Software Development Proposal:

Data Science Image Project

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# Executive Summary

The need for licence plate recognition in modern life is becoming more widespread. The utility provided to the end user through such a tool will allow for many applications in fields including but not limited to; security, residential car parks, commercial car parks, policing etc.

The client and sponsor; *Associate Professor Lihong Zheng* has commissioned *Digitek* with the creation of a software capable of reading licence plates.

This document will go on to:

1. Outline the requirements to which *Digitek* will build the product and the proposed outcome of the system.
2. Next, propose solutions supported by diagrams for each defined use case.
3. Following this, the team structure will note the project team and a basic overview of relevant skills. Further detail on this can be found in the document titled “Team charter”.
4. Risks and Issue Management are covered after this.
5. Finally, there is an outline of why the team has opted for an Agile approach to the Unified Process (UP).

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# Background/Business Case

“The Business” is in need of an automatic parking monitor system for their multi-story car park infrastructure. Digitex has been requested to create a number plate recognition program to replace “The Business’” current paid parking infrastructure. The idea of the new software is to completely replace the current antiquated system and install a new automatic system whereby users do not have to use a ticketing system.

The removal of a ticketing system is a necessity in this ever evolving world, especially with the rise of COVID and the implementation of “Contactless systems”. The current system still involves the user stopping at the entry gate to the carpark, pressing the ticket button, taking the ticket with them into the centre and then paying for their parking ticket at a machine before exit. This system also requires more infrastructure to maintain for “The Business” and is more costly in the long run. The new system will be more thorough and will stop simple errors for users like “Losing their ticket”, or “Paying for parking and then forgetting something and having to rush back to a shop and the ticket expiring”.

Overall it is expected this new system will save costs and improve efficiency of the car park for “The Business”.

# Requirements

The following are a list of high level requirements to which the product will be built:

* Recognise and analyse number plates.
* Segment characters for individual reading.
* Localise plate region.
* Remove “noise”.
* Output resulting data, whether this be to a database or anywhere else.

# Outcome

To create a fully tested program to read licence number plates on vehicles quickly and automatically, without any human interaction. The number (string) identified by the program can be recorded into a database for further processing.

# Proposed Solution

## Solution Overview

* A camera will detect the car using a sensor, allowing it to take a photo.
* The image will be transferred to a server hosted on the cloud.
* An algorithm created and stored on google collab or aws will be used to detect the stored image and begin the recognition process.
* A SQL database will then store a log containing data of the detected licence plate.
* Reports will be generated, saved and exported as required in a readable file format.

## Use Cases

* Car enters car park
* Camera detects car
* Photo is taken
* Image is captured and stored on a cloud server
* Grey binarization
* De-noising image
* Number plate localization
* Character segmentation
* Character normalisation
* Character recognition
* Number plate and vehicle recognized

## Security/Log Management

* View log of recorded licence plates
* Backup data
* Restore data

## Reports

* Report of licence plates identified
* Report of failed licence plate checks
* Ability to Import / Export reports

# Team Structure

The project team consists of four members, listed in the table below.

All team members are committed to providing a high quality product, as specified above, to

the client. All team members bring a variety of skills and experience, which will help them

deliver a successful completion to the project.

## Project Team

| Name | Skills |
| --- | --- |
| Matthew Parr | Java, Python, SQL, UI Design |
| George Salim | Python, Java, SQL, Visual Paradigm |
| John Olsen | Communication, Java, Python, Design |
| Junsen Chen | Java, Python, SQL |

## Roles and Responsibilities

All team members will attend and contribute to meetings. The role of taking meeting minutes

will cycle through the team to distribute administration experience. All team members will

contribute to the design and development of the project. The strengths and weaknesses of

each team member will be managed to aid in the development of a quality product for the

client. The team understands that the product will be better quality for working as a team,

than opposed to individually. Further detail can be viewed in the Team Charter document.

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# Risks and Issue Management

Risk management is an important factor to consider during the development of any project and the following risks have been identified:

| **Risk Description** | **Probability** | **Impact** | **Mitigation Plan** |
| --- | --- | --- | --- |
| Team member leaving | Low | High | Conducting a team meeting and reassigning tasks to remaining team members. |
| Insufficient skills to complete task | Low | High | The team are all conducting extra training in AWS to upskill. Any further skills required throughout the project will be acquired as necessary and tasks redistributed to team members with required skills. |
| Not getting access to required system components on time | Low | High | The team will give plenty of lead time to the client to make the required resources and system competents available to us. |
| Contact with client | Medium | Medium | The team will keep in constant contact with the client to ensure all requirements are being met as required. If the client cannot be reached for a period, then well considered assumptions will be made by the team. |
| Client changing requirements | Medium | Medium | It is the clients responsibility to reach out to the team if this is the case. As the project will be completed in iterations, the client will have sufficient time between each iteration to notify the team of any proposed changes. The client will be notified if the new requirements will require more time or resources to complete. |

# Development Processes

The team will be using Unified Process (UP) and Agile methodologies in their design and development of the project. These methodologies will aid the team to manage changes, by allowing them to adapt quickly to any changes that arise to meet the client needs.