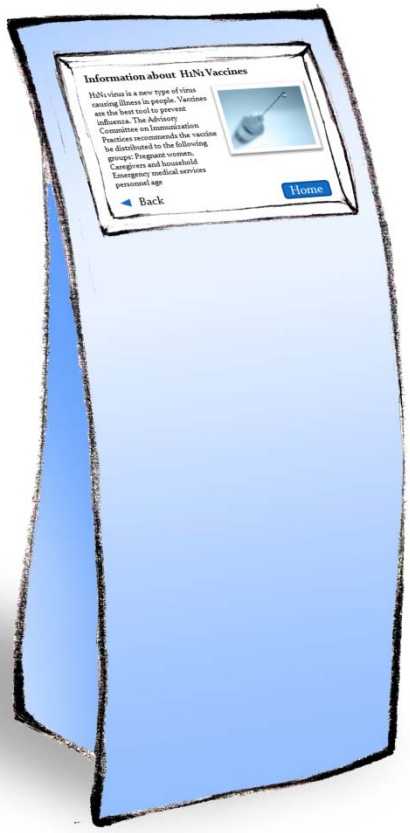
CI Kiosk

Clinic Information Kiosk



Sepideh Ansari

Final report for INFO-564

2009

Table of Contents

Introduction

Background Information

Time has been always the alternative gold. With the advancement of technology during the last century, we have had the opportunity to leverage it for speeding up our tasks and saving some of our valuable time. Automation has been the outcome of this advancement in technology. Automation has helped us to invent vending machines, automatic ticketing stations, electronic checkouts in grocery stores, airport check-in kiosks and many more.

Today, we live in an increasingly fast paced society. "With that fast pace comes the desire to easily access information at any given time or location" (Interactive Kiosks, 2009). Technology has introduced us to new types of machines that provide us information and services, interact with us, and lower the amount of time spent on collecting the information we need.

The introduction of automatic machines into our daily lives has not been without its challenges. The first mechanical cash dispenser was developed and installed in 1939 in New York City, by the City Bank of New York, but removed after 6 months due to the lack of customer acceptance. It took the average consumers more than 50 years to adopt the ATM (Automated Teller Machine) and accept that ATMs do not only increase the revenue for the banks but also lowers the cost on consumers and provides them with faster services (Wikipedia, 2009).

One of the best ways to distribute information is via an information kiosk. "A Kiosk (pronounced key-osk) is a computer based terminal or display that is used to provide [free or paid] information or services, typically in a public place." (Information Kiosk Systems, 2009) Indeed, a kiosk is an electronic based, self-service interactive terminal. A computerized kiosk often implements customized kiosk software that will interact with the users without revealing its internal functions. These kiosks are frequently connected to a larger computer network. Kiosk may provide free or commercial (paid) information.

User interaction in kiosks requires special attention due to its environmental and social context. Public kiosks provide information in the public space and providing private information to the users (e.g. ATMs) require special attention to the design of the kiosk. Traditionally, user interaction has been via buttons, computer style keyboards, and push buttons. Newer interfaces have employed and integrated other technologies such as touch screen, face recognition, and biometrics.

Kiosk systems are being used in a variety of applications, including information directories, customer self-service terminals, electronic catalogs, hospital settings and more (Information Kiosk Systems, 2009). It is estimated that over 131,000 kiosk terminals exist in the U.S. alone. Average number of users per kiosk per day is 32 in North America; average time at a kiosk is 7 minutes worldwide (Research and Market, 2009).

Kiosks increase the return on investment (ROI) on different dimensions including: reduced staff load, increased customer retention rate, lowered waiting time, and higher level of customer satisfaction.

Application Information

The introduction of touch screen interfaces created user-friendly experiences for people of all ages and educational levels that made the kiosk suitable for use in hospital settings as well as business environments. With the advancement of health information systems in the last decade, kiosks gained more attention to provide patients and their companions, information that is not merely the clinics' directory. Hospital kiosks gradually shifted to include simple administrative tasks to reduce the burden of waiting times that are mainly due to administrative processes instead of medical care.

The following is a list of 'Benefits of Kiosks in Healthcare' generated and adopted from the general business benefits of kiosks (Retail Kiosk, 2009):

- Reduce waiting time for patients
- Increase patient awareness by increasing accessibility
- Save staff overhead by reducing administrative tasks
- Enhance patient flow in a clinical setting
- Reduce costs by lowering employee headcount
- Serve more patients quicker and better
- Improve patient satisfaction
- Create user friendly experience for all patients (different ages and various educational levels)
- Provide convenient service for patients

Proposed Solution

In this study, I have proposed a simple but yet effective touch screen 'Clinic Information Kiosk' (CIK) to provide patients and the people accompanying them with information most needed in a clinical setting. Although touch screen kiosks have been studied before in healthcare settings (Nicholas, Huntington & Williams, 2002), my interest has been more on the 'Human Computer Interaction' issues than other aspects such as ROI.

Context & Target Audience

Context Considerations
The kiosk will be used in a clinic setting. Privacy and security are usually of high importance and due to the public presentation of data, limited personal data should be collected or displayed. The machine should also be safe to operate and easy to be physically cleaned for hygienic purposes.

User Considerations
The system will be used by various users. Users will be patients with different ages and different educational levels. Thus, the system requires a fast and simple navigation system (low cognitive demand and minimum memory load), large interface elements and touch screen interaction (increased accessibility for elderly and disabled), and simple textual content (sixth grade).

Design Concept

Technical Considerations

CIK is an informational interactive network-based kiosk and therefore holds numerous technical considerations. For example, the data connection to the hospital information system should be secure and privacy should be at foremost consideration if personal information is being transmitted over the hospital network. The following is a short list of the technical considerations that can affect the design of CIK:

Processing and Networking Issues

- The processing speed (CPU and RAM) of CIK should be able to display graphical elements implemented in the design of its pages without any delay
- The system (including the interface) should be optimized for web-based interaction and should not include graphical elements that are not suitable for web

Privacy Issues

- The content of CIK should not collect sensitive personal information of the user.
- The user should be able to interact with CIK in a semi-private environment.
- Personal information should not be stored locally on CIK.
- Personal information should be transferred to the server in a secure method.
- Personal information should not remain on subsequent pages except the web-forms.

Design Descriptions

After online search and reviewing similar products the following general tasks were identified to be suitable for the 'Clinic Information Kiosk':

Task 1 → Search for Medical Services: Patient should be able to acquire information about the medical services that are provided in the clinic. Medical services include general and specific services that the clinic provides such as Vaccination, Routine Checkup and Senior Care. Of course the list of the services will vary depending on the clinic.

Task 2 → Find a Doctor from the Clinic: Commonly patients search for a special doctor in the clinic to find out more about the options that they have. Sometimes, patients are interested in browsing the list of the doctors to receive a general sense of the clinic's specialty.

Task 3 → Support or Donate: Clinics usually need to provide their information to potential donors or volunteers. Including this type of information will reduce the time spent on collecting the contact information of possible volunteers.

Task 4 → Browse Map: Frequently a clinic's visit results in a lab test request or a prescription. Patients usually ask the doctor, nurse or the administrative staff for directions to the closest lab,

drug store or bus station. Some clinics have a printed version of the directions to the closest lab or pharmacy; however, patients often ask for more details that are not mentioned in the printouts. Including an interactive map of the clinic nearby locations will help the patients to find the information they need quicker and easier.

Task 5 → Book an Appointment: Setting the next appointment with the doctor is usually a time consuming task for the administrative staff. Patients often need more time to decide which time works best for them. Having the option to book an appointment with one of the clinic's doctors (for patients that are already registered with the clinic) will help reducing the administrative workload and provide more flexible options to the patients.

Design Guidelines

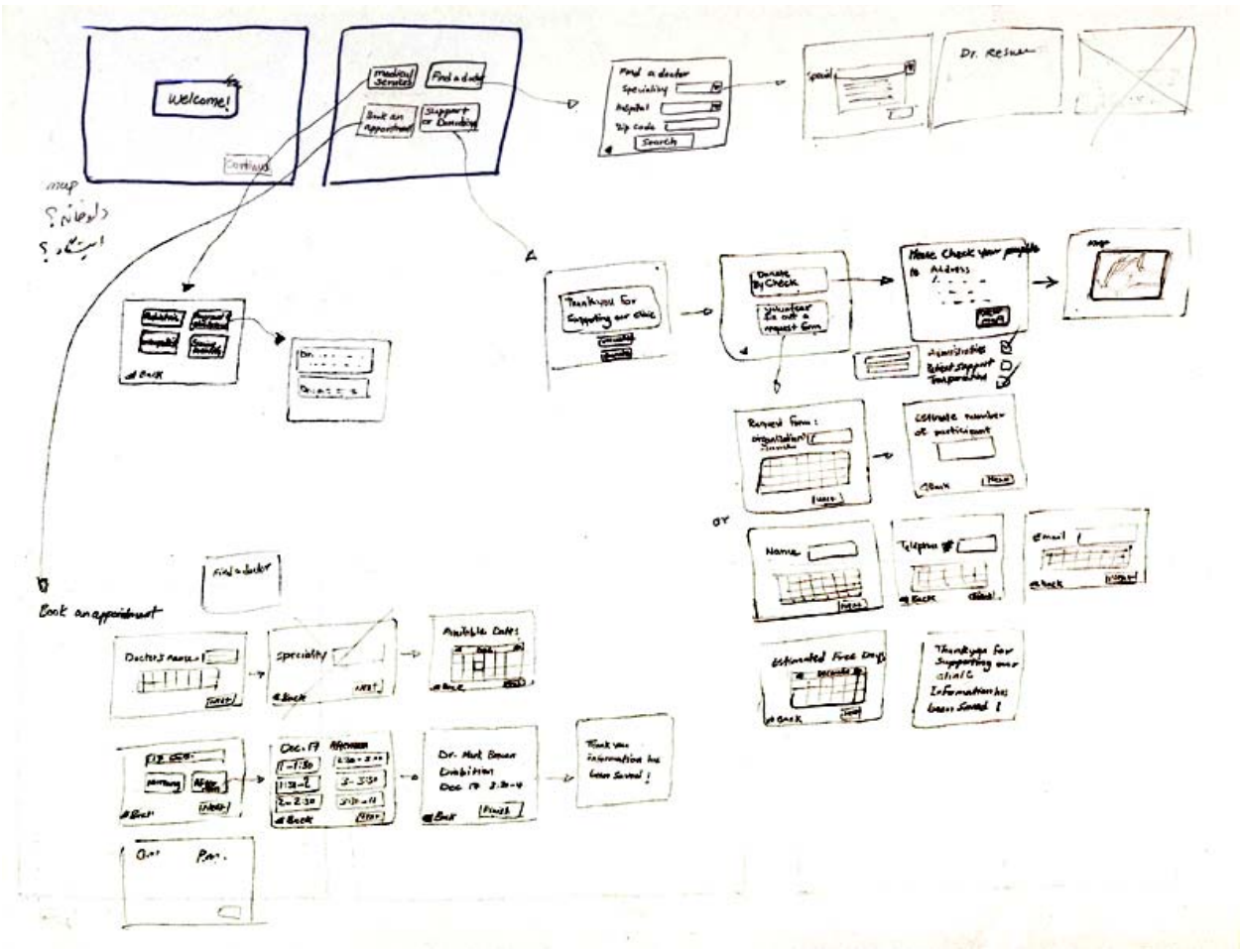
In order to design CIK, I decided to start the design by conducting a short literature review about the common features used in informational kiosks, especially in the healthcare industry. Soon, it became evident that research in this area is still in progress and therefore there are minimum design guidelines for such a solution. The following design guidelines are adapted from the larger design guidelines in creating touch screen solutions for informational kiosks:

- CIK should be designed while considering and understanding the general need of patients
- CIK should implement a simple touch screen technology as patients are typically untrained in interacting with complex touch screen devices (e.g. touch screen gestures)
- CIK's application must be simple and guide the patient effectively
- CIK's application should recover from errors efficiently
- CIK should have limited number of well defined tasks in order to reduce the memory and cognitive load for patients
- CIK must attract the attention of the patients
- CIK must keep the attention of the patients and should never frustrate them
- CIK should deliver wanted information effectively (accurately) and efficiently (quickly)
- CIK should have minimum error rate as patient may walk away for the slightest reason

Early Prototypes and Walkthroughs

Brain Storming

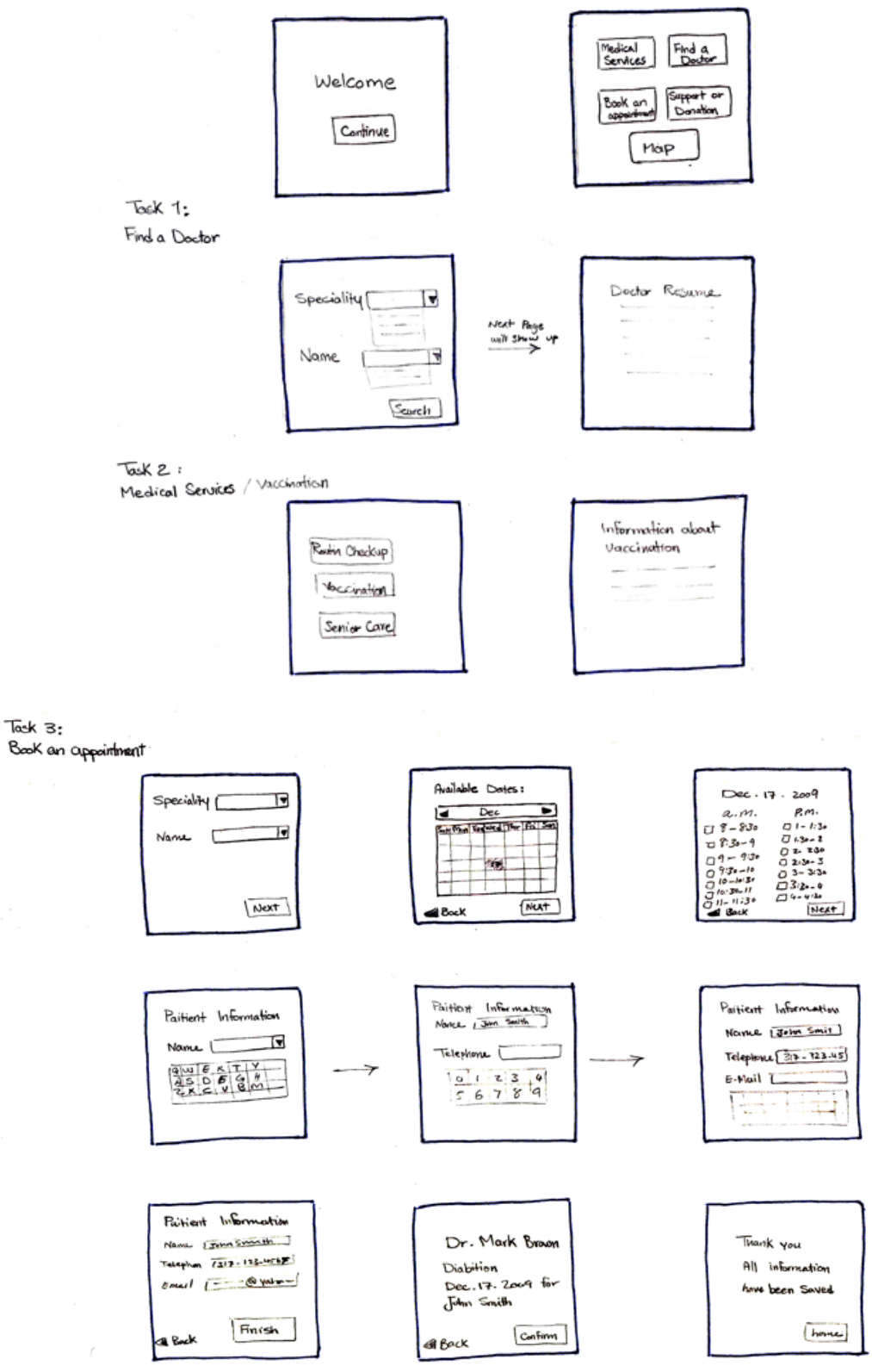
The initial brainstorm was accomplished on paper. While brainstorming the clear tasks and clear path among the screens were not developed yet; therefore, the brainstorming went through multiple iterations. A 'Health Informatician' was consulted in the brainstorming session and valuable feedback was provided: (1) each task should be as short as possible; (2) all major tasks should be accessible from the home page; (3) minimum information should be asked from the patient for the initial booking – the rest of the information can be collected later.



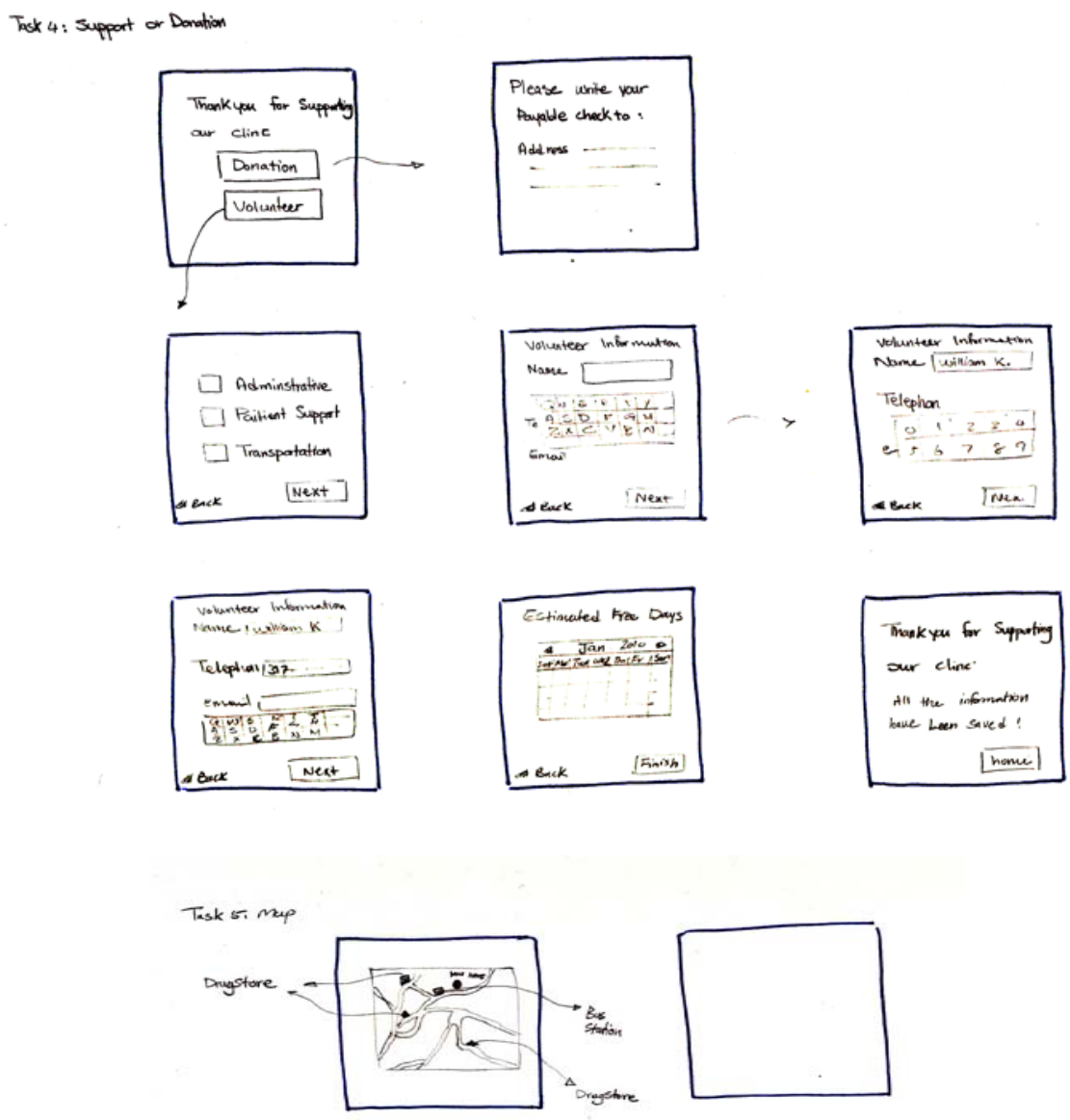
Brainstorming sketches

Paper Prototyping

The initial paper prototypes were drawn after the tasks were identified and the results of the brainstorming session were implemented. The final paper prototypes included possible screens and interactions that CIK will employ to provide the list of services mentioned before (Task 1 to 5).

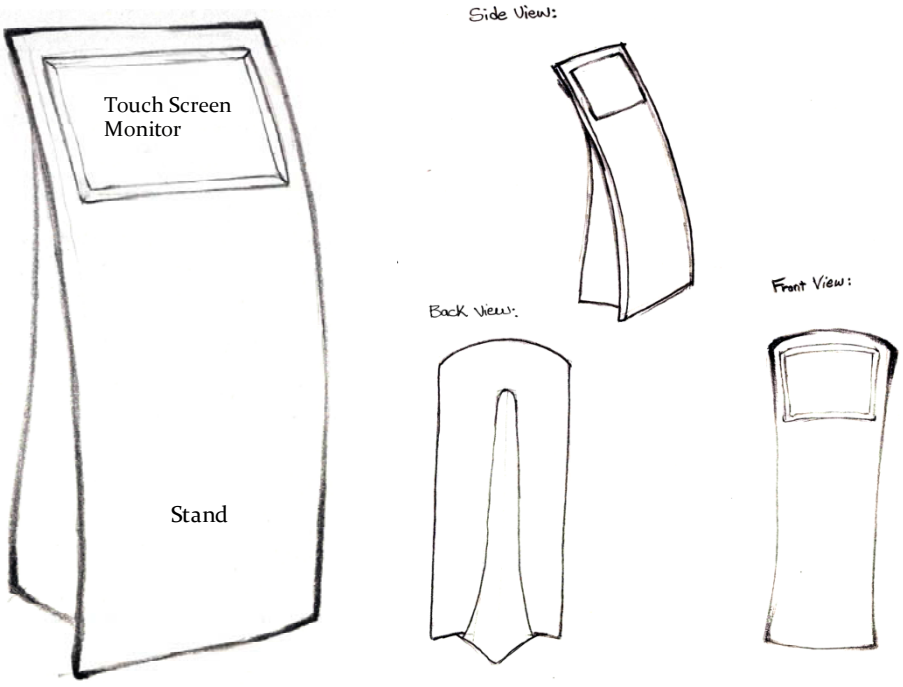


Paper Prototypes (1)



Paper Prototypes (2)

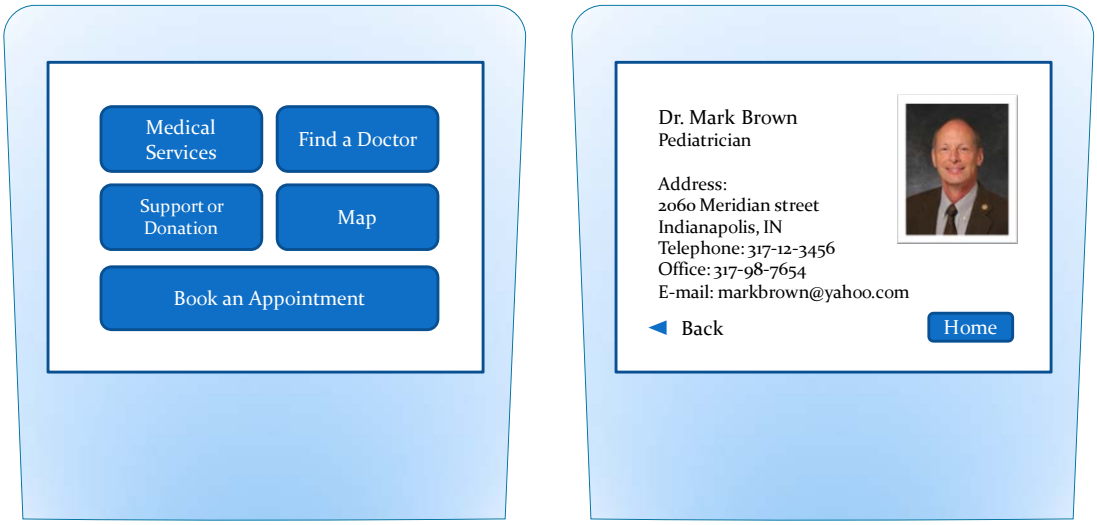
Due to complexity and importance of the product design on the interface design (e.g. distance of the screen to the actual users) a rapid sketch of the actual device was also developed so that users can understand the physical ergonomics of the interaction.



Clinic Information Kiosk – Product Sketches

High Fidelity Prototypes

After brainstorming and sketching the low fidelity prototypes (wireframes), the high fidelity prototypes were produced using Adobe Illustrator and Microsoft PowerPoint. Interactivity was embedded in the PowerPoint slides so that users can navigate through different options offered by the 'Clinic Information Kiosk'.



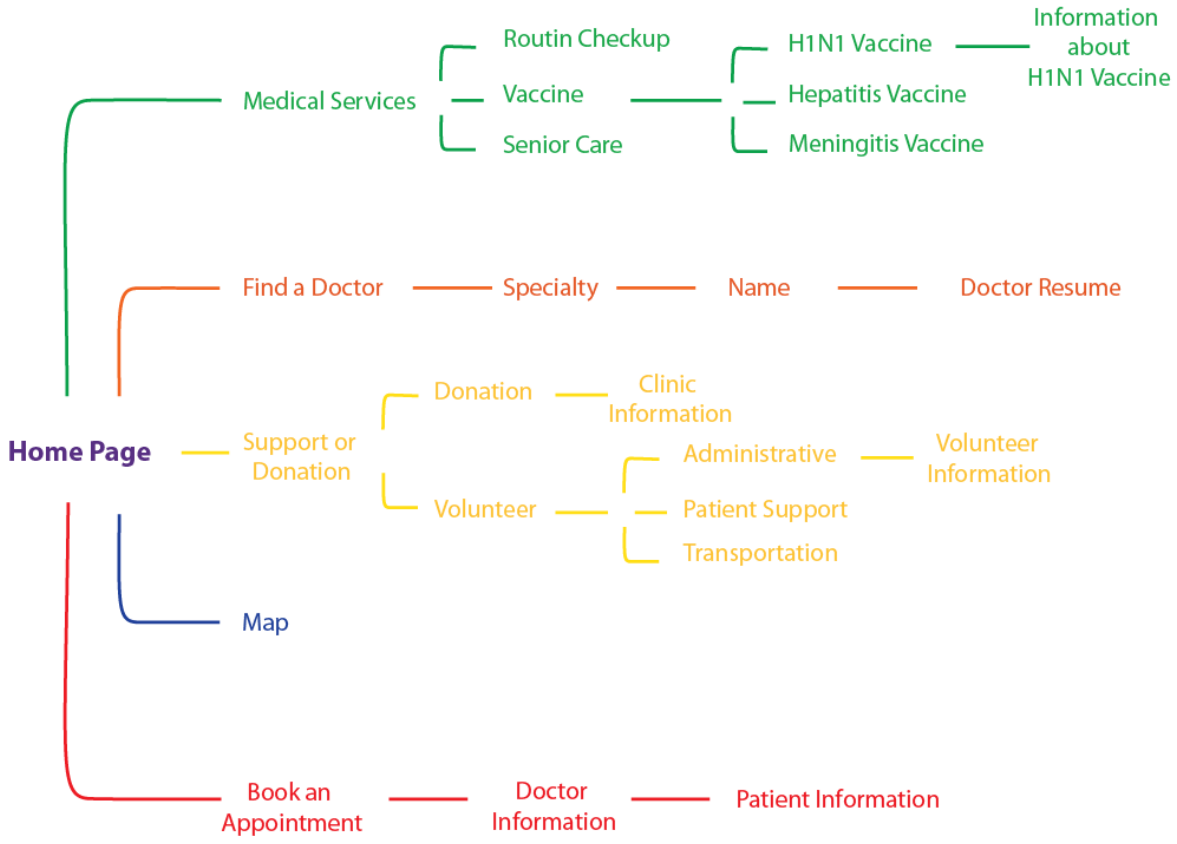
Sample screenshots of the high fidelity prototype

Please refer to the appendix for further screenshots of the high fidelity prototype.

The high fidelity interactive prototype is available for download at:
http://www.sunwebspace.com/backup/Kiosk_final.pptx

Cognitive Walkthrough

A cognitive walkthrough was performed on the prototype. Five major tasks (Medical services, Find a doctor, Support or donation, Map, and Book an appointment) and their sub-tasks were tested to investigate possible user interface problems.



Cognitive Walkthrough Diagram

The cognitive walkthrough only found minor problems with the interface and no problems with the hierarchy of the tasks. The following list includes the problems found in the cognitive walkthrough which were corrected and fixed in the final high fidelity prototype:

- Dates that are available for booking an appointment should be highlighted so that the user does not click on all of the dates to find the open date

- The system should provide an acknowledgement screen confirming the booking in addition to sending the user the same confirmation in email
- The clickable area of the dropdown menus should include the entire menu item and not only the small triangle that opens the dropdown menu
- Keyboard does not need to have some of the functionalities due to the limited characters needed to fill the forms on CIK. For example, there is no need to have CTRL or ALT keys on the touch screen keyboard.

User Experiment

User experiments were conducted with four users:

- A: Male 70 yrs
- B: Female 33 yrs
- C: Male 33 yrs
- D: Female 37 yrs

Each user were given the list of the tasks and asked to go through all of them by using the high fidelity prototype. After the interactions, users provided descriptive feedbacks.

Detailed tasks were introduced to the users as:

Task 1: Medical Services → The task is to find information about H1N1 Vaccines

Task 2: Find a Doctor → The task is to find Dr. Mark Brown a pediatrician and get information about him

Task 3: Support or Donation → (a) Donation: The user needs to get the information about the centre in order to write a check. (b) Volunteer: The user wants to do volunteering for administration purpose. He wants to give his information to the kiosk as well as submitting the free dates (for example Jan. 7th)

Task 4: Map → This task is to get the information about where the clinic is and where are the closest bus stations as well as drugstore.

Task 5: Book an appointment → The task is to book an appointment for the user with Dr. Jackie Thompson a cardiologist on December 17th at 10 am. The user needs to give his information to the kiosk.

The following text was provided to the users to consent to participate in the study and find the instructions of how to participate and what to do afterwards.

Informed Consent Form

Dear Participant,

This is a study about a clinic information kiosk (CIK) intended for patients who visit a clinic. My goal is to make the kiosk appealing, intuitive, and user-friendly. Your participation will help me accomplish this goal.

In this session, you will be working with a prototype of CIK. I will ask you to try several tasks that patients might typically do on CIK, such as finding medical services, finding a doctor at the clinic, support or donate to the clinic, search the nearby map for a drug store or bus station, and booking an appointment with one of the doctors working in the clinic. I will be observing when you accomplish the tasks to take notes and document your feedback.

The tasks are:

Task 1: Medical Services → Find more information about H1N1 Vaccines
Task 2: Find a Doctor → Find more information about Dr. Mark Brown (pediatrician)
Task 3: Support or Donation → (a) Donation: Find information about the centre in order to write a check. (b) Volunteer: Try to volunteer for administration purposes. Provide your information and pick up Jan. 7th as your available date.
Task 4: Map → Find the closest bus stations as well as a drugstore.
Task 5: Book an appointment → Book an appointment with Dr. Jackie Thompson (cardiologist) on December 17th at 10 am. Provide your information afterwards.

All information I collect concerning your participation in the session belongs to my class project at IUPUI and will be used for my research only. I will not videotape or audio tape the session. I may publish my notes from this and other sessions in my class project, but all such observations will be confidential and will not include your personal information (e.g. your name). I will not ask you to provide any personal information during this session and entering any of your personal information will be optional.

This is a test of CIK – I am not testing you! I want to find out what aspects of CIK are confusing so that I can make it better.

To the best of my knowledge, there are no physical or psychological risks associated with participating in this study. There is no reimbursement for participating in this study. The study will last approximately 20 minutes including the interaction with CIK and collecting your feedback. You may take breaks as needed and may stop your participation in the study at any time.

Statement of Informed Consent
I have read the description of the study and my rights as a participant. I voluntarily agree to participate in the study.

Print Name: _____
Signature: _____
Date: _____

Results

All users were interviewed after the study and the following feedbacks were collected from the users:

User A – Male 70 yrs

Task 1: Medical Services → No comment

Task 2: Find a Doctor → He would like to see office hours of Dr. Mark Brown as well as his available hours from this page.

Task 3: Support or Donation → Donation: He would like to see the address of the bank or the account number. Volunteer: He mentioned about having the option of filling address for the volunteer in case if he did not have a phone or an email address so then the clinic can mail the request to him.

Task 4: Map → He proposed adding the bus line number beside the bus station icon on the map.

Task 5: Book and Appointment → The user mentioned about having the option of adding his address to the patient information for the sake of booking appointments. He also mentioned about accessing again the 'available hours' page for making sure that a certain hour (10:00 am) is booked and it is not available on the list any more.

User B – Female 33 yrs

Task 1: Medical Services → No comment

Task 2: Find a Doctor → She would like to be able to book an appointment with Dr. Mark Brown on his information page. She also wondered about more information about whether Dr. Brown is available in other clinics or not.

Task 3: Support or Donation → Donation: She would like to see the name of the clinic or name of the bank account on the address page. Volunteer: She mentioned about having the option of adding the specific hours to the available dates for the volunteers.

Task 4: Map → She would like to be able to zoom in or zoom out of the map. She mentioned that adding the phone number of the drug store beside the drugstore' icon will increase the efficiency of the map. This way she will be able to contact the drugstore in advance before she leaves the clinic.

Task 5: Book and Appointment → She would like to be able to add her address to the patient information as well as adding her insurance company's name and number.

User C – Male 33 yrs

Task 1: Medical Services → No comment

Task 2: Find a Doctor → He liked to have an option to book an appointment with the doctor that he found.

Task 3: Support or Donation → No comment

Task 4: Map → The picture of the map is small and it is not easy to read.

Task 5: Book and Appointment → He did not like the design of the 'Back' button and the format of available times under booking an appointment task. He would like to be able to fill in the text box by clicking on the keyboard.

User D – Female 37 yrs

Task 1: Medical Services → No comment

Task 2: Find a Doctor → She would like to be able to see other people opinion about Dr. Mark Brown.

Task 3: Support or Donation → Donation: She would like to see more information about the clinic such as the bank account number. Volunteer: No comment.

Task 4: Map → She believed the map is not readable and it is small.

Task 5: Book and Appointment → She liked to add her birthday and address to the patient information under this task.

In summary the results from the qualitative user study indicated a general sense of:

- All users expressed their satisfaction and enthusiasm toward the idea of 'Clinic Information Kiosk'. None of the users have had an encounter with such a system before.
- Users like the idea of being able to book an appointment with the doctor that they have searched for his/her information.
- Participant asked to find more information about the clinic (e.g. bank account) in order to write a check as a donation.
- Users found the map too small to browse and asked common features available in Google maps (e.g. zoom) to be present in CIK.
- Most of the participants asked that the system should require providing more options to the patient while entering his/her information to book an appointment (e.g. address, insurance number)

Discussion

Generally participants were very enthusiastic about the idea of CIK. However, the enthusiasm made from the idea of working with a kiosk in a clinic may have overshadowed the actual responses made by participants. For example, if the same interface was proposed as a website, there might be a different overall response as interacting with websites is much more common than healthcare kiosks.

Despite the privacy issues usually concerned with health information systems, users in this study did not express any concern with the privacy in particular. The users even asked to be able to provide more information in regards to their personal information to book an appointment. This may be partly due to low sensitive personal data that was collected by CIK. Another possible factor may also be that CIK will be physically located in a clinic where patients will feel comfortable with providing their personal information in contrast to a website where patients are possible in environments and contexts that do not feel secure in them.

CIK seems to be a very interesting approach in reducing the cost and thus increasing the ROI of the clinics. The business logic behind CIK can be a driving force to develop it further in the real market insofar as both the healthcare providers and healthcare recipients can benefit from it.

Future Work

Designing interfaces for the general patient population is challenging and requires more research. This project is just a snapshot into a relatively new area of human computer interaction where health informatics crossovers human computer interaction.

I am currently considering this topic as one of my options for my Master's thesis. I am interested to find a common ground for 'Clinic Information Kiosk' interfaces and enhance its usability.

Currently some of the hospitals in the greater Indianapolis area are adopting 'Health Kiosks' and therefore an opportunity will become available to study the interfaces in various stages such as expert evaluations, focus groups, and (qualitative or quantitative) user experiments. Further user studies are required to test the CIK prototype with other population groups with different ages, educational levels and language abilities.

References

Information Kiosk System, Mass Media Inc., http://www.touchscreens.com/products-kiosk.html, retrieved Dec 2009

Interactive Kiosks, Jetson Gadgets for Real Life, http://www.articlesbase.com/business-articles/jetson-gadgets-for-real-life-interactive-kiosks-418227.html, retrieved Dec 2009

Research and Market, http://www.researchandmarkets.com/reports/348866/, retrieved Dec 2009

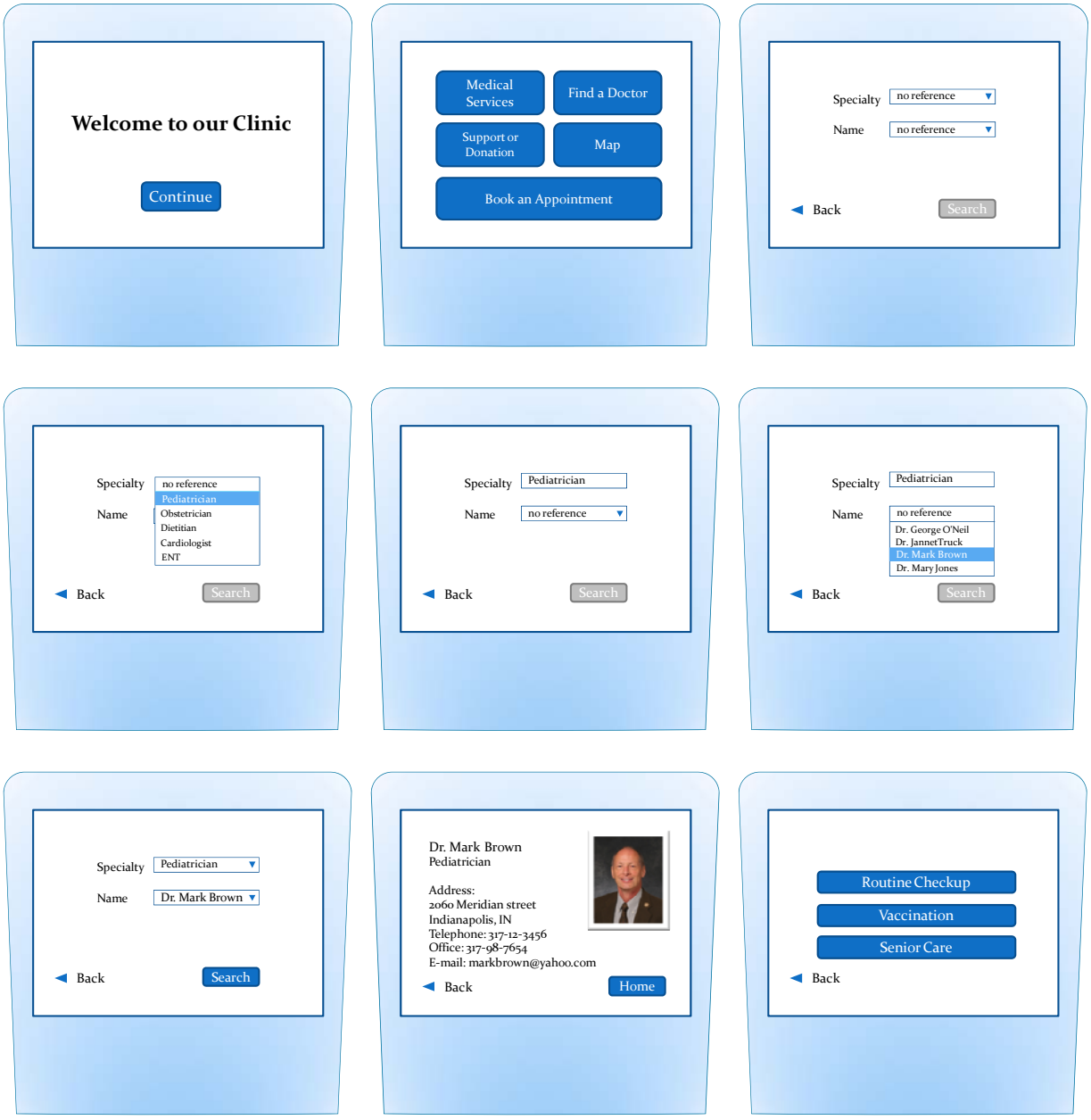
Wikipedia, Automated teller machine, http://en.wikipedia.org/wiki/Automated_teller_machine, retrieved Dec 2009

Retail Kiosk, http://www.kis-kiosk.com/apps/retail-kiosk.html, retrieved Dec 2009

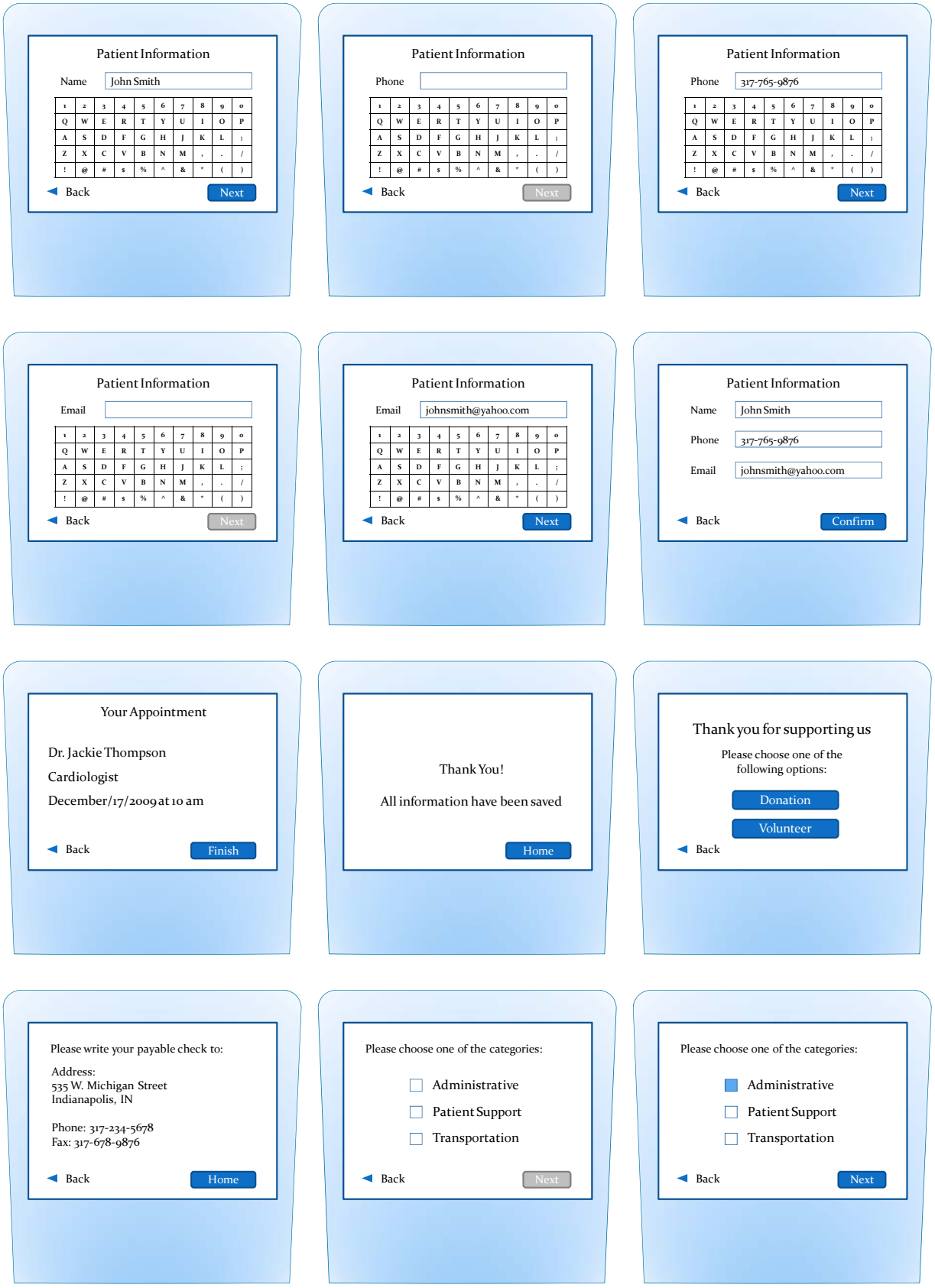
Nicholas, D., Huntington, P., Williams, P. (2002). An evaluation of the use of NHS touch-screen health kiosks: a national study, Aslib Proceedings, MCB UP Ltd, 54, 6, 372-384

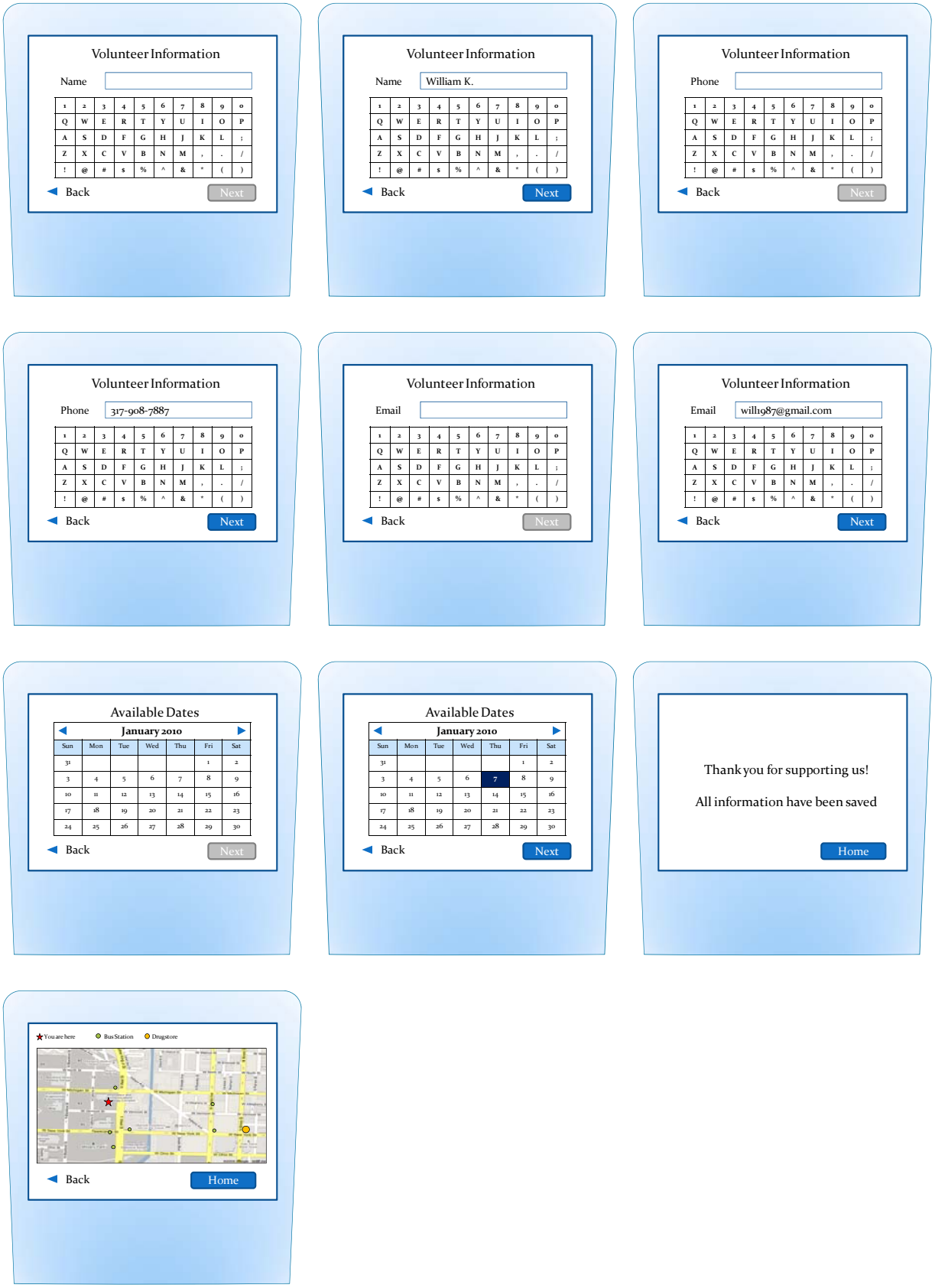
Appendix

Additional Images of CIK (High Fidelity Prototype)




H1N1 Vaccine
Hepatitis Vaccine
Meningitis Vaccine
Back
Information about H1N1 Vaccines
H1N1 virus is a new type of virus causing illness in people. Vaccines are the best tool to prevent influenza. The Advisory Committee on Immunization Practices recommends the vaccine be distributed to the following groups: Pregnant women, Caregivers and household Emergency medical services personnel age
Back
Home
Specialty
no reference
Name
no reference
Back
Next
Specialty
no reference
Name
Pediatrician
Obstetrician
Dietitian
Cardiologist
ENT
Back
Next
Specialty
Cardiologist
Name
no reference
Back
Next
Specialty
Cardiologist
Name
no reference
Dr. Jackie Thompson
Dr. Hans Stone
Dr. William Rosette
Dr. Bob Donald
Back
Next
Specialty
Cardiologist
Name
Dr. Jackie Thompson
Back
Next
Available Dates
December 2009
Sun Mon Tue Wed Thu Fri Sat
1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31
Back
Next
Available Dates
December 2009
Sun Mon Tue Wed Thu Fri Sat
1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31
Back
Next
December 17 2009
am
8:00-8:30
8:30-9:00
9:00-9:30
9:30-10:00
10:00-10:30
10:30-11:00
11:00-11:30
11:30-12:00
pm
12:00-12:30
12:30-1:00
1:00-1:30
1:30-2:00
2:00-2:30
2:30-3:00
3:00-3:30
3:30-4:00
Back
Next
December 17 2009
am
8:00-8:30
8:30-9:00
9:00-9:30
9:30-10:00
10:00-10:30
10:30-11:00
11:00-11:30
11:30-12:00
pm
12:00-12:30
12:30-1:00
1:00-1:30
1:30-2:00
2:00-2:30
2:30-3:00
3:00-3:30
3:30-4:00
Back
Next
Patient Information
Name
1 2 3 4 5 6 7 8 9 0
Q W E R T Y U I O P
A S D F G H J K L ;
Z X C V B N M , . /
! @ # $ % ^ & * ( )
Back
Next


Patient Information
Name John Smith
Back Next
Patient Information
Phone
Back Next
Patient Information
Phone 317-765-9876
Back Next
Patient Information
Email
Back Next
Patient Information
Email johnsmith@yahoo.com
Back Next
Patient Information
Name John Smith
Phone 317-765-9876
Email johnsmith@yahoo.com
Back Confirm
Your Appointment
Dr. Jackie Thompson
Cardiologist
December/17/2009 at 10 am
Back Finish
Thank You!
All information have been saved
Home
Thank you for supporting us
Please choose one of the following options:
Donation
Volunteer
Back
Please write your payable check to:
Address:
535 W. Michigan Street
Indianapolis, IN
Phone: 317-234-5678
Fax: 317-678-9876
Back Home
Please choose one of the categories:
Administrative
Patient Support
Transportation
Back Next
Please choose one of the categories:
Administrative
Patient Support
Transportation
Back Next


Volunteer Information
Name
Back
Next
Volunteer Information
Name
William K.
Back
Next
Volunteer Information
Phone
Back
Next
Volunteer Information
Phone
317-908-7887
Back
Next
Volunteer Information
Email
Back
Next
Volunteer Information
Email
will1987@gmail.com
Back
Next
Available Dates
January 2010
Sun Mon Tue Wed Thu Fri Sat
31 1 2
3 4 5 6 7 8 9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
Back
Next
Available Dates
January 2010
Sun Mon Tue Wed Thu Fri Sat
31 1 2
3 4 5 6 7 8 9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
Back
Next
Thank you for supporting us!
All information have been saved
Home
You are here
Bus Station
Drugstore
Back
Home