# Final Project

Due by December 17th

- Carefully read the problem set and instructions. Select one of the problems below as a team (teams are arranged in page 4).

- Request dataset (or supporting materials) if you chose Problem set 2 or 3. (email request robinekim@snu.ac.kr)

- Submit a full report on the problem set your team chose

- In any of the problem set, submit your codes as well

- No direct use of chat-gpt, git-hub codes are allowed.

Problem 1. – Crack detection and segmentation

- Download crack images from AI-hub (aihub.or.kr). Four example images are shown below.

- Develop a pre-processing algorithm that filters noises such that your code can **well** detect cracks.

- In your report, include discussions about the **filtering algorithm**, **chosen parameters, segmentation,** and **quantitative assessment** on your detecting algorithm performance.

- Your code should be tested for at least 30 images

  - Evaluate your detection/segmentation

- Optional: Compare your results with AI model uploaded in the database

  - You can alternatively develop your own machine learning model, but your report should discuss about pre-processing and detailed algorithm regarding (Reusing ai-hub model will not be considered)
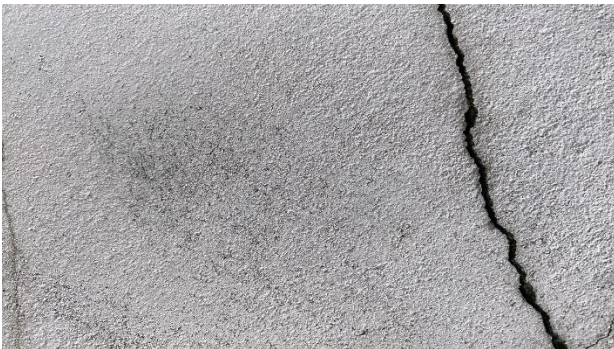
대분류 (재질)	소분류 (결합형태)	이미지(장)	구축 수량
콘크리트	콘크리트 균열 (크랙, 금 등)	- 대상 : 교량, 댐, 옹벽, 건물 - 방법 : 직접촬영, 기확보 활용	170,000 건
	박리 (표면 들뜸, 깨짐, 떨어짐 등)	- 대상 : 교량, 댐, 옹벽, 건물 - 방법 : 직접촬영, 기확보 활용	61,000 건
	백태/누수 (흰색 흔적, 물 자국 등)	- 대상 : 교량, 댐, 옹벽, 건물 - 방법 : 직접촬영, 가확보 활용	80,000 건
	철근 노출 (녹슨 철근 등)	- 대상 : 교량, 댐, 옹벽, 건물 - 방법 : 직접촬영, 가확보 활용	34,000 건

https://aihub.or.kr/aihubdata/data/view.do?currMenu=115&topMenu=100&aihubDataSe=realm&dataSetSn=162

Problem 2. - Hough Transform

- Request glass-beads images (note that files are prohibited from using for other purpose than this project)
    - Sample of images are shown below
- Develop an algorithm that detects beads on the road marking.
    - Your algorithm should include preprocessing of the image to handle different colors of the marking
- Evaluate the performance of the algorithm for at least 5 images (discuss using confusion matrix etc.)
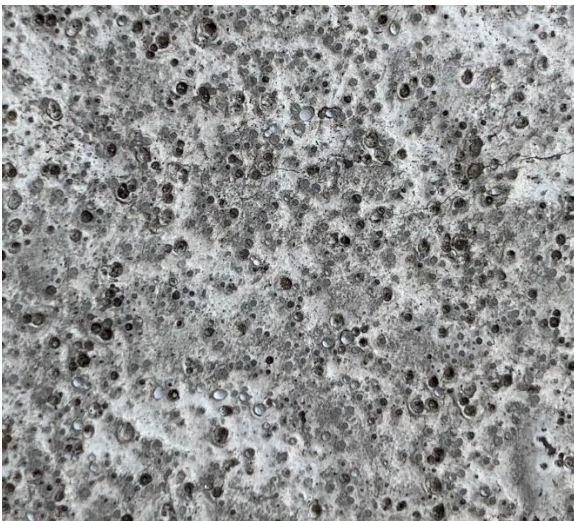
Problem 3. – Tracking [Codes shared from IC-SHM2022]

Perform two-dimensional tracking for simulated response of the structure; Use undamaged video. Assume that the structure plane is parallel to the image plane and the video is taken in 120 fps.

- Choose at least four nodes of the truss structure. Refer to the Node id are shown in the figure below:

- Plot vertical displacement of the nodes in terms of pixels.

- Apply the developed tracking algorithm to a damaged vides

- Evaluate the pixel displacement and evaluate any difference noticed

- Optional1: change pixel unit into SI unit knowing that the one bay is 0.3937 m (i.e. the length of the horizontal member)

- Optional2: Compare your results with ground truth.
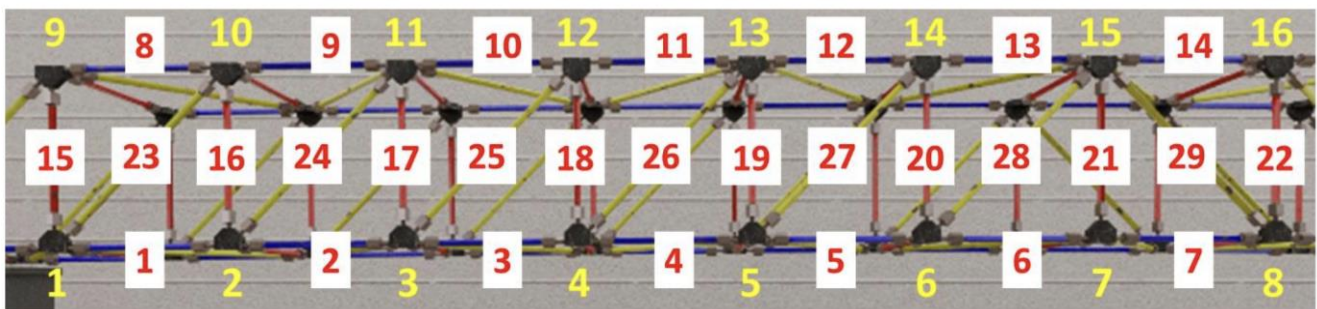
Groups

	Student ID	Name	Group
1	2021-27091	박시형	Group 2
2	2022-20210	우윤철	Group 5
3	2022-21368	송태용	Group 4
4	2022-22067	이상원	Group 6
5	2022-28438	허선영	Group 1
6	2022-32002	박철홍	Group 4
7	2022-39575	조형곤	Group 2
8	2023-20207	이관우	Group 6
9	2023-22498	정동	Group 1
10	2023-22785	유병희	Group 4
11	2023-26075	권상오	Group 5
12	2023-26789	김찬규	Group 6
13	2023-27334	김의현	Group 1
14	2023-29158	이은성	Group 3
15	2023-31531	박성용	Group 3
16	2023-31696	김진홍	Group 5
17	2023-35893	노주연	Group 3
18	2023-36854	김승현	Group 6
19	2023-72161	이상빈	Group 2