A mobile application to enable making digital donations to people experiencing homelessness, circumventing financial isolation in a cashless society

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1.0 Introduction

This project incorporates the software engineering project of building a mobile application that enables users to make digital donations to people experiencing homelessness. In an increasingly digital and cashless society, people experiencing homelessness are at risk of being financially isolated as their main source of income becomes redundant. To encourage more donations, as suggested by research, credits donated through Donate-Mate can only be spent at registered retailers/facilities or saved for a housing deposit/rent. Customers receiving donations from app users shall not require a physical device to accept/spend donations, instead using their Donate-Mate username as a virtual credit card. This project aims to ensure that technological progression is beneficial for people experiencing homelessness, rather than detrimental, by delivering a system for online donations.

App users shall be able to make donations to customers (people experiencing homelessness) via digital payment in the app. These donations shall be converted into credits to be used in registered retailers and facilities (e.g. food stores, pharmacies, shelters, outdoor clothing stores etc.) to purchase necessities including food, sleeping bags, phone credit, shelter, health products etc. Simultaneously, the app could develop to become a platform to inform customers of relevant time information, through app users.

The motivation behind this project includes the recent rise of homelessness in the UK (up 134% since 2010) and the common reservations that many people have regarding donating to people experiencing homelessness – that the money they donate could be more detrimental than beneficial (Homeless Link, 2017). This donation system would reassure and encourage such people to donate, knowing their money is going directly to necessities. Research, particularly user surveys, suggest there is scope for this system to grow and become a chosen method of donating to people experiencing homelessness.

Unsurprisingly, this complex and sensitive problem area presented great challenges, technical and social, as documented throughout this project. Concerns regarding the feasibility of the system, the risk of disconnecting customers from crucial services, and restricting freedom of choice, have deterred potential stakeholders/partners from supporting this system. Interestingly, the response of stakeholders close to the problem area, contrasts with overall public opinion that strongly suggest this solution is one worth pursuing. This is the key restriction and observation of the social enterprise thread of this project.

For the whole donation system to be functional, two additional websites are required and were included in the objectives of the project. However, with public engagement indicating that the solution would not be launching in the near future; the websites were not completed, prioritising the app development.

This structure of this report follows the key phases of the software engineering project (requirements, design, implementation, testing and evaluation) whilst incorporating business and social aspects that shaped the project.

1.1 Background research

Originally, app donations were redeemable only in shelter locations, as opposed to retailers/facilities. Section 3.2 details the research that resulted in changing requirements, namely that shelter in Brighton and Hove is massively oversubscribed and difficult to access. However, initial research aimed to gain an understand of the problems faced by people experiencing homelessness, particularly regarding shelter. This research revealed concerning truths about the situation for people experiencing homelessness. Envisioning the solution to first be deployed in Brighton, this is where most research was conducted, however laws and regulations regarding shelter are almost consistent throughout England.

According to Brighton and Hove council, there are over 1000 rough sleepers every year in the city (Brighton and Hove Gov., 2016). Those granted emergency shelter from the council are required to pay for it, with benefits often not covering the costs (Shelter Org., 2014). The determining factor for people receiving sufficient benefits and being referred to a long-term shelter/hostel, is whether the individual is deemed legally homeless by the council's specific requirements. For example, if you have 'home rights' (i.e. legal right to your home by marriage or civil partnership to the tenant or home-owner) you are not considered homeless (Shelter Org., 2016). Many people experiencing homelessness are not deemed 'intentionally homeless' due to legally having a place to live, whereas many people that fall into this bracket cannot return to their accommodation for fear of their safety. This misguided label is used to discourage people from giving cash donations, such as by Thames Reach reporting that fewer than 20% of people arrested for "begging" in England and Wales in 2014 were legally defined as homeless (Thames Reach Org., 2015). As explained, not all people experiencing homelessness are 'legally homeless' and such statistics do not represent the reality of the situation.

Further complications surrounding shelter includes Brighton and Hove council pledge (2013) for "truly drink-free and drug-free spaces so people who are trying to improve their lives do not get sucked back into addiction by addict neighbours." (Parsons, 2013). Whilst these spaces are essential, the balance works against those tackling addiction whilst living in difficult conditions. Those who are not registered to a long-term shelter currently have few other options for shelter and ultimately the demand for shelter far outweighs the availability (Homeless Link , 2016). Thus, shelter was realised to be an infeasible focus for the app and was changed to general retailers and housing deposit accounts.

Many people experiencing homelessness rely on individual small cash donations as their primary source of income. For reasons explained, some people experiencing homelessness do not receive benefits or any other support. The first problem with relying on cash donations is the approaching cashless society – already most payments made in the UK are electronic and the usage of cash shall continue to decrease (see Figure 1). The second problem is the growing discouragement of cash donations from councils and charities, promoting giving to charities instead. Brighton and Hove Independent recently published an article in support of homeless charities, sending a message in accordance with "being given money by the public made it more likely that they would stay in addiction. And less likely that they would engage with treatment and housing services." (Brighton and Hove Independent, 2016).

Figure 1 – Cash payments 2005-2025 (Payments UK, 2016)

Stronger campaigns have been made by authorities, including Nottingham City Council's failed campaign (see Figure 2) that was banned by the Advertising Standards Authority (ASA). A similarly criticised campaign was launched by London's RBKE council (see Figure 3). Reassuringly, resistance to these stereotypes prevailed. Nonetheless, such propaganda promoting that cash donations only feed addiction, alongside negative bias, has discouraged many from giving cash donations. Yet homeless charities are not in abundance of donations and people continue to donate cash to individuals; perhaps this solution could develop to bridge all parties.

Figure 2 – Nottingham City Council campaign (RT, 2016)

Figure 3 – London's RBKE Council campaign (Bowden, 2015)

Background research results included revealing that the original focus area, shelter, entails many complex factors that are outside the scope of influence of this project. Also reaffirmed was the challenge of shifting public perception against media messages, to embrace donating to people experiencing homelessness. Ultimately, the complexity of the problem space this project addresses, was found.

1.2 Problem space

There is currently no solution to digitally transfer money to individuals experiencing homelessness in the UK. Whilst micro donation apps are surfacing (see 3.3), none exist to help people experiencing homelessness. The problem lies in the digital divide come cashless society and the primary source of income for people experiencing homelessness becoming a dying currency. Debit/credit card and online/mobile payments - particularly contactless and faster payments – are becoming increasing popular and already surpassed cash as the main form of payment in the UK in 2015 (see Figures 1 & 4). With this patterns expected to continue quickly, this problem space is compelling.
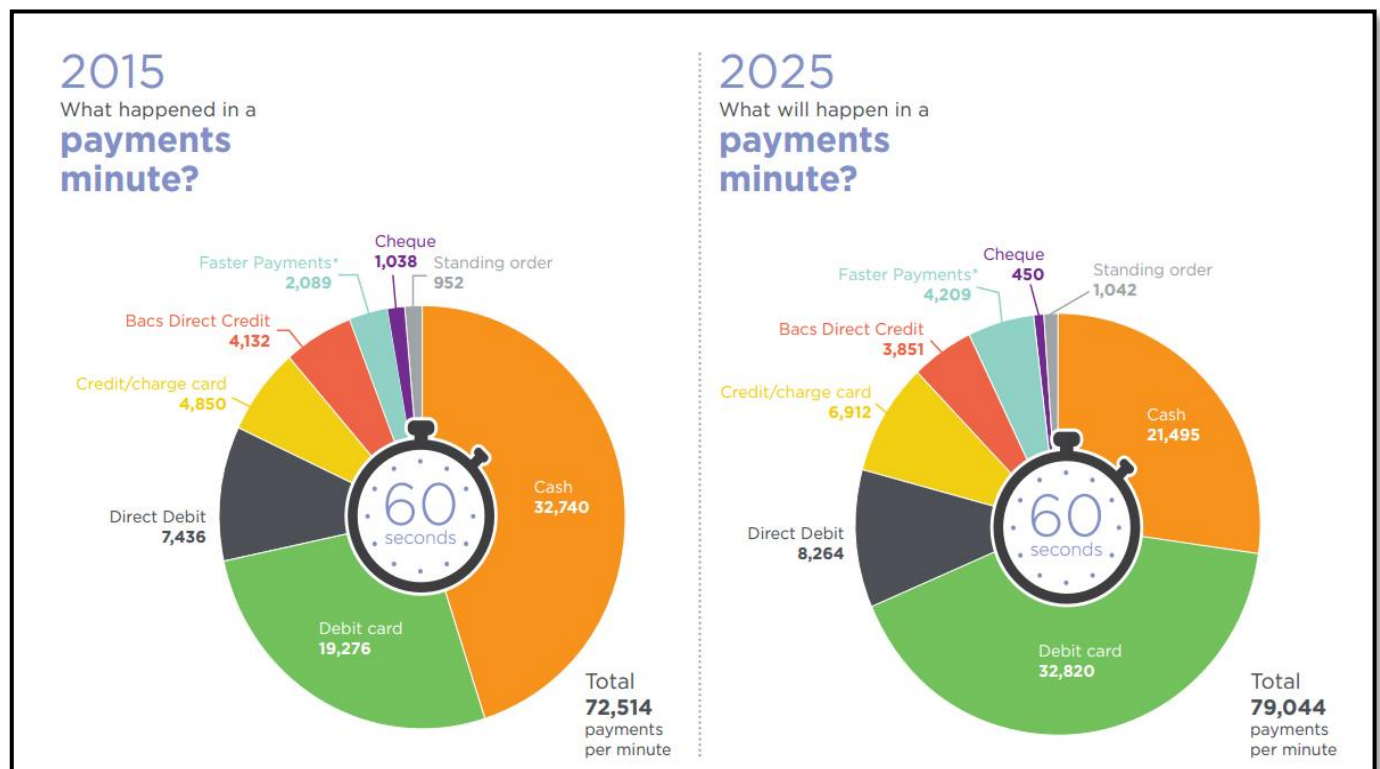

Figure 4 – Payments prediction 2025 (Payments UK, 2016)

Whilst solutions to this problem space have been experimented with in the EU, there are no signs of plans for such initiatives in the UK. Stockholm's Big Issue equivalent have provided card readers for homeless employees since 2013 (Gibbs, 2013); efficient yet infeasible for a nationwide system in a period of austerity. Donate-Mate relies only on the person donating (app user) to have a smartphone and internet connection. With four out of five adults owning a smartphone and with free Wi-Fi in Brighton, this system is highly accessible (Deloitte LLP, 2016). Customers (receiving and spending donations) are not required to have any technology; this is therefore a feasible solution financially, although the practically requires testing. A recent Barclaycard study, resultant of a £500 million drop in charity donations in 2015, revealing that people donate 3 times as much when using contactless card payments (Titcomb, 2017). This hypothesis suggests the potential donating power of Donate-Mate.

The mobile app is expected to encourage more donations, with users reassured that their donations are beneficial; with more people donating, customers should have less difficulty paying for shelter and essentials. Further, the app aims to inform customers relevant information, relayed through the app user, to provide real time information to the customer they may not have access to otherwise.

The problem space of homeless cashless payments currently has no solutions in the UK and is one that governments, charities and people experiencing homelessness should be concerned about.

3.0 Requirements gathering

The potential users of the solution, including their requirements and preferences, were determined prior to the design phase. Gaining an understanding of the problem area and users at the beginning of the project saved time making changes later. To accomplish this, research into similar apps on the market and mobile consumer statistics was completed to establish best practices for producing mobile apps. Questionnaires were completed to identify specific trends and preferences within each user group, as well as ensuring the most useful functionality has been included in the requirements. This phase guided and justifies the requirements specification (4.0).

3.1 Requirements scope

The whole system includes one mobile application and two websites, each with different user groups. Due to each product having varying functions and user groups, the requirements will be researched and defined separately. The three user groups include: app users making donations, retail staff using the retail website to take payments for services/products, and the Donate-Mate staff using the admin website to manage all users.
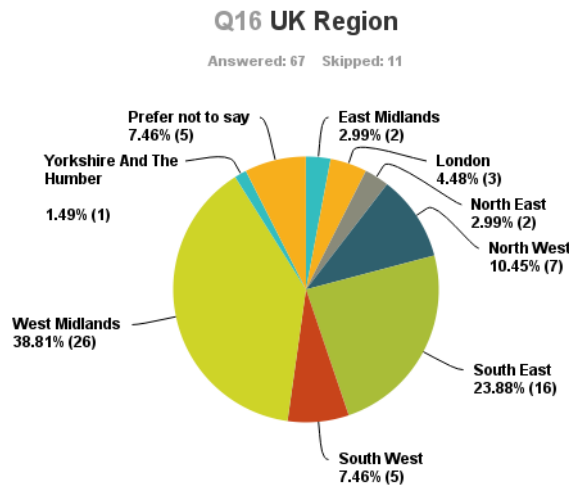
3.2 Changing requirements

The original focus for the project, and where donations would be spent, was shelter. As detailed in 1.1, shelter access encompasses complex restrictions inclusive of the shortage of availability. A meeting with a local representative from YAC (Youth Advice Centre) on November 11th 2016 confirmed that shelter was not a viable option for this app. It was suggested that retailers could be an alternative option; also discussed was the value of housing deposits and thus implementing savings is now a long-term goal for the project. More information about public engagement can be found in section 8.0.

Having established that shelter was not an appropriate focus for this solution, the service model was changed to make retailers and services the merchants of the system, with the addition of the possibility to save for a housing deposit. It was realised early in the project that this was a possible outcome as was written in the interim report, "if feedback suggest this system shall not work in practice, the purpose of the app may change to accept donations towards other necessities such as food/sleeping bags etc.' Sections 3 and 4 have been revised to meet the changing requirements, however changes made were mostly minimal with 'shelter' being swapped for 'retailer'.

3.3 Existing similar products

Existing mobile applications facilitating micro-donation were vigorously tested against HCI principles to aid requirements gathering and establish key design factors.

HCI design, usability and heuristic principles were compared across three micro-donation mobile applications: Givelify, SnapDonate and Share the Meal. This exercise highlighted strengths and weaknesses in the design and usability of the selected apps; the conclusions proceeded to shape the requirements and design of the application. This exercise also highlighted common – possibly expected – functionalities amongst donation apps, giving inspiration for additional features. The results of the HCI evaluation can be found in Appendix C.

Q16 UK Region

Answered: 67   Skipped: 11

Prefer not to say 7.46% (5)
Yorkshire And The Humber 1.49% (1)
West Midlands 38.81% (26)
South West 7.46% (5)
South East 23.88% (16)
North West 10.45% (7)
North East 2.99% (2)
London 4.48% (3)
East Midlands 2.99% (2)

Upon filtering the data to view the responses from those in East Sussex, the results were very similar to the overall results (all regions). It can be assumed that almost all the respondents from East Sussex live in Brighton and Hove. The responses showed 75% of people in this area give to homeless at least once every few months, as opposed to 66.67% of the overall respondents. Further, 62% of East Sussex respondents said they would download the app, greater than the 53.33% of the overall respondents. This is a good indication that the app could be successful in Brighton and Hove.

Key observations made from the app user survey include:

- The majority (61.54%) of cash donations are between 50p-£2 (Q3).
- Over half of the respondents have reservations towards giving money to people experiencing homelessness; of the written responses, 33 included concerns about how donations were spent of which 19 explicitly mentioned drugs/alcohol (Q4).
- The majority (53.33%) of respondents said they think they would download the app (Q5).
- There was some support (37.29% yes, 49.15% not sure) among respondents for setting up regular donations (Q7). This could be an extended feature of the app for future versions.
- The majority of respondents (53.33%) would share their activity on social media at least rarely-sometimes (Q8). This feature should therefore be a secondary objective.
- The majority (71.19%) of respondents saw no ethical/practical issues with the app (Q9). The issues raised included: competition may arise between customers for credits; some security restraints (i.e. identification) are required to ensure credits are not stolen; customers would be limited to registered shelters/retailers only.
- The majority (64.79%) of respondents prefer to make online payments using their credit/debit card however many prefer PayPal (Q11).
- The majority (70.42%) of respondents prefer to sign-up/login with their email and username, Facebook login is the next preferred solution (Q12).
- The majority (60.87%) of respondents prefer apps to keep them logged in however many still prefer to login each time they open an app (Q13).
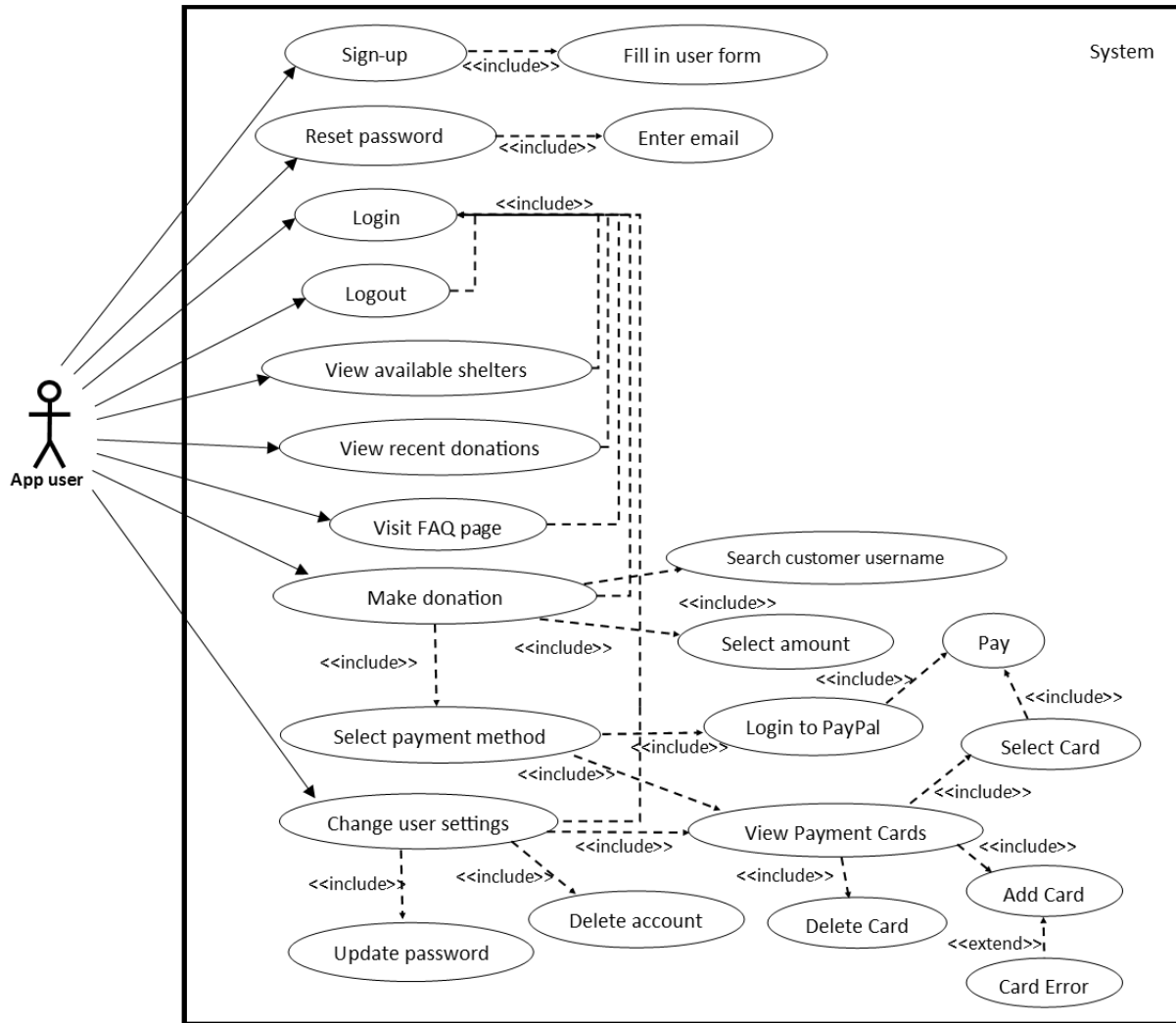
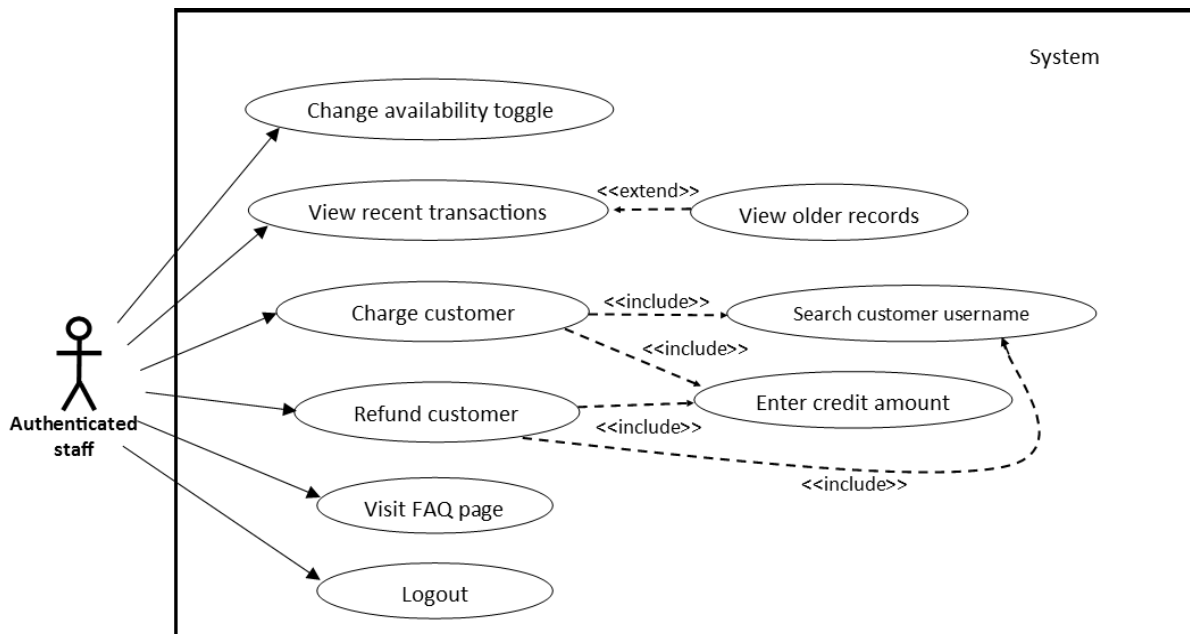Figure 14: Use-case 1 – Mobile Application user

Figure 15: Use-case 2 – Retailers website user

4.0 Requirements specification

This requirements specification shall define the exact functionality required by each element of the system (mobile app, retailers' website and admin website) as guidance and validation of the design and implementation phases. The app requirements are defined in this section and the requirements for the websites are found in Appendix F, as the websites were moved to secondary objectives. The requirements will be defined as user or system and functional or non-functional requirements. Some requirements were changed from the original specification due to changing requirements (see 3.2); these requirements are marked by an asterisk*.

4.1 User requirements

The user requirements listed for each component of the system – the mobile app, retailers' website and admin website – describe the functionality available to the user (functional requirements) and what the app should achieve (non-functional).

4.1.1 Functional requirements – mobile application

The functional requirements of the mobile app have been grouped by related requirements of the app. Each requirement details one functionality or condition that should be implemented in the app.

1.0 Authentication

1.1 – Unauthenticated users shall be required to login with their registered email and password.

1.2 – Unauthenticated users shall be able to sign-up with their name, phone number*, email and password.

1.3 – Unauthorised users shall be able to reset their password on *Forgot My Password* page.
    1.3.1 – User will enter email address and request a password reset email.
    1.3.2 – Unregistered email addresses entered shall return an error message.

1.4 – Authenticated users are remembered; user not required to login each time the app is opened.

1.5 – Authenticated users' landing page shall be the *Home* page whereby donations can be made.

1.6* – Authenticated users shall be able to change their account details on the *Settings* page.
    1.6.1 – *Settings* page shall be hidden for unauthenticated users.
    1.6.2 – User shall be able to update their password.
    1.6.3 – User shall be able to update their phone number.
    1.6.4 – User shall be able to delete their account.
    1.6.5 – Users shall be required to reauthenticate before making changes to their account.

1.7 – Authenticated users shall be able to logout by clicking *Logout* button on the side tab.
    1.7.1 – *Logout* button shall be hidden for unauthenticated users.
    1.7.2 – Upon logging out, the now unauthorised user shall be redirected to the *Login* page.

2.0 – Donation setup

2.1 – Authenticated user shall be able to make donations by following the steps on the *Home* page.

2.2 – User shall first search for a customer by entering the customer's username into a search field.
    2.2.1 – If username is found, donation buttons are shown.
    2.2.2 – If username is not found, the donation buttons remain hidden and an error message is displayed to the user.

2.3 – User (upon successful customer search) shall select a donation button of £1, £2 or £3*.

5.0 Design

The design phase of the project enabled the system architecture to be drafted and well understood, illustrated using diagrams to guide the implementation phase. Wireframes were also created for the first designs of the views; these were reviewed in a user opinion survey, providing further considerations for the final app design. The chosen model, MVC, shall be explained and design aspects shall be grouped by Model-View-Controller components.

5.1 MVC pattern

The MVC pattern separates applications into Model, View and Controller components to segregate the application logic from the user interface. The Model holds business/domain logic, managing application data; in this solution, the Firebase database is the model, connected by a Firebase object in the source code (see 6.2.3). The View component is responsible for the display the user interacts with, rendered by the model and controller; Ionic views were used in this app, as opposed to standard Cordova HTML pages (see 6.2.2). The final component, the Controller, processes user actions/inputs and talks to model to return relevant information; each page in the app has its own controller with relevant methods and logic for the functionality of the page (Tutorials Point, 2016). The MVC model in Figure 17 illustrates how data is passed between the components and where the logic takes place in the app, although the final app is expected to include more functions than are detailed here.
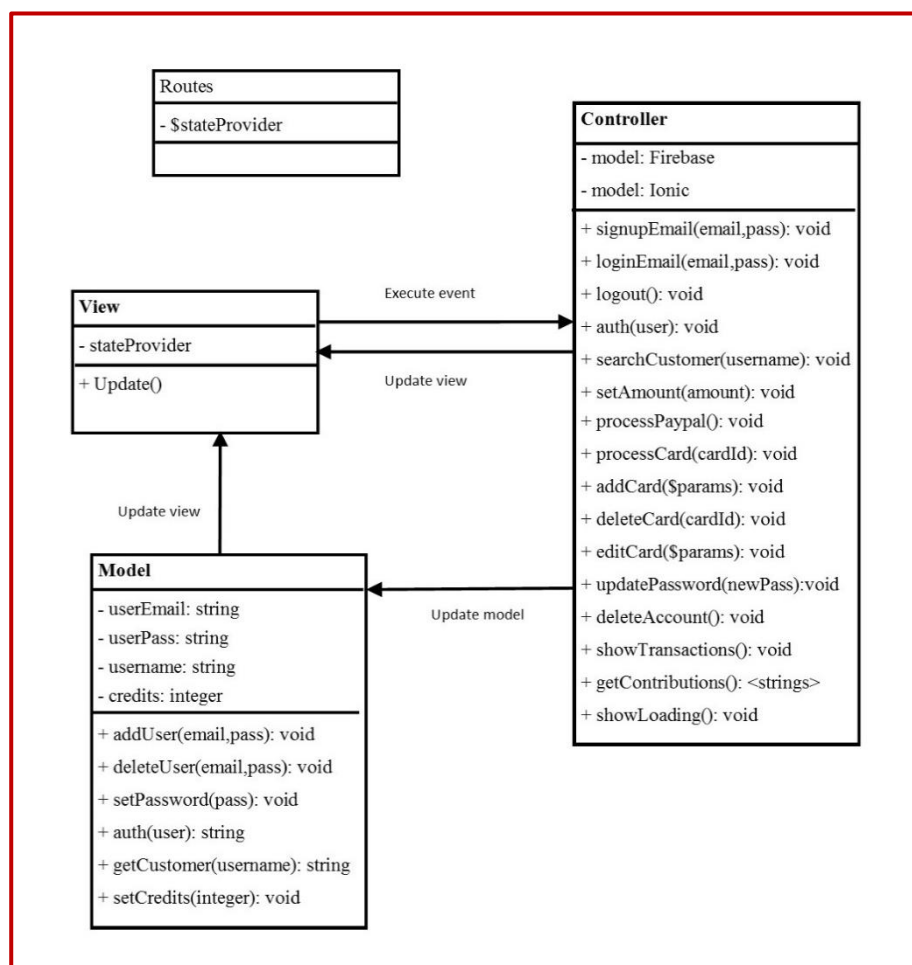

Figure 17 – MVC design

5.5 Controller

The controller shall process user inputs and execute the required functions accordingly, i.e. querying the database with user inputs and updating the view. All functionality shall be implemented in the controllers.js file and each page has a connected controller with the relevant functions for that page. Figure 28 illustrates the controller's function in the example of making a donation.
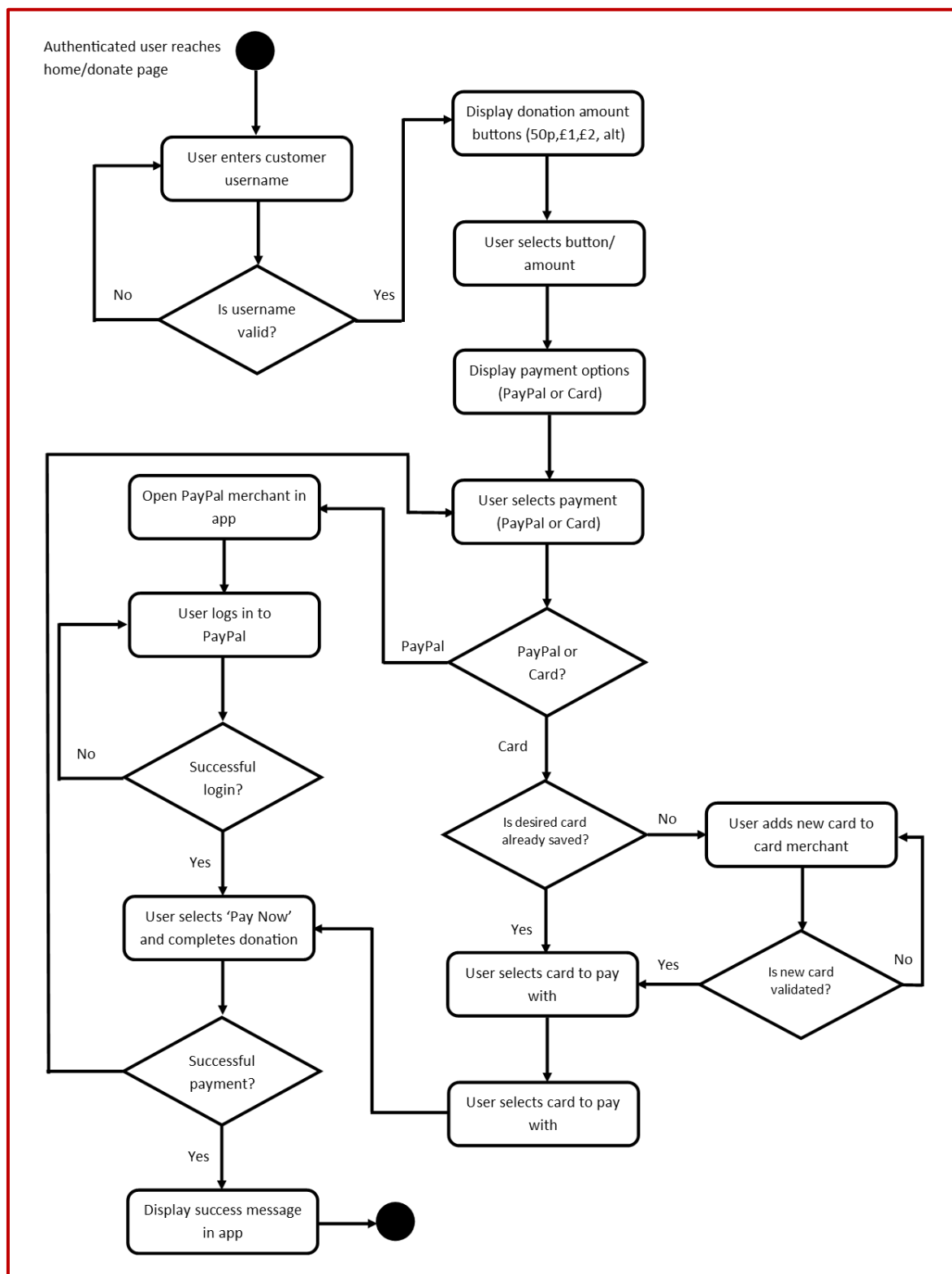

Figure 28 – Donation activity diagram

5.5.1 Sequence diagrams

Sequence diagrams were created for the app's main functions to illustrate how the controller shall behave. Sequence diagrams were also made for the main functions of the websites – see Appendix H.
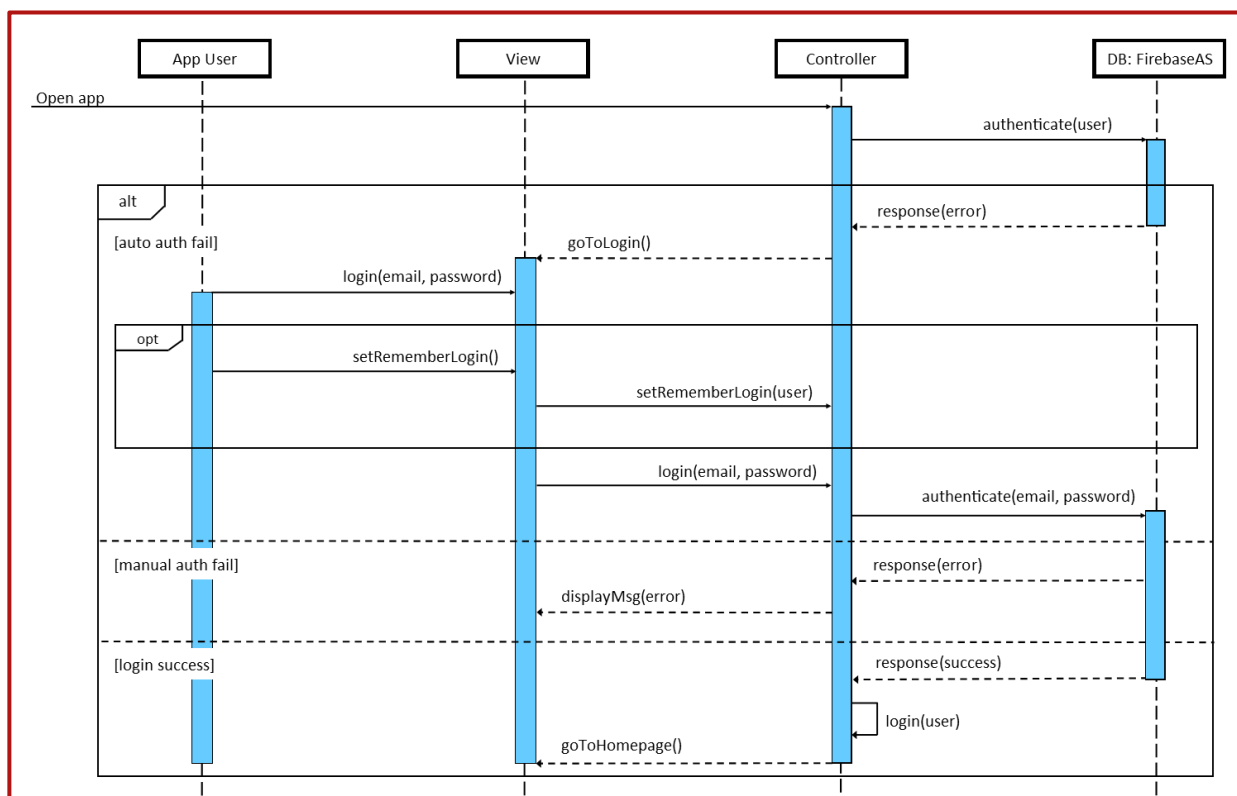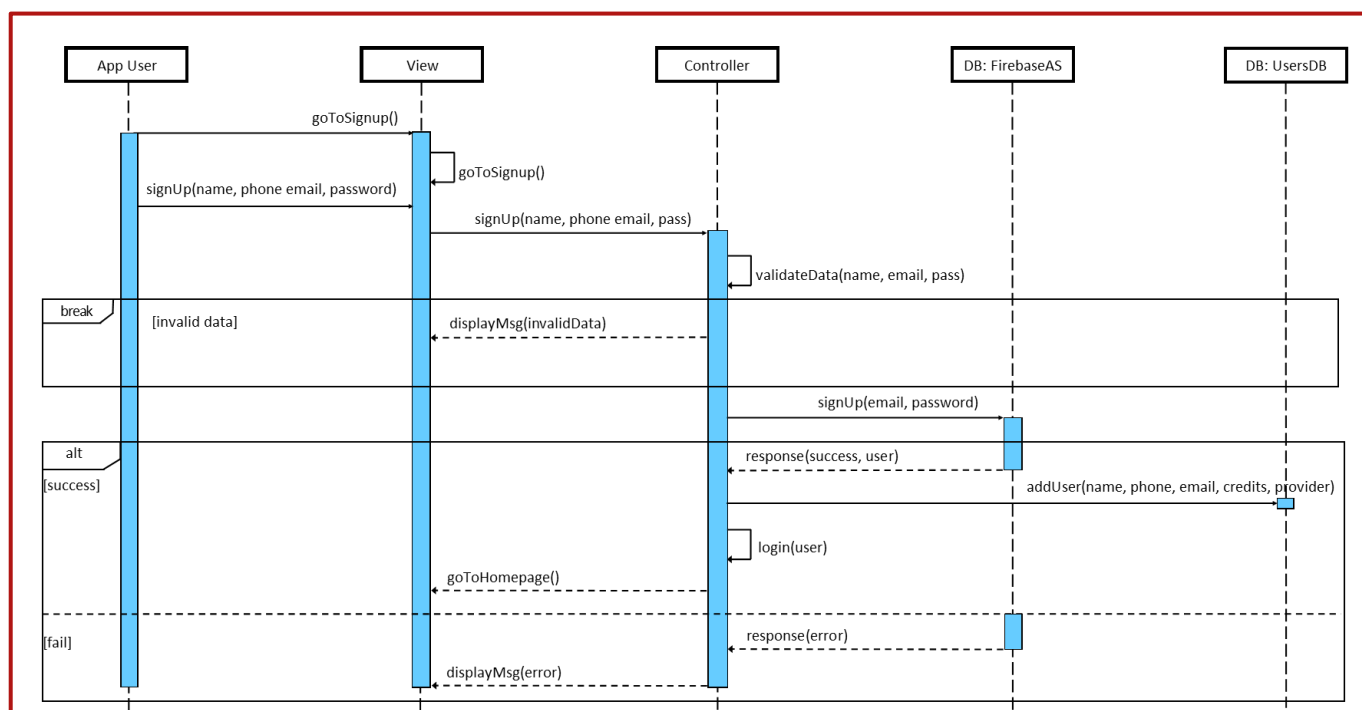

Figure 29 – Login sequence diagram

Figure 30 – Sign up sequence diagram

6.0 Implementation

This section aims to describe and justify the technologies and methods used to create the app, together with demonstrating the resulting final views.

6.1 Development environment

The primary development environment tool was Visual Studio Community (VS), Microsoft's open source IDE. Typically, developers create native apps for Android, iOS and Microsoft using either Java (Android) or C++ (iOS) or C#; due to the project's timeframe and the requirement to reach as great an audience as possible, hybrid/cross-platform development was more appropriate. Hybrid apps are made possible by Apache Cordova (see 6.2.1) for which VS has inbuilt tools; utilizing Cordova, hybrid apps can be developed using JavaScript, HTML and CSS. VS was installed with the necessary SDKs and an Ionic project was started and initialised in the IDE (Microsoft, 2017). VS includes useful code editing, debugging and testing tools to improve coding time and accuracy.

6.2 Frameworks

The main frameworks of the app – Ionic and Apache Cordova – enable building hybrid mobile apps. Secondary frameworks, Firebase (using JSON), PayPal and Facebook APIs, implement authentication, database integration and online payments. All used frameworks are open source and well documented.

6.2.1 Apache Cordova & ngCordova

Apache Cordova allows cross-platform mobile apps by packaging one HTML/CSS/JavaScript solution into wrappers targeting each platform. Cordova's API includes access to native device capabilities such as sensors, data, camera, network status and more. (Apache Cordova, 2017). Cordova uses Node.js for asynchronous JavaScript runtime, and npm to access open source libraries. See Figure 35.
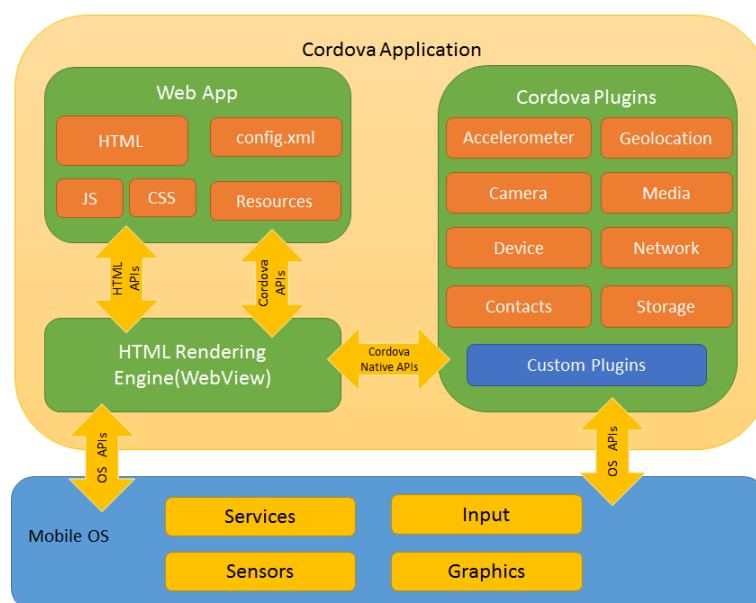
Figure 35 – Cordova Architecture (Apache Cordova, 2017)

NgCordova is an extension of Cordova that includes 70+ AngularJS extensions/wrappers for Cordova plugins, created by and for Ionic, to allow native functionality to be added to apps in just a few lines. Cordova/ngCordova proved to be a flexible and easy to grasp frameworks following previous HTML/CSS/JavaScript knowledge.

Figure 36 – ngCordova (Ionic, 2017)

6.2.2 Ionic framework

Ionic is the top layer on the stack, concerned mainly with UI interaction. Ionic provides standardised and high-quality CSS components including side menus and navigation controllers and works together with Cordova (ngCordova) to create cross-platform, native looking applications. Projects use the MVC pattern and code is written in HTML, CSS and AngularJS. 'Views' consist of Ionic components that are automatically rendered to fit each device, emulating native app UI guidelines using native SDKs (Ionic, 2017). This is a recently advanced technology that is transforming app development. Ionic also features fast and flexible debugging tools that were critical to the speed of development. The documentation provided by Ionic was used to learn and fully utilise the framework (Ionic, 2016).

6.2.3 Firebase API & JSON

Firebase – a Google owned service – provides authentication, real-time databases and cloud services. This platform was chosen for the application backend due to its strong security constraints, compatibility with Ionic and easy integration/maintenance. Using the Firebase console (website) the app was connected to Firebase and tested; the console is also then used for data access. A firebase object was initialised in the app source code to give access to Authentication and Database methods (see 6.4 and 6.5 respectively).

One key resource was used to integrate Firebase into the app was a tutorial written by Arjun SK (SK, 2016). His shopping cart Ionic app example integrates Firebase authentication and includes route/controller/service/app.js pages with UI components. This source was invaluable in learning Ionic and Firebase and shaping the foundation of the app; much of the code was changed however the final app was built on Arjun SK's source code.

Firebase uses a JSON file to configure its database rules and apply security constraints. A single JSON file was created within the Firebase console to restrict data access to authorised users only – see 6.4.1.

6.3.2 Home/Donate page

The donation process includes 3 main steps, each updating the view as they are completed. Views 13-20 illustrate these steps and Views 21-23 display the possible error/success messages displayed as the user attempts to make a donation.
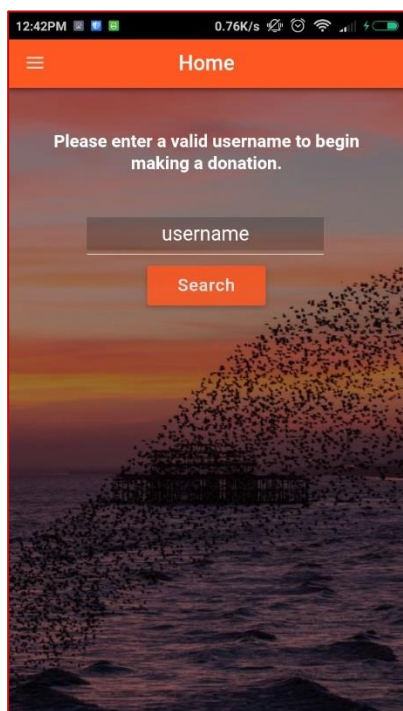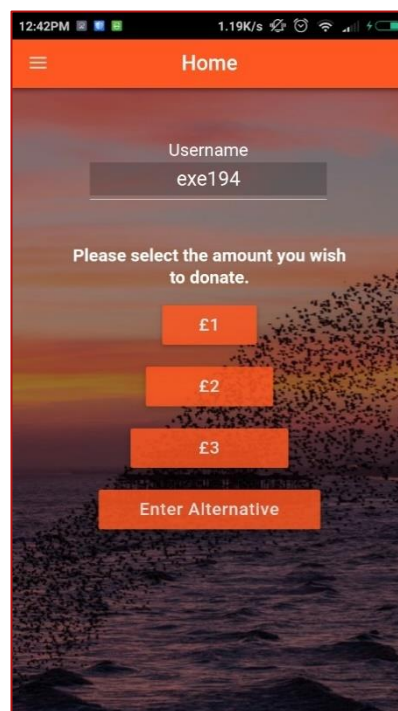

Figure 49: View 13 – Donate start
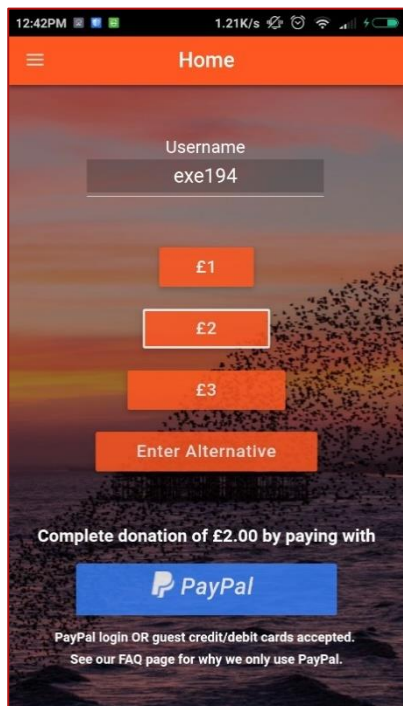

Figure 50: View 14 – Donate step 1

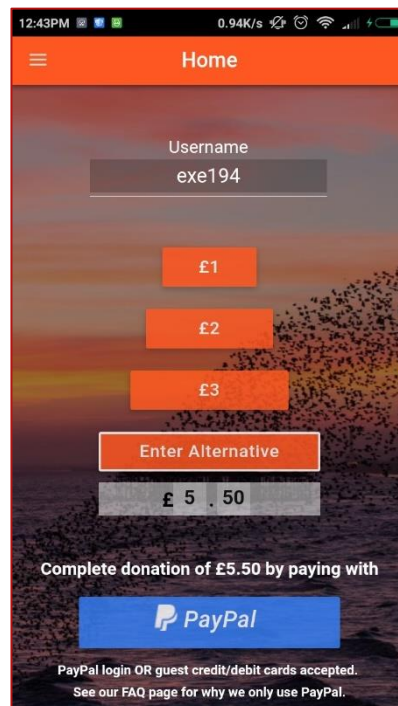Figure 51: View 15 – Donate step 2

Figure 52: View 16 – Donate step 2 alt

6.3.5 Settings

Users may change their user details or delete their account on the Settings page (Views 27 & 33). Users with an emails/password account can change their phone number and password; Facebook users can only change their phone number. Each change or account deletion requires the user to reauthenticate (Views 28-34).
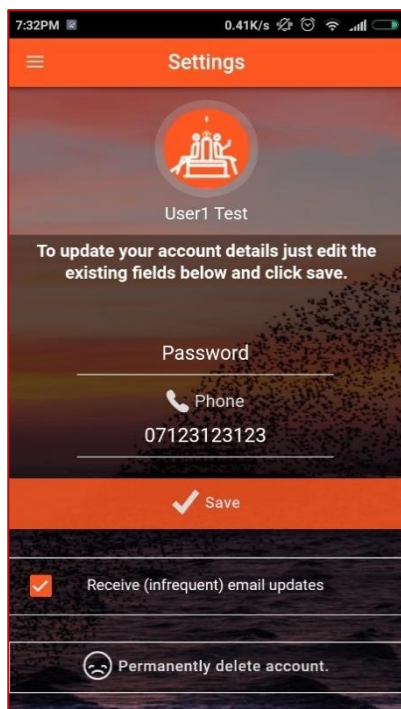

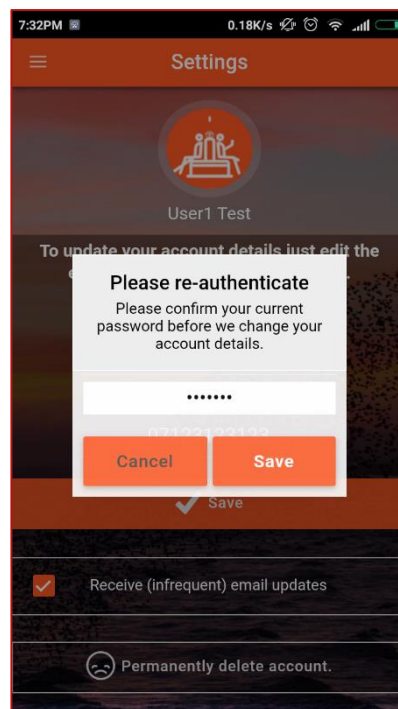Figure 63: View 27 – Settings email/password

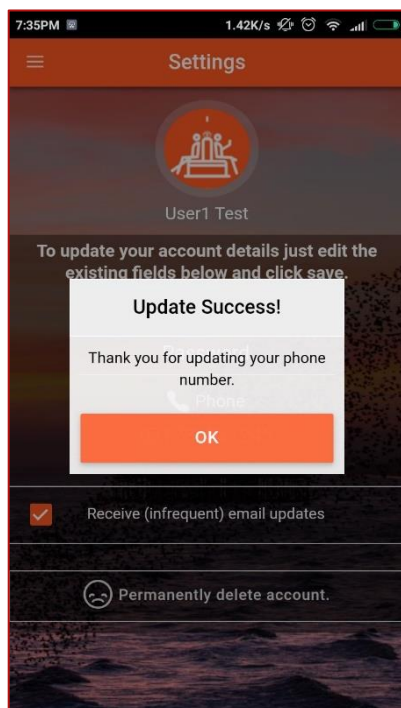Figure 64: View 28 – Email/pass reauthentication
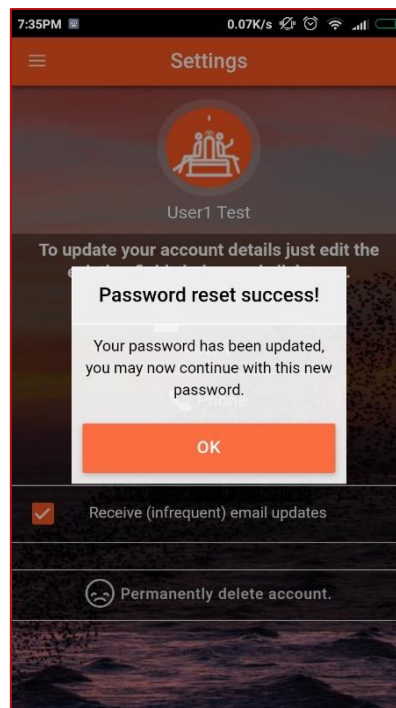

Figure 65: View 29 – Phone update success

Figure 66: View 30 – Password update success

7.0 Testing

Testing was completed manually against the app requirements (see 4.0) to ensure each function works as it should and user testing was completed to gather design and usability feedback. The testing phase confirmed the success of the project as the results from both testing methods were positive.

7.1 Functional testing

Use cases were designed to test each function of the app to measure the success of implementation and highlight any remaining errors/bugs in the app. Use cases were related to the requirements specification and duplicated for email/password and Facebook accounts. Each test was passed with no outstanding errors or caught bugs in the app. Requirements that were not included in the final implementation and testing include requirement 3.3 and all retail/admin website requirements. See Appendix I for use cases and results.

7.2 Usability testing

Usability testing developed understanding of how users interact with the UI and provided feedback on the final solution and its usability. This activity involved 10 testers executing all possible use cases whilst being observed to record the success of the tests and problems encountered. All tests were passed excluding Task 6 of the Facebook test, which was a moderate success - see Appendix J for the usability testing results and tester survey responses.

After completing the tests, testers answered a survey about the design and usability of the app. The response was very positive with 70% of testers agreeing that they think they would like to use the app frequently, and 100% agreeing that the app was easy to use. The System Usability Scale (SUS) measured the app's usability against industry standards and gained a score of 91.75/100, far exceeding the average score of 68 and indicating very high usability (Thomas, 2015).

The success of the project as a software engineering project can be derived from the results of the testing phase. With each objective and almost every requirement implemented without fault and with high usability feedback, the project can be closed with sight of extensions and future versions in mind. Further testing to be completed includes testing the app on several physical devices; although virtual tests have been run on several APIs using Firebase, confirming similar views amongst devices.

9.0 Reflective conclusion

Achievements and challenges, overcome and withstanding, are concluded by objectives met, the project journey, the personal significant of the project and potential future development.

9.1 Objectives and requirements summary

As a software engineering project, success may be measured by the objectives met upon completion of the project. Implementation and testing results conclude that all objectives relating to the mobile app were met – see 1.3 for objectives. Secondary objectives 11, 13 and 14, including card scanning, Facebook login and real-time information, were also achieved. Whilst the requirements changed according to research and development, the key objectives remained the same. With each primary app objective and requirement (excluding 3.3) being met, the software project was considerably successful.

The objectives that aimed to complete a further two websites were not attempted due to time constraints and prioritising the mobile app, alongside public engagement suggesting that the solution would not be used in the very near future. However, should the Donate-Mate app be launched as a functional service under a Non-Profit Organisation, the supporting websites/system could be completed in 2-4 weeks.

A key contributor to this project not being completed in full, with websites included, was the declining probability of the solution being used in the immediate future. Whilst most technical objectives of this project were achieved, the greater objective of launching this service in Brighton and Hove proved difficult to achieve; see 8.0 and 9.2 for the greater societal challenges this project uncovered.

9.2 Project journey

The original purpose of this project was to help people experiencing homelessness to fund shelter through personal digital donations. Inclusive of both a software engineering project and a social enterprise project, the two threads achieved disparate successes.

The software engineering project was a great success, achieving all app objectives and requirements (excluding 3.3). The schedule of the project was shifted with changing requirements and implementation challenges, however was completed in full, on time.

Contrary to the success of the app development, attempts at public/stakeholder engagement achieved a mixed response. Positive feedback from user surveys, suggesting potentially great support for the solution, conflicted with the response of local charity and council representatives. Indeed, the realisation of the complexity of the problem area became more apparent as the project's research developed. Outcomes included changing the focus of the solution from shelters to retailers, due to restrictions to accessing shelter (see 3.2), and unsuccessful engagement with local representatives. Prevalent concerns include the assertion that individual donations are a poor method of donating to people experiencing homelessness as it discourages connecting with local services, and the complexity of the challenges surround homelessness (see 1.1 and 8.0). Challenges in public engagement have curtailed the social enterprise thread of this project, however only temporarily.

Initial unsuccessful response from potential stakeholders should not undermine the potential of this solution and discourage further development. Background research (see 1.1) validates the requirement for a solution to safeguard people experiencing homelessness in an increasingly cashless society. In conjunction with very positive overall feedback – indicating the potential of a large user base – the solution arguably has potential upon gaining the required support, a challenge still ongoing.

9.3 Personal development

As explained in 9.2, there have been two streams of development to this project – software engineering and social enterprise – developing both technical and business/managerial skills respectively.

Prior to this project I had no experience of mobile application development and the frameworks/platforms used to implement the app. Through building the app I learnt the following languages and frameworks: AngularJS, JSON, Cordova, Ionic, Firebase and JavaScript. Additionally, I have gained experience in writing professional quality code, conducting user surveys/testing to adjust requirements, and technical writing. This project has prepared me for a career in app development, software engineering, requirements gathering, testing, technical communication or technical consulting.

Concurrently, business and managerial skills were developed and lessons learnt in the project. The problem space addressed is extremely complex and sensitive, with ethical questions being raised and various challenges to meet. I have gained experience and confidence in meeting with potential stakeholders, demonstrating a product/service and accepting criticism. I recognise these skills as being critical to a successful career and the possibility of continuing the social enterprise of Donate-Mate. With aspirations of starting social enterprises in the future, this project has been invaluable experience.

9.4 Future work

Considering the project's journey so far, a great amount has been achieved in creating the app and gaining supporters of Donate-Mate. Yet the app could not be released and used successfully without initiating a network of app users, customers and retailers, through marketing and administration. Building the organisational structure of Donate-Mate is the next step beyond this dissertation.

Simultaneously, if Donate-Mate were to be launched, the admin and retailers' websites would be required. Whilst the app is fully functional and received good feedback from user testing, several extensions and improvements are possible for future development, including:

- Back button functionality; although currently the menu allows for flexible navigation.
- An infographic illustrating the real-time total amount of money donated through the app.
- Functionality to allow users to change the default donation amounts of the donation buttons.
- Functionality to link each retailer's address.to Google maps location.
- Functionality to allow users to share Donate-Mate activity on Facebook via a share button.
- Functionality to allow donations to be grouped as weekly/monthly transaction to save costs.
- Functionality to set up regular payments to customers.

9.5 Conclusive remarks

The significance of this project relates to the exposed challenges and lessons learnt in offering a new technical solution to a longstanding societal problem. Research completed during this project proves the requirement of a solution to the problem space of people experiencing homelessness being financially isolated in a cashless society. Accordingly, a hybrid mobile app was successfully built to facilitate digital donations to people experiencing homelessness, redeemable at retailers or saved for housing deposit. Whilst all main objectives were met and the software engineering project was successful, the challenge of building a social enterprise around Donate-Mate, remains unmet. Potential stakeholders were not supportive of the solution, or seemingly concerned about the problem space; with the complexity of area being a recurring answer. Conclusively, the observations made during this project suggest that the required support for Donate-Mate to be successful is dependent on society's readiness to face such challenges with new solutions. Yet the urgency of the problem space, alongside wider support shown by surveys and peers, indicates that the successful completion of this dissertation should not mark the end of Donate-Mate.