

Android Application Development II

Version 1.0 approved

NIRO Solutions

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Revision History

Name	Date	Reason for Changes	Version
Nigel Francis	2019/03/29	Initial Draft	1.0
Nigel Francis, et al	2019/04/14	With contributions and edits from all team members, we refined the document	1.1
Nigel Francis, et al	2019/05/21	Style, editing, additional information from all team members	1.2
Nigel Francis, et al	2019/06/14	Final editing and proofreading	2.0

Group Members

Name	Responsibilities
Nigel Francis	Overall Design, News and Settings Fragment
Romario Renée	Login, Registration, Forgot password and Shuttle Stand Fragment

1. INTRODUCTION

1.1. PURPOSE

The purpose of this document is to build a system to manage passengers' ease of access to the shuttle service at the University of the West Indies Cave Hill Campus in Barbados.

1.2. DOCUMENT CONVENTIONS

This document uses the following conventions.

DCF Database Cloud Firestore

FB Firebase

FS Firebase Storage

SAS Shuttle Access System

SSA Shuttle Scanner Application

SAA Shuttle Access Application

UWI CIIT University of the West Indies China Institute of Information Technology

GIST Global Institute of Software Technology

1.3. INTENDED AUDIENCE AND READING SUGGESTIONS

This project is a prototype for the UWI Shuttle Service system, and it is restricted within the UWI CIIT Suzhou premises. This has been implemented under the guidance of teachers at GIST / UWI CIIT.

This document is also intended for the developers of the project allowing them to get a deep dive into what the software is aimed at achieving, how it was architected, the role it plays with its other components and how it was developed. It is also intended for college professors. This project is useful for the shuttle drivers, shuttle passengers as well as the administrator personnel of the shuttle service.

1.4 PROJECT SCOPE

The purpose of the SAS and SSA is to improve and ease passengers' access to the shuttle service and to create a convenient and easy-to-use application for drivers to verify passenger identity. The system is based on three systems that work in unison however due to the scope of the project we will only discuss two;

The SSA – Shuttle scanner application

The SAA – Shuttle access application

There will be a database (DCF) that sits between both applications which will be used to transfer information to both applications.

We hope to provide a comfortable user experience along with quick access to user information.

1.5 REFERENCES

Android Programming: The Big Ranch Nerd Guide

Google Developers Website

Firebase Developers Website

2. OVERALL DESCRIPTION

2.1 PRODUCT PERSPECTIVE

The SSA – Shuttle Scanner Application

Note: Whenever the progress bar is running the user can cancel the transaction by taping the progress bar.

Login Screen:

Drivers will login using their work email and can also reset their password. Only registered drivers in the system are able to login.

Route Choice Screen:

Drivers will choose the designated route. This screen shows the route name along with the route description.

Passenger Identity Screen:

This screen shows the scanned passenger name, sex, student id number, level, picture and arrears (true or false). It also shows whether the system is online, how many passengers on board, the current selected route, passengers left behind and the driver currently signed in.

The SAA – Shuttle access application

News Screen:

All news and events for the various shuttle services will be displayed there along with the date posted. The shuttle service along with a description will be displayed here

Shuttle Card Screen:

Registration, login, forgot password and the passenger QR code will be displayed here.

Shuttle Stand Screen:

The shuttle stand name, days and times of operation, breaks and notes are displayed here. There is also a get directions button which opens the map to give directions to that specific shuttle stand.

Settings Screen:

1. Notifications:

In app notifications and vibrate can be enabled or disabled.

2. General:

Dark mode theme and language change can be set from here. The shuttle website and the version of the app is also displayed here.

3. Security:

Screen lock (finger print, passcode, password or pattern) can be enabled from here. The logout button is also available here.

The DCF – Stores the following information

News:

Current and archived news in English, Spanish, French, Portuguese and Mandarin.

Shuttle Stand:

Current and archived shuttle stand information such as days and times of operation, breaks, notes and geolocation are stored in English, Spanish, French, Portuguese and Mandarin.

Trip Logs:

The route name, driver name, passenger email, passenger count, timestamp and passengers left for each journey is stored here.

Users:

1. Passengers: Passengers name, sex, level, picture link, arrears, user id number and state of arrears.
2. Drivers: Drivers email and names are stored here.

The FS – Stores the following information:

Passengers pictures are stored here.

2.2 USER CLASS and CHARACTERISTICS

The SSA – Shuttle Scanner Application

Drivers of the system should be able to login, reset their password, choose a route and start scanning passengers QR code. Passengers where the systems show they are in arrears should only access the shuttle upon showing documentation that they are not in arrears.

Drivers should be able to do the following:

- Login, logout and reset driver's password
- Choose the journeys route and change the journeys route
- Start Scanning passengers QR code

- Allow or deny access to passengers
- Input count of passengers left behind
- Begin or cancel a journey

The SAA – Bus access application

Users of the system should be able to login, reset their password, access their QR code. They should also have access to the news and shuttle stand.

Users should be able to do the following:

- Login, logout and reset driver's password
- Choose the journeys route and change the journeys route
- Start Scanning passengers QR code
- Allow or deny access to passengers
- Input count of passengers left behind
- Begin or cancel a journey

2.4 OPERATING ENVIRONMENT

Operating environment for both applications are listed below.

Internet

Access to the Google service Firebase

Android 7.1 (API level 25)

2.5 DESIGN and IMPLEMENTATION CONSTRAINTS

The project is susceptible to a few constraints due to the location of the University. The application will mainly be used and is targeted to countries such as Barbados, Jamaica & Trinidad. However, The University of the West Indies has connections with other universities around the world. One of them being Gaobo in Suzhou, China. This specific location brings a few constraints, in China, Google services are blocked which means the application will not be able to fetch any data. This provides a very serious implementation challenge as it halts the use of the system totally unless a VPN is used.

One of the other constraints are offering multilingual options to the users of the application. SSA is built using a focus on only English as one of the primary functions of drivers is to communicate in English, NIRO Solutions would have to slightly change the template system used to make it more flexible in order to allow for language changes. SSA is built using a focus on five languages; English, French, Spanish, Portuguese and Chinese as its primary users and students from countries which speaks these languages.

2.6 ASSUMPTION DEPENDENCIES

Let us assume that this UWI Shuttle Service has implemented the other main component - the web application and that it is fully operational and has populated the DCF with all relevant information accurately.

3. FUNCTIONAL REQUIREMENTS

The SSA – Shuttle Scanner Application

Requirement #: SSA 1

Use Case: *Registered Driver Login*

Rationale: *Registered drivers are the ones operating the application.*

Description (User Requirement): *The application shall allow registered drivers to login*

Details (System Requirements):

Acceptance Criteria: *Registered drivers are able to login*

Relates to/Dependencies: *Internet and FB services are available*

Priority: *High*

Requirement #: SSA 2

Use Case: *Route Selection*

Rationale: *Registered drivers are the ones operating the application.*

Description (User Requirement): *The application shall allow the registered driver to select the route.*

Details (System Requirements):

Acceptance Criteria: *The registered driver is able to choose the route*

Relates to/Dependencies: *Internet and FB services are available*

Priority: *High*

Requirement #: SSA 3

Use Case: *Change Route Selection*

Rationale: *Drivers destination could change so a change route option is necessary.*

Description (User Requirement): *The application shall allow the registered driver to change the route.*

Details (System Requirements):

Acceptance Criteria: *The registered driver is able to change the route*

Relates to/Dependencies: *Internet and FB services are available*

Priority: *Medium*

Requirement #: SSA 4

Use Case: *Registered Driver Logout*

Rationale: *There are multiple drivers using the system*

Description (User Requirement): *The application shall allow the registered driver to logout.*

Details (System Requirements):

Acceptance Criteria: *The registered driver is able to logout*

Relates to/Dependencies: *none*

Priority: *Medium*

Requirement #: SSA 5

Use Case: *QR Code Scan*

Rationale: *Passengers identities can only be confirmed by QR Code*

Description (User Requirement): *The application shall use the camera to scan for QR codes*

Details (System Requirements):

Acceptance Criteria: *The camera scans for QR code*

Relates to/Dependencies: *Access to camera*

Priority: *High*

Requirement #: SSA 6

Use Case: *QR Code Translate*

Rationale: *QR code needs to be translated to a string*

Description (User Requirement): *The application shall translate the scanned QR code*

Details (System Requirements):

Acceptance Criteria: *The Scanned QR code is translated*

Relates to/Dependencies: *Internet, FB services and Requirement #: 5 (QR Code Scan)*

Priority: *High*

Requirement #: SSA 7

Use Case: *Database Query*

Rationale: *The translated QR code needs to be verified in the database*

Description (User Requirement): *The application shall query the database using the translated QR code*

Details (System Requirements):

Acceptance Criteria: *The database is queried successfully using the translated QR code*

Relates to/Dependencies: *Internet, FB services and Requirement #: 6 (QR Code Translate)*

Priority: *High*

Requirement #: SSA 8

Use Case: *Display Passenger Credentials*

Rationale: *The driver needs to verify the passenger's identities*

Description (User Requirement): *The application shall display the passenger credentials from the database*

Details (System Requirements):

Acceptance Criteria: *The passenger's credentials are displayed*

Relates to/Dependencies: *Internet, FB services and Requirement #: 7 (Database Query)*

Priority: *High*

Requirement #: SSA 9

Use Case: *Passengers in Arrears Allow / Deny Access*

Rationale: *Passengers database credentials may be different from actual credentials*

Description (User Requirement): *The application shall request driver input as to allow or deny access for passengers in arrears*

Details (System Requirements):

Acceptance Criteria: *The application requested driver input as to allow or deny access for passengers in arrears*

Relates to/Dependencies: *Internet, FB services and Requirement #: 7 (Database Query)*

Priority: *Low*

Requirement #: SSA 10

Use Case: *Passengers Left Input*

Rationale: *The amount of passengers left is necessary to make future decisions on shuttle times*

Description (User Requirement): *The application shall request driver input as to how many passengers were left behind*

Details (System Requirements):

Acceptance Criteria: *The application requested driver input as to how many passengers were left behind*

Relates to/Dependencies: *none*

Priority: *Low*

Requirement #: SSA 11

Use Case: *QR Code Validity*

Rationale: *The Driver and Passenger should get immediate feedback if QR code is valid or invalid to be aware*

Description (User Requirement): *The application shall play audio clip of “YES” if QR code is valid or “NO” if invalid*

Details (System Requirements):

Acceptance Criteria: *Audio clip “YES” is played when QR code is valid and “NO” when QR code is invalid*

Relates to/Dependencies: *Requirement #: 5 (QR Code Scan)*

Priority: *Low*

The SAA – Shuttle Access Application

Requirement #: SAA 1

Use Case: *Display News Items*

Rationale: *Passengers should have knowledge of events affecting the normal operation of the shuttle service*

Description (User Requirement): *The application shall display news items from DCF*

Details (System Requirements):

Acceptance Criteria: *News items from DCF are displayed*

Relates to/Dependencies: *Internet and FB services are available*

Priority: *High*

Requirement #: SAA 2

Use Case: *Passenger Registration*

Rationale: *Passengers need to register before login*

Description (User Requirement): *The application shall allow passengers to register*

Details (System Requirements):

Acceptance Criteria: *Registered passengers are able to login*

Relates to/Dependencies: *Internet and FB services are available*

Priority: *High*

Requirement #: SAA 3

Use Case: *Registered Passenger Login*

Rationale: *Passengers need to login to access QR code to access the shuttle.*

Description (User Requirement): *The application shall allow registered passengers to login*

Details (System Requirements):

Acceptance Criteria: *Registered passengers are able to login*

Relates to/Dependencies: *Internet and FB services are available*

Priority: *High*

Requirement #: SAA 4

Use Case: *Display Passenger QR code*

Rationale: *The Passenger QR code is needed to access the shuttle*

Description (User Requirement): *The application shall display the passenger QR code*

Details (System Requirements):

Acceptance Criteria: *The passenger's QR code is displayed*

Relates to/Dependencies: *Internet and FB services are available*

Priority: *High*

Requirement #: SAA 5

Use Case: *Display Shuttle Stand Items*

Rationale: *Passengers should have knowledge of normal operating information of each shuttle stand*

Description (User Requirement): *The application shall display shuttle stand items from DCF*

Details (System Requirements):

Acceptance Criteria: *Shuttle stand items from DCF are displayed*

Relates to/Dependencies: *Internet and FB services are available*

Priority: *High*

Requirement #: SAA 6

Use Case: *Shuttle Stand Directions*

Rationale: *Passengers should be given directions to the shuttle stand*

Description (User Requirement): *The application shall transfer the selected shuttle stand coordinates to an external map*

Details (System Requirements):

Acceptance Criteria: *The selected shuttle stand coordinates is transferred to an external map*

Relates to/Dependencies: *GPS, Internet, FB services are available, and a map application is installed*

Priority: *Medium*

Requirement #: SAA 7

Use Case: *Push Notifications*

Rationale: *Normal notifications don't work when the app is closed*

Description (User Requirement): *Push notifications shall be displayed when a news item or shuttle stand is created or edited*

Details (System Requirements):

Acceptance Criteria: *Push notification is displayed when a news item or shuttle stand is created or edited*

Relates to/Dependencies: *The user allows notifications, Internet and FB services are available*

Priority: *Medium*

Requirement #: SAA 8

Use Case: *In App Notifications*

Rationale: *Users are alerted when in app*

Description (User Requirement): *Notifications shall be displayed when app is in the foreground*

Details (System Requirements):

Acceptance Criteria: *Notifications is displayed when app is in the foreground*

Relates to/Dependencies: *The user allows notifications, Internet and FB services are available*

Priority: *Low*

Requirement #: SAA 8

Use Case: *Dark Theme*

Rationale: *Latest android supports a dark theme natively*

Description (User Requirement): *The system shall allow a dark theme change*

Details (System Requirements):

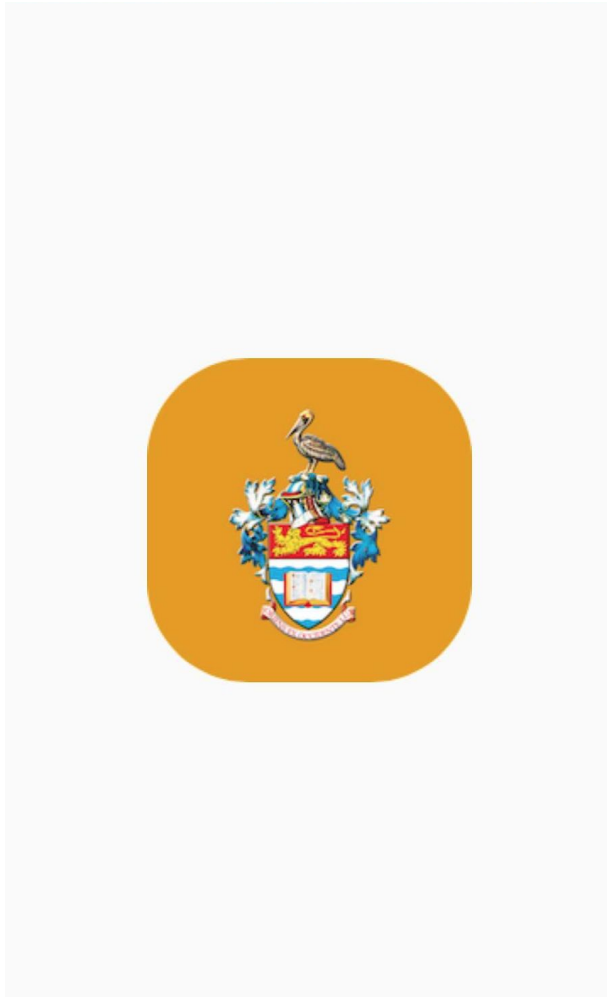
Acceptance Criteria: *The system colors have changed*

Relates to/Dependencies: *none*

Priority: *Low*

4.1 USER INTERFACES

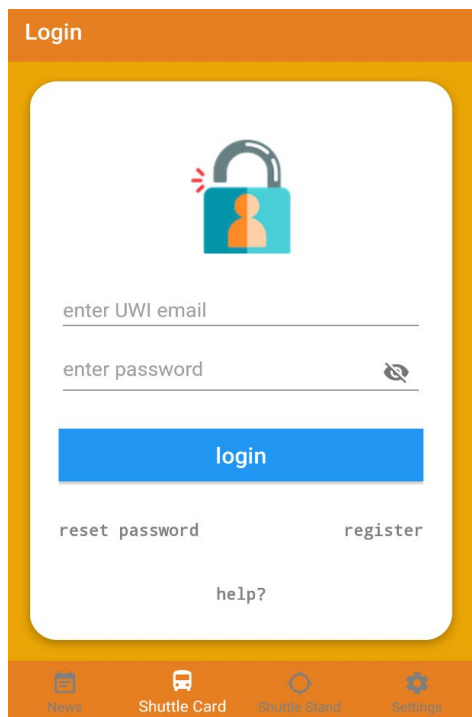
Android Student Application



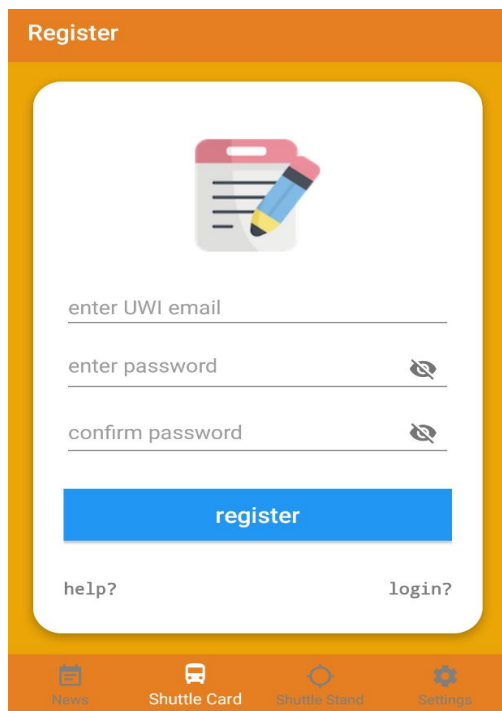
Android Customer Splash Screen with Animation



News Stand Interface

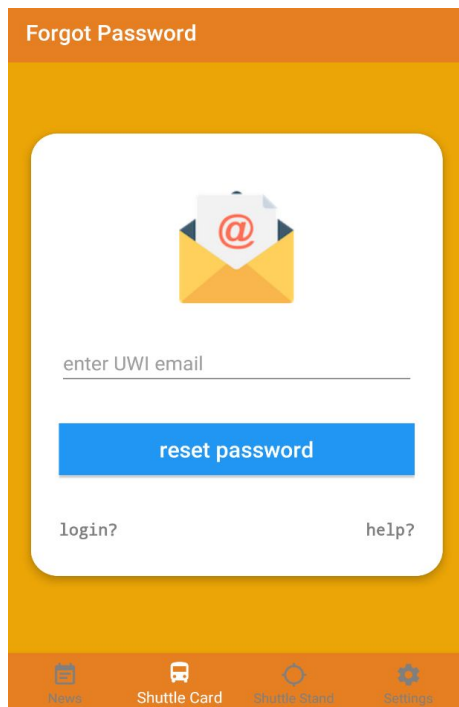


Shuttle Card - Login Section Interface



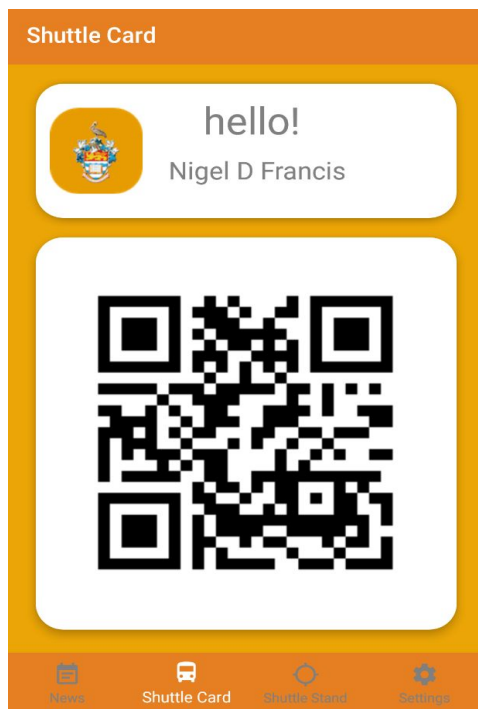
The Register screen features an orange header with the title "Register". Below the header is a white rounded rectangle containing a clipboard icon with a pencil. There are three input fields: "enter UWI email", "enter password" (with an eye icon for toggling visibility), and "confirm password" (also with an eye icon). A blue "register" button is positioned below the input fields. At the bottom of the white area are links for "help?" and "login?". The bottom of the screen has an orange navigation bar with four icons: News, Shuttle Card, Shuttle Stand, and Settings.

Shuttle Card - Registration Interface

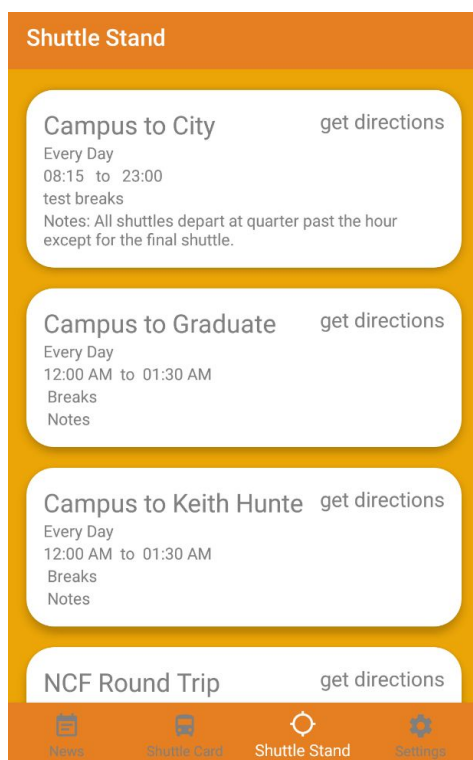


The Forgot Password screen has an orange header with the title "Forgot Password". It features a white rounded rectangle with an envelope icon containing an @ symbol. There is one input field labeled "enter UWI email". A blue "reset password" button is located below the input field. Links for "login?" and "help?" are at the bottom of the white area. The bottom navigation bar is orange with icons for News, Shuttle Card, Shuttle Stand, and Settings.

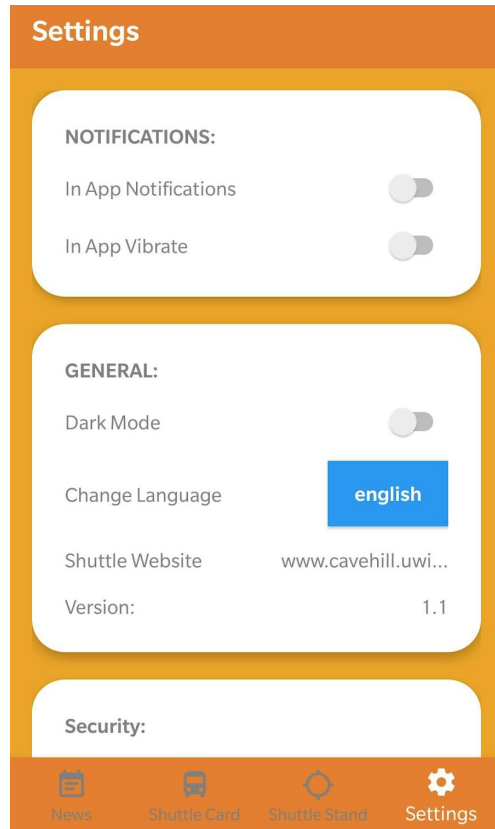
Shuttle Card - Forgot Password Interface



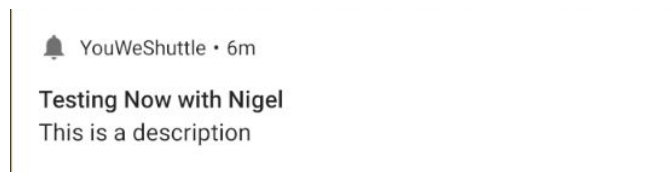
Shuttle Card QR Code Interface



Shuttle Stand Interface

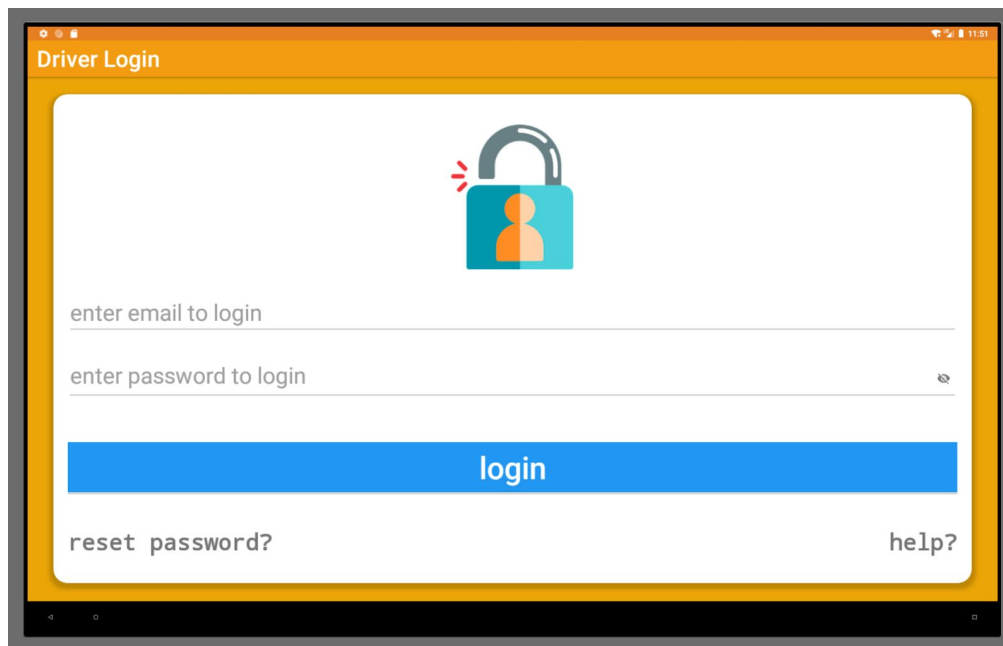


Settings Interface

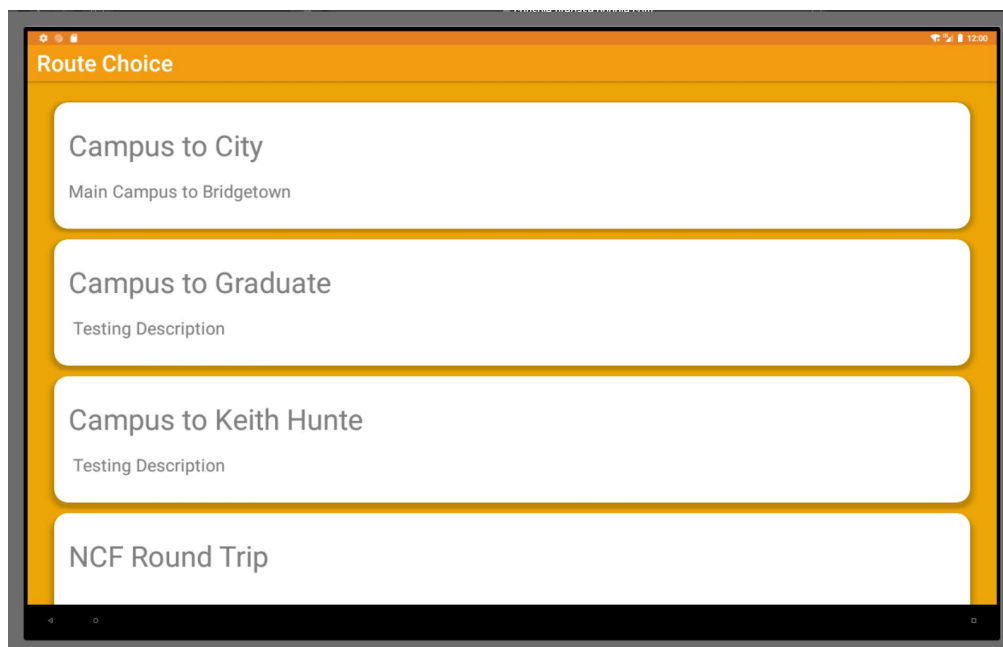


Push notification Component

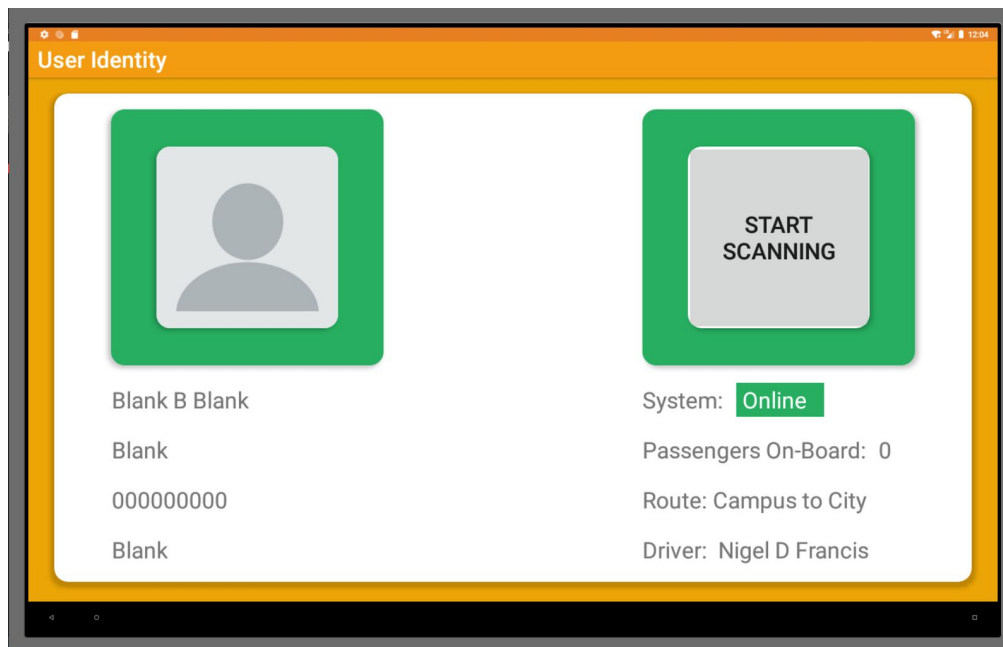
Android Bus Application



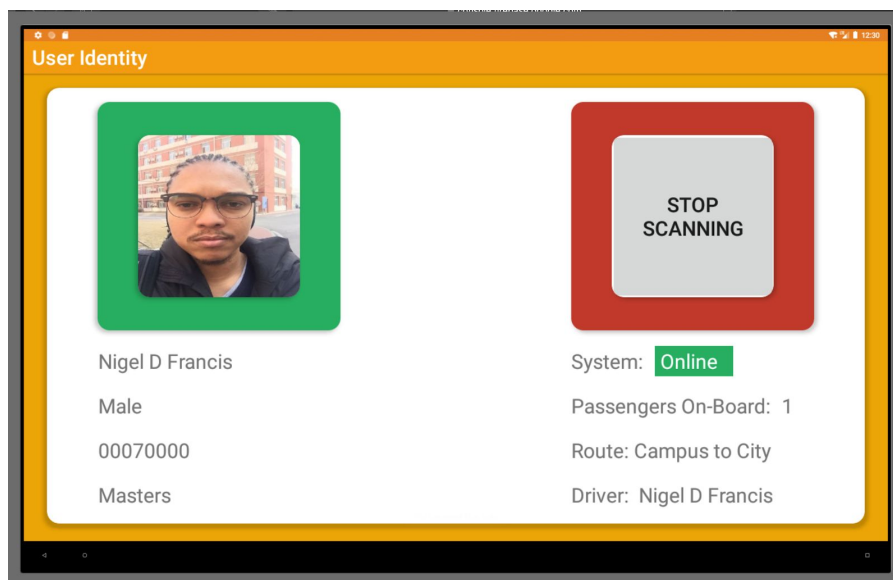
Driver Login Interface



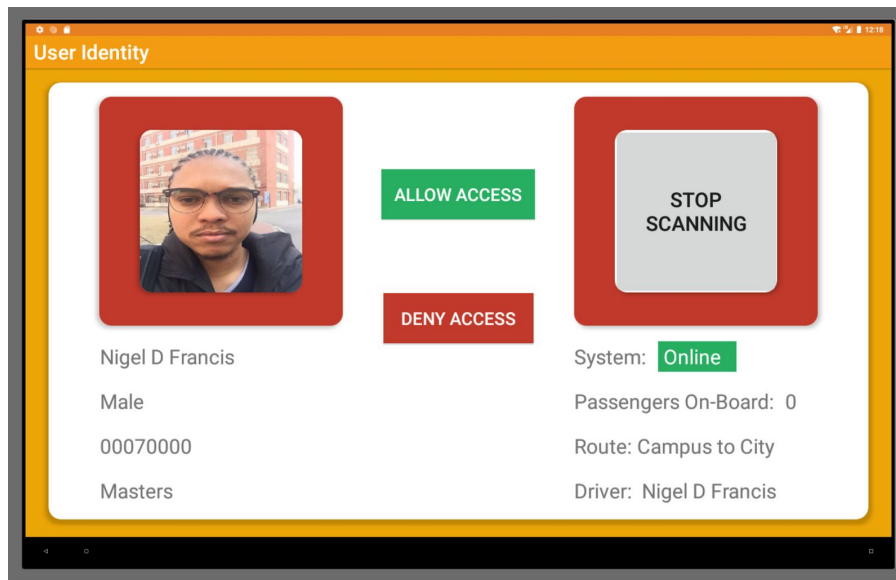
Driver Route Selection Interface



User Identity Interface



Student Verification Valid Interface



Student Verification Invalid

4.2 HARDWARE INTERFACES

SSA:

Speaker to announce valid QR code

Camera to scan QR code

Screen to display passenger credentials

Internet speed of at least 320 Kbps

SAA:

Android device

Internet speed of at least 320 Kbps

5. NONFUNCTIONAL REQUIREMENTS

1. The SSA – Shuttle Scanner Application

1.1. Performance Requirements

1. The system should respond to the user within 5 seconds after an initial click given that the user is using the recommended internet speed
2. The system should let the user know at all times what is happening in the event that an action is being performed or is triggered
3. The system should allow the user to cancel an event that is being performed.

1.2. Security Requirements

1. The system should only allow users with cavehill.uwi.edu domain to login (we used hotmail.com for the project as we don't have access to a UWI staff email)
2. The system should only allow registered drivers to login
3. The system should encrypt all data transferred
4. The system should suspend a user account after five failed login attempts
5. The system should only allow passwords between 7 and 17 characters long and must include at least one uppercase letter, one lowercase letter, one special character and one number

1.3. Software Quality Attributes

AVAILABILITY:

1. The system should be able to access data with intermittent or no internet connectivity
2. The system uptime should be 99.99% per annum

CORRECTNESS:

1. All user credentials should be displayed with specific characteristics such as a user name, user sex, user id, user level, user picture and user arrears.
2. All shuttle log information should be saved with specific characteristics such as a start date including time, driver name, passenger email, passenger count and passengers left.
3. Driver password reset link should be sent to the correct driver email address

1.4. Business Rules

1. The application launch icon should be UWI Cave Hill crest
2. The application color scheme should reflect UWI Cave Hill colors and branding
3. The system should in no way offend anyone based on color, religion, sex ethnicity nor creed

2. The SAA – Shuttle Access Application

2.1. Performance Requirements

1. The system should respond to the user within 5 seconds after an initial click given that the user is using the recommended internet speed
2. The system should let the user know at all times what is happening in the event that an action is being performed or is triggered
3. The system should allow the user to cancel an event that is being performed.

a. Security Requirements

1. The system should only allow registered passengers to receive a QR code
2. The system should encrypt all data transferred
3. The system should suspend a user account after five failed login attempts
4. The system should only allow passwords between 7 and 17 characters long and must include at least one uppercase letter, one lowercase letter, one special character and one number
5. The system should provide the option to password protect itself
6. The system should clear and delete the QR code, all shared preferences and saved folders upon logout

a. Software Quality Attributes

AVAILABILITY:

1. The system should be able to access data with intermittent or no internet connectivity
2. The system uptime should be 99.99% per annum

CORRECTNESS:

1. All news items should be displayed with specific characteristics such as a news title, news description and news date
2. All news item dates should be displayed in the official format based on the language selected
3. News items should be ordered from latest date on the top to earliest on the bottom
4. Only users with mycavehill can login/register
5. Users email must be verified before login
6. The QR code displayed should correspond to the logged in user
7. Password reset link should be sent to the correct email address
8. All shuttle stand items should be displayed with specific characteristics such as shuttle stand name, description, days of operation, times of operation, breaks, get directions and notes

9. Shuttle stand get directions should to user to external map to get directions to specified shuttle stand
10. Shuttle website link should take user to UWI shuttle service website

a. Business Rules

1. The application launch icon should be UWI Cave Hill crest
2. The application notification icon should be mini UWI Cave Hill crest
3. The application color scheme should reflect UWI Cave Hill colors and branding
4. The system should in no way offend anyone based on color, religion, sex ethnicity nor creed.