

Term Project

Objective:

- Apply concepts of image processing learned in lectures and lab to a real-life problem.

Project description

This project aims to develop your own vision system. The developed system should act on images/videos, process them and report its decision using an appropriate mean (visual, audio, control). Students are encouraged and will be rewarded for submitting their own innovative ideas. Examples of such systems are:

1. **Gate access controller:** A gate is open for specific cars based on their plate number.
2. **Biometric-based office access controller:** The system grants access to specific persons based on their faces, ears, iris, or fingerprint.
3. **Surveillance system:** The system recognizes certain objects or persons' existence or disappearing and acts accordingly.
4. **Face & Hand Applications:** Face Recognition, Face Overlay (Cartoonization), Hand Gestures (Calculator, Controlling game, etc.), Detecting Sleeping Eye and Emotions Detection.
5. **Interaction with visual actions:** [For example: Playing drums by hands](Advanced)
6. Any other real-life problem.

Deadlines

Project proposals delivery(phase1) Online	5/Nov/2022
Final project delivery(phase2) Online	17/Dec/2022

Team members: 4

Deliverables

Deliverable	Due to	Description
Project proposal	Phase1 – hard copy	<p>The proposal should contain the following:</p> <ul style="list-style-type: none"> • Team members • The project idea and need. • Informative Block diagram of the project (i.e., block names, inputs, outputs, and methods) • Any needed non-primitive functions (indicate which will be implemented from scratch). • Any additional comments. • Scientific paper(s) as references
Project code	Phase 2 - Online	The code of your project
Project report	Phase 2 – Online	<p>The project report should contain the contents of the project proposal in addition to the following:</p> <ul style="list-style-type: none"> • Used algorithms • Experiment results and analysis • Performance & accuracy (refer to experiment results section below) • Conclusion and references. • Work division between team members. • Any additional comments
Experiment results	Phase 2 – Online –inside the project report	<ul style="list-style-type: none"> • Level of variety for test cases used in experimental results. • Choice of comparison metric: accuracy, recall and/or etc. • Complete analysis for the system elaborating points of strengths and weakness. Showing the weakness of your



system doesn't mean that the system is not good. It means that you conducted good experiments with logical interpretations of the results.

Test cases	Phase 2 – Online	You have to include a wide range of test cases related to your project, including working and failed test cases.
Read me file	Phase 2 – Online	Contains directions on how to operate your project and needed libraries, if any.

Grading criteria

Quality of Deliverables (10%)

Experimental Results (20%)

performance (5%)

Project blocks (60%)

Code modularity, readability, and style (5%)

Bonus (10%)

- Fancy GUI.
- The complexity of the idea (TA should declare it at the idea proposal).
- Converting the idea to a complete application and should be real-time if applicable
- Unique features at delivery time.
- High Speed-up performance.

Individual Work

Each individual is given a percentage of team grade based on their work.

Notes

General:

- Having an integrated pipeline that works well enough is better than having independent modules that work perfectly on their own but are not integrated. You can build your whole pipeline using ready-made functions to make sure everything is working, then you can start replacing them with your own code to make troubleshooting easier.
- Start working as early as possible. Don't expect everything to work from the first time. Image processing includes a lot of trial and error.
- The project is a 4-persons based project. If your project is smaller than intended, you will be penalized.
- Results of similar projects will be compared, and the comparison may affect the grade.
- Any cheating is penalized by 0 in the project and -10 in the other work grades.
- You are recommended to use a Private repository (For example, Github or Gitlab) to provide:
 - Work time management.
 - Backup, in case the project didn't work eventually.
- The discussion date for phase one will be announced to you later.
- The specific method for online delivery will be determined later.

Usage of Open-Source Code or Library Functions:

- Clear permission should be taken from a TA before using any implemented function or open-source code except primitive functions.
- If the TA allowed the usage of any open-source code, attribution should be written in the report and inside the code itself.
- The allowance of open source code will be decided based on the project complexity and its relevance to image processing course objectives.
- Any violation of these rules will be considered cheating.

Usage Deep Learning Techniques:

- You are **NOT Permitted** to use any deep learning approaches in your project since the aim is to apply the studied image processing techniques to real-life problems.

Performance Testing:

- TAs should be able to test the project with samples gathered during the discussion. If that is not possible, the team should take approval from the TA on the test samples (to make sure it's general enough).
- Corner cases should be handled as much as possible. The accepted level should be discussed with the responsible TA.
- Reasonable performance is a must; however, high speed up (using GPU, parallel execution, and so on) is a plus [For high speed up, a bonus will be given].