Project Brief: AI Lab Capstone – Summary of Context, Insights, and Direction

1. Project Context

This project is part of a university-level **AI laboratory course** involving **Natural Language Processing (NLP)** and/or **Computer Vision (CV)**. Students are expected to design and implement an AI-driven solution that addresses a **non-trivial problem**, ideally one that would be difficult or inefficient to solve using classical programming methods.

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2. Instructor Expectations (Inferred from Past Projects & Feedback)

- The specific topic is **flexible**: the key requirement is to demonstrate **AI being used to solve a real-world problem**.
- The **solution does not need to involve both NLP and CV**. You can choose either or combine them based on what suits your idea best.
- **Evaluation criteria** focus on:
    - The **difficulty and relevance** of the problem.
    - **Effectiveness of the AI solution**.
    - Clear **documentation** of:
        - What made the problem complex.
        - Challenges faced during development.
        - Design decisions, experiments, and outcomes.
- **Using public datasets is acceptable**; collecting your own data is optional.
- Creating or fine-tuning a **custom model** is strongly encouraged (not just using off-the-shelf tools without modification) but not necessary.

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3. Examples of Notable Senior Projects

These past projects received high marks (some with full scores or honors), and provide insight into the type and scope of successful work:

Project	Area(s)	Description	Notable Aspects
Pokémon Image Generator	Computer Vision / Generative Models	Used a custom generative model to create Pokémon-style images.	Creative use of generative AI, though resource-intensive.
Autonomous Drone Navigation	Computer Vision + Robotics	Used a programmable drone to follow defined paths.	Technically impressive but hardware-dependent.
Gun-mounted Object Detection	Real-time CV	A CV system mounted on a gun guiding aim direction.	Complex real-time feedback, but hardware-based.
Infrared Image Upscaling	CV + Deep Learning	Used two models to enhance infrared image quality.	Demonstrated practical value and strong execution; received top score.
Twitch Chat Moderation	NLP + Real-Time Systems	Automated filtering of abusive messages in live Twitch chat using NLP.	Highly relevant real-world use case; solid example of NLP for social platforms.
U.S. Civil Code Semantic Analysis	NLP / Legal AI	Built a system to analyze and extract structure from U.S. legal code documents.	Received **30 cum laude**; exemplary use of NLP in a domain-specific setting.

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4. Constraints and Considerations

The project must be scoped realistically to ensure completion within the available time and resources. Key constraints include:

Constraint	Description
No hardware	Projects requiring external hardware (e.g., drones, sensors, smart cameras) are excluded due to budget constraints.
Limited timeframe	The project must be completed in **under one month**.
Teammate experience	Team members are still building familiarity with essential tools and workflows. Simplicity in setup and collaboration is key.
Standout portfolio value	The project should be unique, impressive, and suitable to showcase in a **resume or portfolio**.
Avoid common ideas	Overused topics (e.g., emotion detection, sign language translation) should be avoided in favor of fresh, impactful problems.

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5. Project Objectives

The ideal project should:

- Tackle a **meaningful and moderately challenging problem**.
- Use **AI (NLP, CV, or both)** in a thoughtful and non-trivial way.
- Be achievable **without requiring extensive compute resources or hardware**.
- Include proper **documentation** of the development journey, including:
    - The initial challenge
    - AI modeling choices
    - Experimentation and evaluation
    - Final results and analysis
- Be **original and practical**, offering real-world relevance, creative application, or both.
