**Project Initiation Document**

A Face Authentication System

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**Module: SE3IP11-15-6A**

**Project ID: A-FACE**

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| --- | --- | --- | --- |
| Primary Supervisor | Hong Wei | | |
| Secondary supervisor | James Ferryman | | |
| Supervisor’s check: For each item below the supervisor should circle ✓ if it is satisfactory for this stage of the project; if it is not satisfactory then the supervisor should circle 🗶 and add a suitable comment to indicate the deficiency. The supervisor should then sign below to confirm the ✓,🗶 and comments. | | | |
| **CHECKLIST** |  | Comments, concerns and recommendations | |
| Background | **✓ 🗶** |  | |
| Problem statement | **✓ 🗶** |  | |
| Technical Products | **✓ 🗶** |  | |
| Crosscheck | **✓ 🗶** |  | |
| Purchases | **✓ 🗶** |  | |
| Health & Safety | **✓ 🗶** |  | |
| Social, Legal & Ethical | **✓ 🗶** |  | |
| References | **✓ 🗶** |  | |
| Project Plan | **✓ 🗶** |  | |
| **Supervisor’s Signature** |  | | **Date:** |
| **Submission rules: The PID, with this form completed and signed by the supervisor, must be handed in to the student information centre (G47) AND submitted online on Blackboard by Friday 9th October 2015. If the deadline is not met, the student will face a penalty of 5 marks being deducted from their overall module mark. It is expected that students will address any comments noted by their supervisor on this form in due course.** | | | |

# Introduction

This document initialises the project originally mandated in [1]. It clarifies *what* is expected and *how* it is to be done. As in any project initiation there may be uncertainties and they are identified where possible using the term TBD – to be determined.

The background motivating this project is summarised below in §2. A concise statement of the objectives of this project is presented in §3. How these objectives are expected to be satisfied is summarised with a headline list of *products*[[1]](#footnote-1) listed in §4.

The project is undertaken under the auspices of the final year project module SE3IP11-15-6A and this mandates that the examination products listed in §11 are delivered as well as the technical products listed in §4.

An assurance that the intended technical products are likely to be adequate is given in §5 where the objectives and technical products are crosschecked. §12 provides an outline plan and shows the plausibility that delivering the products (both technical and examination) is feasible.

The purchases expected in the plan are listed in §6. Mandatory safety, social, legal and ethical concerns are addressed in §7 and §8 respectively. All references referred to in this document are listed in §10.

# Background

Technological advances striving to replicate human processes has resulted in biometric analysis being a focused area of research over the past twenty years. Biometric analysis of fingerprints, palm, eyes and faces have been a concentrated area of research. Humans perform face recognition on a daily basis effortlessly. Face recognition is one of the most non-intrusive methods of biometric analysis which makes it one of the most relevant applications.

With so many applications such as video surveillance, human computer interaction and law enforcement biometric analysis is a focused area of research. The main issues regarding computing face recognition is the subject’s posture, age and lighting which restricts the usage of such systems to a controlled environment. With technological advances in hardware we draw closer to more efficient and reliable face authentication systems.

# Problem Statement

<< Provide a problem statement using a guide budget of between 100 and 160 words. Before writing you should assess the technical problem being addressed by your project. Then boil it down to the objectives being satisfied and what imposed constraints are placed on any solution. Finally identify any assumptions any acceptable solution would depend upon. When you have done your preparatory investigation and thinking read the <<’readme’>> paragraph (below) and summarise your problem statement by completing the sections §§3.1, 3.2 & 3.3. Remember when doing so to add and cite important references.

Note that there is a tight word limit. This is deliberate to ensure that you focus on the headline details encompassing the scope of the whole problem rather than detail – which will be dealt with in other documents as the project progresses.

If you are confident about writing problem statements and your supervisor allows it you may forego using the rubric and sections §§3.1, 3.2 & 3.3 and construct a problem statement as a narrative of between 150 and 180 words (guide budget).>>

<<’readme’>> On the basis of the soundness of the following assumptions, §3.3, it is deemed worthwhile to satisfy these objectives, §3.1, by delivering technical products subject to these constraints, §3.2, on how they may be developed and/or delivered.

## Objectives

1) Develop a graphical user interface to capture and display images.

2) Capture images from a camera device and save images as graphic files.

3) Implement Face detection algorithms on camera feed.

4) Implement Face recognition algorithms on the camera feed.

5) Integrate face data base into face authentication system.

6) Display recognition results displaying rejection and acceptance rates.

## Constraints

1) The system will be used in a controlled environment i.e good illumination, distance of subject to camera.

2) Hardware such as camera resolution will dictate the quality of analysis results.

3) Faces captured for recognition should be of a neutral gesture and posture.

4) Faces captured for recognition will be frontal facing or within 20 degree angle.

5) Project deadlines and delivery date.

## Assumptions

1) Experiments will be carried out in a suitable environment i.e good lighting conditions, no foreign objects between the subject and camera.

2) Images of faces stored in database will be frontal facing. Images taken for authentication will be frontal facing.

3) System subjects will not be wearing obstructive facial items i.e. sunglasses, burka, head scarf.

4) Participants using the system will be aware of the handling of sensitive data

# Technical Products

**Product 1:** Graphical User Interface

The graphical user interface will provide a method of interaction from the user to the system.

The user interface will display a camera feed, the stored image for comparison, acceptance and rejection rates of the recognition and computation statistics yielded in the recognition. It will provide mechanisms for the user to customise and interact with the authentication system.

Time constraints of other project deadlines and objectives. The chosen language for implementation may have its constraints when implementing the interface. Storage of the system software could become corrupt or damaged.

**Product 2:** Capturing and storing images as graphical files.

This product will enable a camera feed to be displayed through the GUI. It will allow the user to capture and store an image as a graphical file.

Successful implementation of the camera feed into the GUI and the ability to capture and save graphical images with satisfy this products completion.

Ethics and security needed to be considered when allowing a user to interact with the system.

**Product 3:** Computing Face Detection

The detection software will locate and track the face of a user. It will compute and draw a rectangle encompassing the contour features of the face.

For this products completion the face detection software will correctly be able to locate and track a human user’s face. It will be able to illustrate through the camera feed the area of image that is being detected visible for the user.

Hardware failures, loss of code, long exposure to computer screen, good posture when working.

**Product 4:** Computing Face Recognition

The face recognition software will be able to compare the user’s captured image with a previously stored image of the user.

The system should be able to successfully compare and recognise similarities of biometrical features within two images of a user’s face.

Time deadlines, ethics, security.

**Product 5:** Integrate Face Database into system

The integration of an online database that stores images and details of users faces into the system.

Setup connections to an online database through the face authentication system. Some aspects of this products completion are TBD.

Key Risk to its completion

**Product 6:** Display recognition results displaying rejection and acceptance rates.

This product will display acceptance and rejection rates and recognition results to the user interface.

Displaying the acceptance, rejection and recognition results will satisfy this product.

Dependent on the completion of the previous products.

# Crosscheck of approach

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Product 1 | Product 2 | Product 3 | Product 4 | Product 5 | Product 6 |
| Objective 1 | X |  |  |  |  |  |
| Objective 2 |  | X |  |  |  |  |
| Objective 3 |  |  | X |  |  |  |
| Objective 4 |  |  |  | X |  |  |
| Objective 5 |  |  |  |  | X |  |
| Objective 6 |  |  |  |  |  | X |

The products in which this project have been broken down into §4 satisfy the objectives proposed §3.1. Each product provides a detailed solution to the tasks of each of the objectives stated in this document. Each product is associated with its own individual objective.

The time plan illustrated in the tables of §10.3 details the time allocated for each technical and examination product. The technical deliverables are scheduled to finish 2 weeks before the deadline of the final report examination product. This for extra testing, documentation and project conclusions. The deliverable products §4 have been designated adequate proportions of time §10.3 in which they can be completed and delivered in.

# Health and Safety

1. Computing for extensive amounts of time without regular breaks and unsupported seating position can cause eye strain, neck and back injuries and muscle strains.
2. Using the software system in an inadequate environment i.e. outdoors when raining, a wet room.
3. Using the camera in a cluttered area with objects on the floor (trip hazard). The area in which the camera will be used needs to be cleared from any trip hazards as the user will focusing on the user interface.

# Legal and Ethical

When using the face authentication system subjects need to be aware that the system will be handling there biometrics. Likewise participants need to be aware they are being monitored as uniformed used would be intrusive and a violation of privacy. Permission needs to be granted by the user before carrying out any analysis.

An individual’s biometrics is a unique set of data that needs to be handle extremely sensitively and securely. You can get a new bank card with ease but it’s much harder to replace your face.

The face authentication system proposed in this project should not be used within critical systems unless results can be guaranteed. There is no place for ambiguity in critical systems. For example the use of a recognition system that cannot guarantee reliable results in a critical system may falsely identify someone for a crime they did not commit. This can be damaging to a person reputation and the repercussions can be severe.

# Examination Products

The mandated examination products are as follows. Risks identified that may obstruct their completion are listed in [2] with cross-reference to this section.

**EX1. Name**: PID

* **Short Description**: The document that initiates this project and guides it thereafter.
* **Acceptance Criteria**: The PID must be written as a Microsoft Word or PDF document in compliance with the format and content instructions indicated in this document (the PID Master). All sections should be complete to a reasonable depth and quality, consistent with the stage of the project, that satisfies the technical judgement of the project supervisor and, if appropriate, the Company Partner. The sign offs on the cover page will be completed.

**EX2. Name**: Autumn Term Week 6 Logbook Check

* **Short Description**: A formal check of project progress based on the logbook.
* **Acceptance Criteria**: The Student Information Centre staff, and Project Co-Ordinator if necessary, must be convinced the project progress has been sufficient to date and that this progress has been adequately recorded in the logbook. The logbook must include a sign-off sheet that indicates that the logbook has been assessed by the supervisor on a weekly basis.

**EX3. Name:** Project Progress Review

* **Short Description**: A formal check of project progress based on a checklist form.
* **Acceptance Criteria**: The ‘Project Progress Review Individual Form’ must be completed by the student and supervisor and signed and submitted by the appropriate deadline.

**EX4. Name**: Spring Term Week 6 Demonstration

* **Short Description**: A formal presentation of the executable technical products of the project to the project supervisor and internal moderator.
* **Acceptance Criteria**: During Week 6 of Spring Term, the student must demonstrate their project to their supervisor and internal moderator. The demonstration should show that the project’s technical products are on track to be completed by the end of the project.

**EX5. Name**: Poster

* **Short Description**: A poster summarising a significant aspect of your work.
* **Acceptance Criteria**: A poster is constructed based on the template (TBD). It will be of a quality typical of an academic conference poster presentation. The content will introduce and explain some aspect, claim of other facet of the project that the student deems most interesting and which is agreed by the supervisor.

**EX6. Name**: SCARP Abstract

* **Short Description**: An abstract in a form typical of an academic conference.
* **Acceptance Criteria**: The abstract is written according to the academic template (TBD). It will summarise the project with a focus on its achievements with respect to the objectives and technical products and what was learned.

**EX7. Name**: SCARP Paper

* **Short Description**: A short paper in a form typical of an academic conference.
* **Acceptance Criteria**: The paper is written according to the academic template (TBD). It will describe the project with a focus on its achievements with respect to the objectives and technical products and what was learned.

**EX8. Name**: Final Report

* **Short Description**: The academic write up of the work achieved by the project in addressing the technical problem.
* **Acceptance Criteria**: The report shall be formatted according to provided rules (TBD). It shall have content assessable according to the criteria (TBD). It will include sections such as Introduction, Literature Survey, Problem Analysis, Solution Analysis, Implementation, Evaluation (detail TBD).

**EX9. Name**: Demonstration to Internal Examiners

* **Short Description**: A formal presentation of the executable technical products of the project.
* **Acceptance Criteria**: The working demonstration must be convincing to the examiners in terms of: showing a significant satisfaction of the objectives through the operation of the developed technical products; showing that the work is substantially the product of the student’s efforts.

**EX10. Name**: SCARP Presentation

* **Short Description**: A 10 minute presentation of your work in a conference setting.
* **Acceptance Criteria**: The paper is presented in a clear, coherent manner in the allotted time and plausible answers are given to such questions that are possible in the conference schedule (typically two or three questions).

**EX11. Name**: Project Archive

* **Short Description**: A CD containing all project documents.
* **Acceptance Criteria**: The CD must contain all the files and folders specified in the guidelines (TBD).

# References

[1] << Put in reference details for the Project Mandate; e.g. :Project to make a TARDIS, Project Mandate, ID 123XYZ, SSE Projects Digest 2014-2015, Blackboard >>

[2] << Put in a correct reference to your RA1 Risk Assessment Form >>

# Project Plan

<< Split your project work into sections/categories/phases and add tasks for each of these sections. First deal with the headline products you identified in §4 and then deal with the examination products listed in §11 as illustrated by the two tables below.>>

## Technical Products

<<Create and populate a table as illustrated here. The idea is that every headline technical product will be delivered as a result of project activity (tasks). If you wish, you may add sub products as illustrated in the ‘Installed Thingy’ example. It is very easy to waste time planning at too much precision – to avoid this you are limited to a maximum of 25 rows to the table. Note on effort ratings: These weeks are working time not elapsed time. For example working time of one week will take two weeks of elapsed time if you are working only half time on the project. This understanding is important for creating realistic plans.

Table 12‑1 Technical Products

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Product | Task  ID | Task Description | Effort  (weeks) | Who[[2]](#footnote-2) |
| Built Widget | T1 |  |  |  |
|  | T1.1 | Specify, Design, | 2 | Bill Poster |
|  | T1.2 | Implement and test | 2 | Dawn Poor |
|  |  |  |  |  |
| Installed Thingy | T10 |  |  |  |
| - Thingy Infrastructure | T10A |  |  |  |
|  | T10A.1 | Purchase stuff | 2 |  |
|  | T10A.2 | Assemble stuff | 1 |  |
| -Thingy Code | T10B | Design, Code & Unit Test | 3 |  |

>>

## Examination Products

< <Create and populate a table as illustrated here. The idea is that every examination product will be delivered as a result of project activity (tasks). List each. You are limited to a budget of 20 rows. >>

Table 12‑2 Examination Products

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Product | Task  ID | Task Description | Effort  (weeks) | Who |
| Final Report | E1 | e.g. Write-up project report | 4 |  |
| SCARP Poster |  | e.g Create SCARP poster | 1 |  |
|  |  |  |  |  |
|  |  |  |  |  |

## Time Plan for the proposed Project work

**Plan for the proposed Project work**

**Time Plan for the proposed Project work**

Table 12‑3 Time Plan Technical Products

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Product / Product phase** | **START DATE: <enter the project start date here>** | | | | | | | | |  | | | | | | | |
| Pre-Term | AUTUMN TERM (weeks) | | | | | | Break | SPRING TERM (weeks) | | | | | | | Break | SUMMER TERM  (exams) |
| 1-2 | 3-4 | 5-6 | 7-8 | 9-10 | 11 | 1-2 | | 3-4 | 5-6 | 7-8 | 9-10 | 11 |  |
| Product 1: Graphical User Interface |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |
| Product 2: Capturing and storing images as graphical files. |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |
| Product 3: Computing Face Detection |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |
| Product 4: Computing Face Recognition |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |
| Product 5: Integrate Face Database into system |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |
| Product 6: Display recognition results displaying rejection and acceptance rates. |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |

Table 12‑3 Time Plan Examination Products

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Product / Product phase** | **START DATE: <enter the project start date here>** | | | | | | | | |  | | | | | | | |
| Pre-Term | AUTUMN TERM (weeks) | | | | | | Break | SPRING TERM (weeks) | | | | | | | Break | SUMMER TERM  (exams) |
| 1-2 | 3-4 | 5-6 | 7-8 | 9-10 | 11 | 1-2 | | 3-4 | 5-6 | 7-8 | 9-10 | 11 |  |
| PID |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |
| Autumn Term Week 6 Logbook Check |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |
| Project Progress Review |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |
| Spring Term Week 6 Demonstration |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |
| Poster |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |
| SCARP Abstract |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |
| SCARP Paper |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |
| Final Report |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |
| Demonstration to Internal Examiners |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |
| SCARP Presentation |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |
| Project Archive CD |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |

1. A *product* in this context is something completed by the activity of the project. This is terminology of PRINCE2 project management. Some other PM regimes refer to *deliverables*. [↑](#footnote-ref-1)
2. [↑](#footnote-ref-2)