BACHELOR OF INFORMATION TECHNOLOGY (HONS)

FINAL EXAMINATION
JANUARY 2020

Course : EC3301 (Information Systems Design) Time: 9.00am – 12.00noon (3 hours)

Lecturer : Ts. Harlina Harun Date : 14 October 2020

Instructions:

Answer **ALL** questions.

This examination paper is confidential. The questions must be answered individually. Students are NOT PERMITTED to discuss or consult with other students or individuals.

Using Google is not allowed at all. Thus, the answer from the Internet will be considered plagiarism. Plagiarism is an offence. University guidelines on plagiarism will apply.

All exams submitted are final. Students will NOT BE PERMITTED to submit any additional work or alternative version, even if time is remaining. Only the initial submission will be forwarded for grading.

Your answer MUST be submitted within the stipulated time. Failure to submit your answers within the deadline given may result in the award of zero marks. You will be given an additional 30 minutes at the end of the specified exam duration. This extra time is for you to submit and upload your completed exam. It's not intended as extra working time. If you experience technical difficulties, you can use this time at your own discretion, but you must leave sufficient time to submit and upload your completed exam.

Answer Format:

i. Do not put your name on any materials related to the exam. Use only your Student ID Number for identification.
ii. All answers must be handwritten, scanned (using CamScanner) and converted to PDF file.
iii. Save your answers in the following format: **STUDENT ID_COURSE CODE_COURSE TITLE**

Honor Pledge for Exams

"I affirm that I have not given or received any unauthorised help on this exam, and that all work is my own."

Name and Signature: _____

This question paper consists of 3 pages.
(excluding front cover)

The Attendance System below is able to recognise a minimum of 10 faces at one time and with a different head pose angle varying from -90° to 90°.

Figure 1: Attendance System[1]

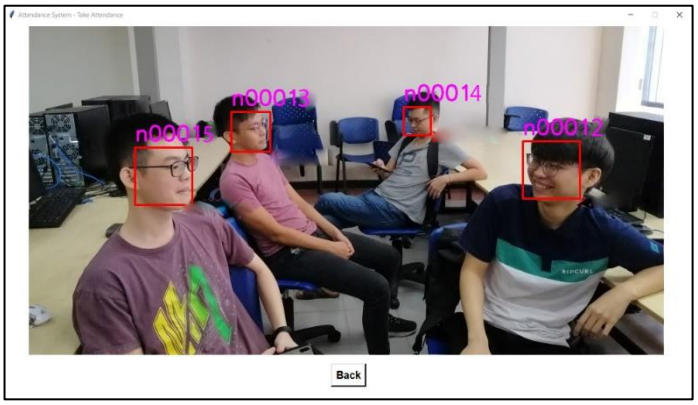

Figure 2: Attendance System[1]

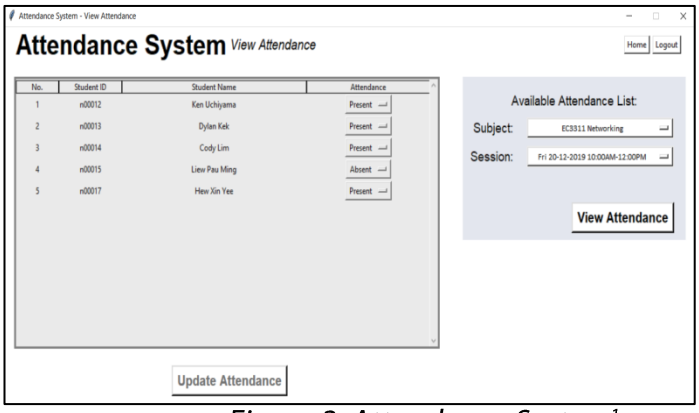

Figure 3: Attendance System[1]

Answer the following questions for the above attendance system as shown in *Figure 1, Figure 2 and Figure 3.*

[1]*Hew Xin Yee, Multiple Face Recognition based Attendance System using Convolutional Neural Networks, Capstone (Project II), 2019.*

1. a. Draw state charts to model the dynamic behavior of the components in the interface shown in *Figure 1* and *Figure 3*. **(10 MARKS)**

   b. Draw architectural designs using "Pipe and Filter" and "Implicit Invocation" style architecture of the above system. Present your design using Software Architectural Visual Notation. **(12 MARKS)**

   c. Discuss any **THREE (3)** advantages of "Implicit Invocation style". **(3 MARKS)**

2. a. Create **FIVE (5)** generic scenarios to assess the robustness for the Attendance System above. **(5 MARKS)**

   b. Use the generic scenarios identified in Q2a to evaluate the architectural design in the "Pipe-and-Filter" and "Implicit Invocation" drawn in Q1b. **(15 MARKS)**

   c. Discuss the evaluation results above. Which architectural design is the best to handle robustness? **(5 MARKS)**

3. a. Define equivalence partitioning and Boundary Value Analysis. What is the difference between these two? **(3 MARKS)**

   b. Devise test inputs using Boundary Value Analysis (BVA) that could be used to detect the student's face as shown in *Figure 2*. **(6 MARKS)**

c. Below is the sample face detection codes using JAVA **(6 MARKS)**

```
1: CascadeClassifier faceDetector = new CascadeClassifier();
2: faceDetector.load("haarcascade_frontalface_alt.xml");
//Input image
3: Mat image = Imgcodecs.imread("E:\\input.jpg");
// Detecting faces
4: MatOfRect faceDetections = new MatOfRect();
5: faceDetector.detectMultiScale(image, faceDetections);
// Creating a rectangular box showing faces detected
6: for (Rect rect : faceDetections.toArray())
   {
7:      Imgproc.rectangle(image, new Point(rect.x, rect.y),
        new Point(rect.x + rect.width, rect.y +
        rect.height),new Scalar(0, 255, 0));
   }
// Saving the output image
8: String filename = "Ouput.jpg";
9: Imgcodecs.imwrite("E:\\"+filename, image);
```

Draw a Control Flow Graph for the above codes and calculate its Cyclometic Complexity.

d. Software architecture has a profound effect on most qualities in one way or another. Discuss how architectural design, detail design and interface design affect robustness. **(10 MARKS)**

4. A palindrome is a word, number, phrase or other sequence of characters which reads the same backward as forward such as "18881", "787", "madam", "racecar ", e.t.c. You are required to design a Palindrome software that accepts a number and determines whether the number is a palindrome or otherwise.

a. Draw an architectural design using "Main Program/Subroutines" style. Present your design using Software Architectural Visual Notation. **(12 MARKS)**

b. Discuss the necessary modifications to the architecture and components of your design, if input may take more than one word, for example "A nut for a jar of tuna". **(7 MARKS)**

c. Discuss **THREE (3)** advantages and **THREE (3)** disadvantages of the Main Program / Subroutines style. **(6 MARKS)**

-END OF QUESTION PAPER-