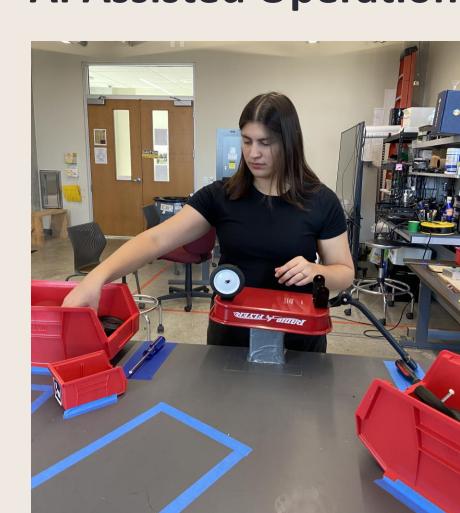


Figure 3: Computer Vision Element Breakdown

### Human Factors

#### **Traditional Operation Al Assisted Operation**





- Human Observation
- Al-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



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**Claire Pauwels** Team Member Project Manager

### Acknowledgements

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