

## Final Project

### 1 Introduction:

The purpose of the term project is to practice embedded application development. There are various I/O interfaces on the E9V3 board, you need to use some of these interfaces to develop an application. The basic requirement is to get input, process it, and generate an output that may be used for a certain predefined purpose. For example, taking a video signal, processing it, and do something based on the processed result. Due to the quick advance in both processor performance and signal processing algorithms, pattern recognition, or more specifically, face recognition technology becomes matured and popular, and we could easily find it being used in some security applications such as passport control in the airport. In this project, you need to implement a system that performs the face recognition task.

### 2 Requirements:

- 2.1 Take a video input from the video camera which is connected to the board, so the video can be displayed on the monitor (HDMI or LCD is both fine).
- 2.2 Detect a human face, which can be done by using public domain algorithms.
- 2.3 Extract features from the detected human face, it can also be done by using public domain algorithms.
- 2.4 Based on the detected features, try to design an algorithm that can identify an individual, such as yourself. The algorithm has to extract certain features which can be processed for identification purpose. The processed result should be stored as the individual record so that it can be used later to identify that person.
- 2.5 Design an algorithm capable of detecting whether a person is wearing a mask. This functionality can be implemented using existing public domain algorithms.

### 3 Grading Criteria:

- 3.1 Real-time Facial Recognition (45%)
  - 3.1.1 Detect three people simultaneously using the camera: two group members and the TA, Display student IDs for group members and "unknown" for others.
  - 3.1.2 Three evaluation criteria
    - (1) Able to detect three faces. (10%)

(2) Able to accurately and in real-time recognize three faces, Significant delays are acceptable, or it can be designed to start recognition with a button press, but the recognition time must not exceed 30 seconds. (15%)

(3) Able to accurately and in real-time recognize three faces, with minimal delay when the camera moves. For example, recognizing only one frame in 30 seconds is unacceptable; only minor delays are allowed. (20%)

### 3.2 Facial recognition with masks. (40%)

3.2.1 Given a hidden photo, accurately detect whether 5 people are wearing masks correctly. (10%)

3.2.2 Performance: Class-wide ranking, Compare the accuracy in detecting the correct number of people wearing masks. using hidden photo. (30%)

Hint : The hidden test cases will be revealed in the final week (12/26), The provided method is the same as in Lab3.

### 3.2 Report (15%)

You also need to hand in a project report (either in English or Chinese) that describes your system, including how you design the recognition algorithm, and how your system works. It does not need many pages but should be concise and easy to understand by readers. The report will take 15% of the project grading.