I. Abstract

The advent of the internet has provided an incredible platform for social interaction that has revolutionized the way many people connect with others. There is no shortage of social networks online, but one area which has been observed to be lacking is that of charity-based social networks. Noting that despite common perceptions about lack of internet access among homeless individuals, more than 80% of them get online more than once per week\textsuperscript{1}, this project explores the possibility of peer-to-peer local donations via a dedicated social web application.

As such, in this project, I developed Home Connections, a social web platform for connecting local volunteers with homeless individuals for resource donation, with focus on food, laundry washing, transportation, showering, temporary shelter, and mentoring. The goal of this project was to create a usable online charitable exchange platform while learning and refining skills in web development and making informed, well-researched decisions in choice of frameworks, technologies, and security techniques. The features in the current build of the project include: accounts and session management, customizable profiles, messaging other users, a multi-step exchange system with review functionality, fine-grained privacy controls, and user matching via search. The final choice of major technologies included Ruby on Rails (backend framework), PostgreSQL & PostGIS (DBMS), Devise (authentication), Git (version control), RSpec & Capybara (testing), among others.

The application includes the most essential features for its purpose and may be deployed as an alpha in the fall of 2016. In this paper, I discuss the features and development process of Home Connections.

II. Features and Development

1. Summary

The features in the current build of the project include: accounts and session management, customizable profiles, messaging other users, a multi-step exchange system with reviews, fine-grained privacy controls, and user matching via search.

The privacy settings, search, and exchange systems were implemented from scratch, while the user registration, session management, and messaging systems were built from a combination of existing frameworks as a base with hand-crafted integration and additional features.

As noted, the final choice of major technologies included: Ruby on Rails (backend framework), PostgreSQL & PostGIS (DBMS), Devise (authentication), Git (version control), RSpec & Capybara (testing), and HAML (HTML templating) with the Yahoo Pure-CSS modules (styling).

Ruby on Rails was chosen for its community and facilitation of rapid development. PostgreSQL and PostGIS were chosen for the database for their speed, stability, wide-support, and special support for geospatial queries.

Home Connections’ session management (log in, log out, session timeout) and registration management (initial confirmation email, resending confirmation email if not received, password reset emails) relies heavily on Devise, an authentication framework available as a gem for Rails, as its backend. In the area of security, it is best not to reinvent the wheel, as one is likely to fare worse for it. Devise is the major authentication framework available for Rails and was chosen for being the most battle-tested solution available.

Testing was done with a combination of manual testing techniques with automated ones. The latter, done with RSpec and Capybara, were found to slow down development time significantly, but bring great benefit towards future maintainability. (See Figure 1.)
2. Features

2.a. Accounts & Session Management

In order to encourage potential users, Home Connections features a short sign-up process that asks for only very basic information in order to initially make a profile, in two steps. In step 1, the user clicks through to the registration page via a button that sets whether they are a provider or seeker of resources. In step 2, they provide an email, name, postal code, and password. This creates their account. The user is sent a confirmation email and must follow its confirmation link before being able to sign in. Session management, implemented via Devise, allows users to sign in and sign out, and times sessions out after a period of inactivity. Beyond basic registrations, users are also able to resend their confirmation email for registration upon request or reset a lost
password over email. Further account management is done via the profile and security settings described in following sections.

2.b Profiles

Registered users have profiles with the following information: name (required), postal code / location (required), gender (optional), age (optional), “about” text (optional), “about” snippet (optional), resources needed or offered of food, shelter, transport, showers, laundry, buddy system partners / mentoring, or miscellaneous, as well as text fields to describe specifics for each (all optional) and the ability to specify need/availability of disability-accessible housing or housing which allows pets. The user is able to edit any of these fields when desired through the profile settings pages, reachable via the “settings” link in the header.

Notably, the postal code, set during registration (or changed during profile editing), is used to determine and set the user’s location. Users are not able to change location information arbitrarily, instead providing a postal code which the server uses to determine further specifics. Home Connections uses geocoding and latitude/longitude calculations to achieve its location-based features, determining approximate latitude/longitude, city, state, and country via the supplied postal code. Efficient distance calculation via latitude/longitude is achieved via the PostGIS extension for PostgresSQL, bypassing the need for external API calls after the initial geocoding, which is of incredible benefit both in speed and avoiding API usage limits. That initial geocoding is achieved via the Geocoder gem available for Rails, which uses the Google Maps API to determine users’ location information when initialized or changed.

See Figure 2 for an example of a user profile.
2.c. Privacy Settings

Another feature very important to the nature of Home Connections is the availability of privacy controls. Users have a privacy settings page through which they can choose from 5 privacy levels to control the visibility of a number of fields of their profile and listings in search results. These levels are:

1. Viewable publically

2. Viewable only to signed in users

3. Viewable only to users of the seeker/provider category opposite to the user

4. Viewable only to other users with whom the user has accepted an exchange

5. Viewable only by self
These privacy levels can be applied to each of the following: email, location, last log in time, gender, age, “about” section in profile, resource needs/offers, resource need/offer descriptions, and number of exchanges. The defaults for these settings are: email:5, last log in time:2, and 1 for all others. Additionally, the user’s name is protected under category 2, but the user is not able to configure this in the current version, as a design decision.

2.d. Searching

Searching serves as a very important function in Home Connections, as it provides the means for users to match themselves with other users. As such, the homepage shown to signed-in users is the searchable index of other users, defaulting to showing results appropriate to their own profile (i.e. offering or needing the resources the current user lists as needing or offering). Users are able to search by the following parameters: distance, offering/needing food, shelter, transport, showers, laundry, buddy system partners / mentoring, and miscellaneous, as well as being able to filter for disability accessibility and allowance of pets in the case of shelter offers/requests.

The resulting set of users is displayed in increasing order of distance away from the current user’s set location. The attributes of the users in the result set displayed on the results page includes their name, distance, location, resource needs/offers, and the ‘tagline’ specified for themselves, as well as the link to their profile.

See Figure 3 for an example of the search results page.
2.e. Exchanges

The exchange system is another core component of Home Connections, serving as the mechanism by which volunteers and resource seekers exchange aid. It is designed as a multi-step system to ensure mutual agreement of both initiating and finishing the interaction. The steps are as follows:

1. User 1, either a seeker or provider, may initiate the exchange with User 2 through User 2’s profile by extending an exchange “offer” or “request”.

2. User 2 is notified of this offer/request via their inbox and can either accept or decline it through their dashboard.

3. User 1 is notified of User 2’s reaction via their inbox. If User 2 accepted, the exchange enters the mutual-acceptance phase, in which the users are encouraged to contact each other over
the messaging system to set up their in-person interaction. At this point, the users each have the option to confirm this in-person interaction truly occurred or cancel the exchange altogether.

4a. If User 1 or User 2 cancels the exchange before mutual confirmation occurs, the other user is notified of the cancellation via their inbox.

4b. If both users confirm the interaction occurred, the exchange is marked as completed, the users are notified via their inbox and are authorized and encouraged to leave a review for their exchange partner.

Once the exchange is completed, each user is able to leave a review for the other. This review includes an overall rating, public comments visible to all users, as well as a private comments section not visible to the reviewed user.

Home Connections

Dashboard

In-Progress Exchanges

<table>
<thead>
<tr>
<th>With</th>
<th>Began On</th>
<th>Last Updated</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macie</td>
<td>05/05/16 - 02:45</td>
<td>05/05/16 - 02:45</td>
<td>Details</td>
</tr>
<tr>
<td>Alessandra</td>
<td>05/05/16 - 02:45</td>
<td>05/05/16 - 02:45</td>
<td>Details</td>
</tr>
</tbody>
</table>

Complete Exchanges
Currently no complete exchanges.

Figure 4. The exchange dashboard.

2.f. Messaging

Users are able to communicate with each other and receive automated notices through Home Connection’s internal messaging system. In Home Connections’ messaging system, users have a mailbox with ‘inbox’, ‘sent’, and ‘trash’ folders which categorize messages in the expected way. Users are able to write to other users by following the “contact” link on a given user’s profile page, or by replying to a message in their inbox, in either case submitting their messages with a
Users are alerted of new messages via a notification which displays the number of unread messages next to the “Inbox” link in the header of each Home Connections page.

Home Connections’ messaging system relies on Mailboxer, a Rails gem which provides the core message creation and management functionality. Home Connections also uses Mailboxer’s functionality to notify users of certain events via email and/or the internal messaging system.

III. Conclusions & Future Directions

While there are a number of features and tweaks that could improve the site, it is overall in a usable state. Because it is likely that focusing on iterations in reaction to user feedback will yield better results than pre-planning alone, as well as the fact that the site could provide benefit to real people even in an imperfect state, I intend to launch the site as an alpha build in the fall of 2016.

Features and revisions which may be considered for future iterations include: Allowing the user to decide the level of specificity of the location information they provide, rather than mandating postal code level. The ability to search text of different profile sections to find users. Other more advanced search options (AND, OR, etc). More engaging biographical questions in profiles. Map visualization features. The ability to blacklist / block other users. Moderation and the ability to report others. Additionally, it would likely be wise to employ the help of a graphic designer to make the page layouts and appearance more engaging, as this is not a strength of the author.

In whole, the development of Home Connections was an enriching experience which posed significant challenges and opportunities for learning in the process of designing, writing, and debugging its code. I look forward to continuing work on Home Connections beyond the semester and deploying it for the use of real individuals.