Prospectus

ChoreoNova: A real life software development opportunity

(Technical Report)

Mobile Health: A possible solution to healthcare inaccessibility

(STS Research Paper)

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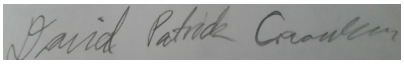
Signed: 

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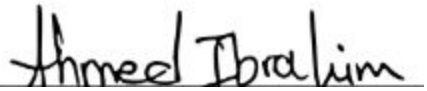
Approved:  Date: 11/30/2019

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Introduction

Many consider healthcare an essential service that is necessary for their everyday lives. However, there are a multitude of communities, such as rural communities, that don't have the ability to access that service as easily as one might expect. There are a lot of societal and physical barriers to entry when it comes to healthcare. A project I have been working on includes pitching an idea of a smarter, more technologically advanced option for healthcare. The project will be aimed primarily at rural communities in the Charlottesville area. The overall mission is to give less fortunate communities the ability to have a hospital-like experience in their own home.

In order to recreate this experience, we are proposing the idea of creating a phone and/or web application that allows partnerships and integration with local hospitals to connect doctors to teleconferences with patients unable to make it to a hospital. Also, similar to Amazon's PillPack service, we want to make it easier for people to obtain their prescription drugs by allowing users to directly order their medication in the application. Our hope is that a service like this fully integrated into a new medium like smartphones will be able to help users who aren't familiar with the healthcare process both understand it better and feel more confident when getting help.

Charlottesville is an interesting case in regards to servicing everyone in the community with quality healthcare, as the only practical place to actually get medical treatment is at the UVA hospital. There isn't a closer option if you live in a rural area.

For my technical report, I will be discussing my involvement in software development for the non-profit dance company ChoreoNova. I am working on the project with three other Computer Science students: Eldon Luk, Vivian Pham, and Jared Taylor. The project we are developing is a ticketing system. This system will allow ChoreoNova's users to order tickets for the events in a separate website. It utilizes Python programming language and Django web framework to run and store the information of the users.

ChoreoNova: A real life software development opportunity

Introduction

ChoreoNova is a non-profit dance presentation company with a mission to develop, produce, and present transformative contemporary dance works that tell impassioned stories. ChoreoNova also hopes to promote personal empowerment and communal justice with all those in the communities they perform in and they help to improve individual and collective resilience amongst community members as well. Thus, their core values include storytelling, well-being, diversity, inclusiveness, cooperation, and self-supporting. ChoreoNova currently holds around three to four events per year. Each of these shows has multiple showings at different times and days, potentially at different venues as well. In recent years, ChoreoNova's performances have been increasingly moving towards using more forms of media than just simply dance, integrating

the arts with the sciences. Our main objective in this Capstone group is to develop a system to allow these dance presentations, as well as other ChoreoNova events, to have an efficient and high quality ticketing system by the end of the Spring 2020 semester.

Currently, ChoreoNova's way of listing events and selling tickets are very disjointed and disconnected due to compatibility issues with the way their main webpage is built. Their current website is built on Joomla, where they have found many compatibility issues when they attempted to integrate new webpages onto their site. Their current method of selling tickets include having all their events listed on their main website in the "Events" tab. However, users are not able to purchase tickets from that "Events" page, which is merely used to display upcoming events that ChoreoNova is holding. Instead, users must go through another link sent to them in a newsletter via email or found on ChoreoNova's Facebook page to access an EventBrite page for the specific event's date and time they would like to order tickets for. Overall, ChoreoNova's current band-aid solution to not being able to integrate links onto their webpage is extremely inelegant and unscalable. First off, this is a very inefficient process for users as after seeing an event they may be interested in on ChoreoNova's main webpage, they would need to somehow find this other link to the EventBrite page via email or Facebook. If this user had not signed up for the newsletter before or does not own a Facebook account, it would be virtually impossible for them to access this EventBrite page and order tickets to attend the event. For more impatient users, all this clicking and searching for the proper link to order tickets may even discourage them from purchasing tickets altogether, resulting in ChoreoNova losing business. On top of that, ChoreoNova is also handing over control of their ticket sales to a third-party company: EventBrite. This means they lose control over a lot of the revenue they generate and also are giving EventBrite valuable data that they could have kept for themselves. As such, our goal is to help ChoreoNova find a more elegant solution to their ticket sales, integrating everything into one system linked to the main website throughout this school year.

Currently, our plan is to split most of the work on this ticketing system into two semesters worth of work. The first semester will be focused on putting together a functioning ticketing system where users can see events and purchase tickets altogether in one system. The second semester we will focus on integrating our system with ChoreoNova's existing systems while adding more additional features into our ticketing system we have built in the first semester. Once the systems are in place, the user interface (UI) and user experience (UX) will then be worked on. Choreonova values a smooth and enjoyable experience for their customers, and therefore wants the ticketing system to reflect this.

This project is important for many reasons, as it supports the arts and the local Charlottesville community. In recent years, the rise of STEM careers has in many cases displaced studies that are sometimes referred to as "softer" studies, such as the arts. Many see STEM as more productive for society, contributing more to the further advancement than something like the arts. However, society needs balance and many times, the arts provide that balance by introducing more abstract concepts, such as humanity or justice, all necessary for a full functioning society. With no humanity, society would have lost its human roots, removing us from our very own nature. The arts, especially a company like ChoreoNova, which promotes inclusivity, well-being, and cooperation help to ensure this social aspect of our species is not lost. ChoreoNova also has the added benefit of being a company that is local here to Charlottesville.

As the divide between the University of Virginia continues to grow with the local Charlottesville area, it is very important for University of Virginia students to have the opportunity to give back to the surrounding area, and to thank them for welcoming us into their home for the past four years.

System Design

The main goal of the capstone project for ChoreoNova is to create a functioning ticketing system that will allow customers to purchase tickets for events. The ticketing system has a number of requirements that need to be met. These specifications were put in place by our client, Davida Rae. Her original vision was to have the system embedded on her original website. However, our group felt it was best for testing and building purposes to have our product be a completely separate website and link it straight from our client's own website. Doing it this way allowed us to make modifications without impacting or conflicting with our client's work.

In terms of functional requirements, our group has to prioritize ease for users, as that is the main obstacle facing ChoreoNova's current band-aid solution. The main goal of our project is to allow typical ChoreoNova customers, who have varying levels of technological experience, to be able to easily go on the main ChoreoNova website, click the link to buy tickets, and then purchase the tickets in a reasonable amount of time.

The front-end is the part of the website that the users can access and interact with. The front-end is being built to be logical and streamlined. The client has placed heavy emphasis on reducing the number of clicks and webpage redirects. The current front-end design has been created around this vision, and only requires 3 webpage redirects to purchase a ticket. First, the user is redirected from the main website to the homepage of the ticketing website. From here, the user can then pick an event from this page. There is a list view and also a calendar view to select an event from. There are also filters if the user wants to reduce the number of events or only see the events of a certain type. Once the user has decided on an event, they will then click on the event and be redirected to the ticket purchasing page. Here, the user must select the quantity, location, and accommodations they want. Then, the user will purchase the tickets and be finally redirected to a confirmation page. This system will default to a simple system that a person who is not technologically savvy will be able to complete, but will provide the tools, such as calendars and filters, that allow more advanced users to have a more refined experience.

The product needs to also have an easy-to-use back-end system for our client or any other ChoreoNova employees to access the website as an admin and be able to modify objects, view statistics, and be able to look at user demographics so they can plan for their next event. Having an admin back-end system will also give the flexibility for ChoreoNova to expand with more employees and more shows if they choose to do so in the future. This will lay the groundwork for years, if not decades, of future development. The back-end for this system will hold all the information that ChoreoNova will need in regards to ticketing, with the most important information including the event that tickets are being sold for, how many tickets are left for that event, the price of tickets, a seating chart if relevant, and special requests that specific customers may have, for example, special accomodations. This information would be stored in a database

that will be easily accessible by ChoreoNova employees and display all the information for them efficiently and effectively.

Our group is using Django, a web framework that uses Python as the programming language and has an MVC structure. MVC structures stand for Model-View-Controller. It is a three-tiered structure that keeps data, presentation, and logic separate from each other. Using this framework allows our ticketing system to be able to store tickets and events as models, display the desired information as a view on the rendered webpage, and control how a user interacts with the system. The actions of a user determine what views and models are impacted. For example, if someone orders a ticket, the view will update to an "order success" message, and then the ticket model will decrease by a value of one, signifying that one ticket has been removed from the system as it has been sold.

System Requirements

System requirements are the various functionalities that the system we are building must contain, per our customer's wishes. Gathering system requirements allows us to begin the process of building a system by planning what needs to be done. By splitting the list of system requirements into minimum requirements, desired requirements, and optional requirements, we will know which features should be prioritized. The minimum requirements are as follows:

- As a user, I should be able to buy a ticket to the event I selected so that I have a verified method of entrance.
- As a user, I should be able to input any special requests so that the company knows how to accommodate my needs.
- As a user, I want to be able to get back and forth between the main website and the ticketing website easily.
- As the owner, I need to be able to connect my bank account to a payment page in the website so people can make transactions on the same page.
- As an admin, I should be able to create an event and include the appropriate details so that users can see what events are occurring.
- As an admin, I should be able to track ticket sales so that I can see the number of remaining tickets for an event.
- As an admin, I should be able to know that the ticketing website will not conflict with the already existing software.
- As an admin, I should be able to see which tickets have a special request so that I can properly accommodate their needs.

After the minimum requirements have been completed and we have a functioning ticketing system, we will be able to work on desired requirements. These include:

- As a user, I should be able to select which seat I want in the venue so that I know where I will be sitting.
- As a user, I should be able to print or receive a QR code after I purchase my ticket so that I can present it to get into the event.
- As a user, I want to be able to look at a calendar of events to make it easier to find out which performances I can attend.
- As a user, I should be able to see how many tickets are left easily.
- As an admin, I should be able to edit the event throughout the sale period so that I can make updates as needed.
- As an admin, I should be able to list different seating categories with the number of seats available per category so that I can keep track of sales and seating arrangements.

Finally, if there is any time left after the completion of the ticketing system, we will work on the optional requirements:

- As a user, I should be able to organize events by type so that I know which shows I would be interested in.

Implementing these features will create a ticketing website that is versatile, elegant, and functional. This system will allow the client to stop focusing on technical issues, and put more passion and time into their art. Our client runs a nonprofit dance company and helps bring art to the community of Charlottesville or wherever they choose to perform, and our product helps them run it more smoothly and efficiently. This is also a very good opportunity for us as future software developers to be able to develop and code a product for a real life client. Our software development experience has so far only been with professors that know what to expect based on some form of grading guidelines. Working with someone who is not used to working for a software development team is a useful real life experience, because in the future when we may have to develop for a non-technical customer. This project will not only help artistic endeavours and the Charlottesville community, but will also aid our team in becoming more patient and effective developers.

Mobile Health: A possible solution to healthcare inaccessibility

Introduction

For many people going to the doctor is as simple as making an appointment and getting themselves there. However, being unable to ensure one's own health is a harsh reality for a plethora of people. While mobile health options are being created at a rapid pace to try to help these less privileged folks, there are still a tremendous amount of other hurdles standing in the way of an ideal solution.

Mobile health is a newer innovation in the realm of healthcare. It is the idea of either bringing someone to a healthcare facility or having the healthcare facility brought to them. One form of mobile health is telemedicine, which is a modern concept that envisions professionals giving patients proper health treatment from any distance as long as they are in possession of an internet capable device. In order to propose ideas on how to make a city flourish with healthier and safer people, I need to understand what problems still exist in accessing healthcare and the benefits and limitations of mobile health solutions.

My goal is to find the important context to help us frame our project. I have tasked myself with finding the answer to the following questions: What primarily causes poor healthcare accessibility in communities in the United States? How can mobile health solutions, such as telemedicine and Uber, both negatively and positively impact the lives of people in these communities?

Literature Review

Current literature suggests that poor transportation is one of the largest barriers to healthcare in the United States. Samina T. Syed, Ben S. Gerber, and Lisa K. Sharp researched how transportation acted as a barrier to good health. They found that transportation issues can impact up to 67% of a single community's access to health care. If one regularly uses a bus to make their way around, they will have double the chance of missing their appointments than car users. Up to 25% of all patients missed their appointments because of transportation issues in general (Syed, Gerber, Sharp, 2013). Talia M. Cray studied the correlation of a lack of transportation and healthcare accessibility. The results of the research showed that many healthcare professionals find that transportation can be a problem, but is never realistically considered as an in-depth situation that needs a solution (Cray, 2000).

While mobile health solutions do fix some problems with physical distance and insufficient finances, there are a number of drawbacks. In an analysis of mobile health by Steven R. Steinhubl, Evan D. Muse, and Eric J. Topol, they discussed some of the potential drawbacks to proposed solutions. In the case of smartphone applications, at the time the article was written, they reported that the U.S. Food and Drug Association had only reviewed and approved around 100 healthcare related applications out of the tens of thousands available on various app stores. The article also discussed how these types of solutions can weaken the already fragile relationships of patients and doctors (Steinhubl, Muse, Topol, 2013).

Mark Rugarber is a Charlottesville emergency health worker who acts as a resource for people who don't have primary care. During my interview with him, he stated that UVA itself is actually the central hub for a majority of healthcare in the area. One of the main reasons for this is because of a lack of competition, forcing people to have to find more difficult ways to access

their health care facility. He also discussed how people in rural communities, and even sometimes people in the more populated downtown, have to spend hours just to make it to the hospital because of traffic and distance.

STS Framework and Research Method

To answer this question, I will picture healthcare as a Social Construction of Technology (SCOT). This type of framework connects the stakeholders related to a certain technology or idea, the artifacts that the social groups interact with, and the problems that connect the stakeholders and artifacts (Bijker, 2001). The different social groups include rural patients, urban patients, doctors, and other medical personnel. Visualizing a system like this is helpful to determine the context of situations surrounding a certain technology or system.

Transportation and distance issues have some of the most connections in a social construction of healthcare. For example, rural patients are connected on this diagram to problems of missing their appointments, not having the time to travel to a hospital, and not having the finances to pay for gas or to be able to miss work. These issues are all connected by the fact that hospitals can be lengthy distances away from people. As a result, transportation issues can imply other problems, like traffic or income disparity.

While current mobile health solutions can fix some problems, other issues still arise from their implementations. Telemedicine in particular requires the patient to be within range of usable, modern technology, which may not be feasible due to income inequality. In the case of Uber transportation systems, while they fix the problem of people not owning cars, the more people that use Uber for healthcare means the more active cars on the road, making the already existing traffic problem worse.

Moving forward in my research, I want to conduct interviews with more community members to see what issues in Charlottesville are directly related to poor transportation. Charlottesville is a good case study with an interesting story about how its major hospital thrives on not having any reasonable competition. I want to also determine more of the connections on the social construction of healthcare by exploring the deeper, more negative repercussions of mobile health solutions to avoid falling into similar pitfalls. In the future, I also want to look more in-depth about the positive aspects of mobile health solutions that already exist to see what requirements we should prioritize for our project.

Transportation and healthcare are two necessities that are viewed as parallel but are really meticulously intertwined. Current mobile health solutions are a step in the right direction but they are, as of now, inadequate in truly being a quality solution that people in every community will use and embrace. However, there are some positive elements that can be found in some currently existing mobile health solutions, like prescription drugs being shipped directly to people's homes or telecommunication between specialists and patients. I believe if we can figure out a reasonable way to combine these positive ideas into one, easy-to-use system, we can start to make healthier and safer people in our community.

Mobile health solutions are becoming mainstream and helping people all over the country. However, because healthcare relies on other people being in a different power dynamic than others, someone will always be at a disadvantage. Distrust issues require years, if not generations, of societal rebuilding to fix. As long as people feel marginalized, it is hard to find a band-aid solution. The best we can do is to further understand these societal connections and healthcare problems to try to find what the best course of action is.

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