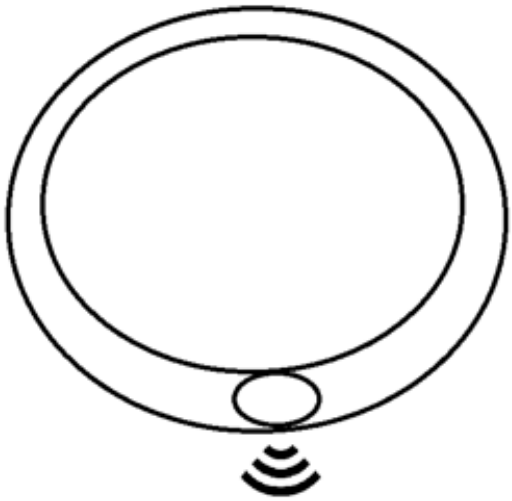
Department of Computer Science & Engineering
The University of Texas at Arlington

Project Charter
CSE 4316: Senior Design I
Fall 2022



Team Name: Medi ID
Product Name: Medical ID Bracelet

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Revision History

Revision	Date	Author(s)	Description
0.1	09.19.2022	AN	document creation
0.2	09.24.2022	AN, MN, IC, AS, CB	complete draft
0.3	09.26.2022	CB	release candidate 1
1.0	12.06.2022	MN	Finalized
2.0	4.24.2023	CB	Updated Version

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1 Problem Statement

Current models of the Medical ID bracelet use a QR code to scan and open a webpage with the user's information on it. The problem with the QR code method of retrieving the user stored data is that the QR code on current models is facing the user's wrist and the user's sweat over time fades the QR code out, causing the user to re-order the bracelet, costing the user more in the long term. Furthermore, the bracelet does not have enough security. Currently, the only form of security is having the QR code face toward the user's wrist. This is not secure enough as anyone with a scanner can scan the QR code when exposed and access the user's data.

2 Methodology

We are going to build a medical ID bracelet that uses an NFC to redirect users to the desired medical information of the user, which mitigates the problem of QR codes fading out. NFC does not fade out and can be read using a phone just like a QR code, this would not change the technology needed to read the information and would enhance the technology currently used. Furthermore, we will add a layer of verification where the user has to log in before exposing the user's information to ensure that only the allowed users are accessing the medical information, which mitigates the problem of insufficient security. Our layer of verification will only allow the owner of the bracelet and EMT/hospital workers to access the information on the bracelet allowing for security.

3 Value Proposition

Our sponsor should invest funding, time, and expertise in supporting our team develop the medical ID bracelet, as this project is a big advancement for the medical industry. Our bracelet will attract more clients as our layer of verification will make the clients more confident in putting their information on the bracelet as they are guaranteed only the EMT/hospital workers can access their data. Furthermore, our project will attract more users as they can save more by buying our bracelet. This can be seen as the user would not have to keep purchasing the bracelet since the NFC does not fade or go bad, unlike the QR codes which fade. This proves that a big cliental is willing to invest in our project and there is potential to gain from the project.

4 Development Milestones

- Sprint Plan 1 - September 12, 2022
- Project Charter first draft - September 26, 2022
- Sprint Review 1 - September 26, 2022
- Sprint Plan 2 - October 3, 2022
- System Requirements Specification - October 17, 2022
- Sprint Review 2 - October 17, 2022
- Sprint Plan 3 - October 24, 2022
- Architectural Design Specification - November 7, 2022
- Sprint Review 3 - November 7, 2022
- Sprint Plan 4 - November 14, 2022
- Sprint Review 4 - December 5, 2022

5 Background

The current medical identification bracelet issue is that it uses a QR code that redirects the user to the patient's medical information. The problem with the QR code is that it fades over time, causing the QR code not to be readable and needs to be replaced. Furthermore, since the current medical identification bracelets use a QR code to get the user to the patient's medical information, this makes the patient's medical information not secure and causes a major security risk as now anyone can access the patient's medical information if the QR code is visible. Our sponsor would like us to work on this project as it will greatly advance in the medical field. Developing the medical identification bracelet will make it much easier for an EMT to identify patients' medical information as it will always be accessible. Furthermore, our sponsor wants us to undertake this project as it will now have a greater cliental since our new design will have much more security implemented into these bracelets. Our new security features will make customers feel much more comfortable putting their personal information on these bracelets allowing for a much bigger market for these medical identification bracelets. The customer of this project is our Professor Shawn Gieser, and the development team is Ahamad Natsheh, Mahmoud Natsheh, Alex Stringer, Ivan Chu, and Christian Blundell. The bracelet is being developed for our team's senior design project. The relationship between the development team and the client is that the client is the professor of the development team.

6 Related Work

Currently there are many medical identification bracelets on the market with creative solutions. Some of these solutions include a QR code sticker attached to the bracelet, so the EMT/hospital workers can scan it and access the patient's medical information [3]. This design is already on the market and available to the public; however, it has many flaws and would not work for our clients. This product would not work for our client because this medical identification bracelet uses a sticker of a QR code to give an EMT/hospital worker access to a patient's medical information. The QR code over time begins to fade with everyday wear and tear from either the user's sweaty wrist or water damage from everyday activities [1]. Thus, this current solution is not very reliable for clients as in a time of need, if the QR code is faded this would cause a major issue for the client. Furthermore, since this current model is just a QR code that someone can scan and then have access to the user's personal medical information, this has little or no security to it, causing customers not to want to use this bracelet as their medical information is not secure, which is another reason why this current bracelet on the market is not a viable solution to our client [4]. Another solution on the market is a medical identification bracelet made from metal and has the client's medical information engraved on the bracelet. This solution also does not work for our client for a few reasons. For example, the bracelet has no security implemented into it, and anyone can come by and just read the client's personal information without any issue. Therefore, this solution would not work for our client as our client is very concerned with the user's privacy and does not want their user's information to be accessed just by anyone. Another reason this current medical identification bracelet would not work for our client is that with a metal engraved bracelet, one can only record their name, date of birth, and any medical conditions [2]. However, our client wants to be able to store much more information for their users, like lab work, recent medical visits, and much more. Thus, the metal engraved bracelet would not be sufficient to store all this information as it is small. Furthermore, our client wants to allow its users to update their medical information on their medical identification bracelet frequently so it would always have the most up-to-date medical information for the user [5]. However, with the current metal engraved medical identification bracelets, it is not easy and fast to update a user's medical information as it takes time to order a new bracelet, thus, making this not a good option for our client.

7 System Overview

Our team will design and create a new medical identification bracelet that solves many issues with the current medical identification bracelets on the market. We will do this by heavily focusing on security and being able to update customers' medical information easily and efficiently. We plan to implement security by having an NFC placed inside a bracelet the customer will wear. When an EMT or hospital worker needs to access the customer's medical information, they will scan the medical identification bracelet using their phone. They will then be redirected to a webpage requesting them to log in to view the customer's medical information. Once the EMT or hospital worker enters their credentials and is verified, they can access the customer's medical information. However, if they cannot verify their credentials by logging in, they will not have access to the customer's medical information keeping it secure and safe. We will be able to allow a quick way for customers to always keep their medical information up to date by allowing users, once they set up their online account, to add and update their medical information without requiring assistance from anyone. We will allow customers to log in to our online website using their user names and passwords, and from there, they will have the option to add new medical information like labs or x-rays or even update their most recent doctor visit. This will always allow customers to have their most accurate and up-to-date information available on their medical identification bracelet for an EMT or hospital employee for when they require it in an emergency where they are either not conscious or unable to communicate with their EMT or hospital employee.

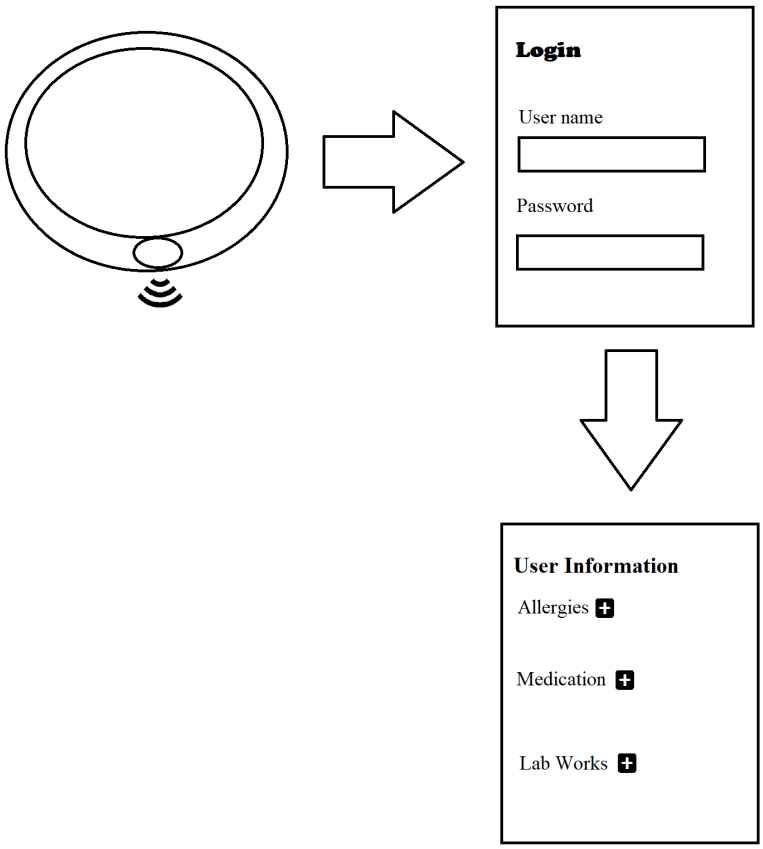

Figure 1: Major Components of System

8 Roles & Responsibilities

Stakeholders of the project include all members working on the project: Christian Blundell, Ivan Chu, Ahamad Natsheh, Mahmoud Natsheh, and Alex Stringer. Stakeholders also include the main client and overseer of the project, which is Shawn Gieser. Depending on whether actual testing in various settings is necessary, medical facility or University of Texas - Arlington CSE faculty or students that test the product will be considered as stakeholders as well. The main point of contact will be the overseer of this project which is Shawn Gieser. He will be contacted through Canvas email and weekly visits by the group. Team members are Christian Blundell, Ivan Chu, Ahamad Natsheh, Mahmoud Natsheh, and Alex Stringer; their responsibilities vary on the sprint, and each team member contributes to each aspect of this project. Each member will work on the design specifications, architecture specifications, and software implementation and testing. The role of project owner and scrum master will change each sprint, as each member of the team will become a scrum master for each iteration of the project that we complete. Some members of the team will become project owner/scrum master for multiple sprints.

9 Cost Proposal

The budget of this project will be on the low end, and may not use the entirety of the 800-dollar budget provided by the UT Arlington CSE department. The hardware is simple and does not require labor costs or distribution costs, and software services will be on the low end due to the small scope of the project environment. Since there will not be thousands of users accessing the database concurrently, servers will not be expensive to maintain.

9.1 Preliminary Budget

Bracelets with NFC chips: $30 - $15 dollars -> spare bracelets = extra 15 dollars = 30 dollars Database servers: $325 30-100 dollars / month -> median value 65 dollars / month -> 5 month development period = 325 dollars Software licenses: $150 20 - 40 dollars / month -> median value 30 dollars / month -> 5 month development period = 150 dollars

9.2 Current & Pending Support

The only registered source of funding for this project is from the CSE Department at UT Arlington, which has given this project around 800 dollars for the preliminary budget. There may be external sources of funding depending on the magnitude of the project or if there are interests from medical facilities that would like to test this product on a larger scale. Registered Funding Sources: UT Arlington CSE Department: 800 USD

10 Facilities & Equipment

There is no physical lab space needed for the implementation of the product, but testing will require in-person testing from an open area. This testing area does not need to be in a specific setting, so the likely testing ground for this project will be at the Engineering Research Building at UT Arlington. Implementation and meetings can take place virtually, so there is not a designated work/meeting area required for our team to successfully implement the product. Makerspaces are not needed for this project, nor does any lab space need to be reserved. There is no specific equipment required for this product except for software tools that may require a license which will be borrowed or purchased. Testing of the progressive web application will be done on the self-owned devices of each team member. This lack of needed facilities and equipment is reflected in the cost proposal, as there is little to no necessity for using additional facilities/equipment.

11 Assumptions

The following list contains critical assumptions related to the implementation and testing of the project.

- The wrist bands and NFC chips as well as any other tools and equipment needed will be purchased by the end of 2nd sprint cycle
- Project Costs will remain under the $800 cap
- Design, specifications, and requirements for the Medi ID application will outlined by the 3rd sprint cycle
- Implementation of the Medi ID application log in page for all users will be finished and tested by the 4th sprint cycle
- Demonstration of Medi ID log in and Single sign-on delivered by the end of 4th sprint cycle
- Implementation of userâs profile page that contains all the information to be shared will be delivered by the 5th sprint cycle
- Demonstration of adding and removing information from a userâs page will be delivered by 6th sprint cycle
- Finalize all designing and by the 7th sprint cycle

12 Constraints

The following list contains key constraints related to the implementation and testing of the project.

- Total development cost cannot exceed $800
- Data obtained and stored must adhere HIPAA regulations
- Final prototype demonstration must be completed by April 29st 2023
- Project demands a max of 5 developers to design and implement the prototype
- Application must be available for hospitals and there must be a way to verify hospitals
- Medical band must come with detailed instructions and video for easy setup

13 Risks

Risk description	**Probability**	**Loss (days)**	**Exposure (days)**
Availability of sponsor	0.20	14	2.8
Lab not available	0.25	14	3.5
Bracelet not available	0.15	9	1.35
Delays in shipping from vendors	0.10	14	1.4
Unfamiliarity with computer vision and other necessary skills	1	15	15

Table 1: Overview of highest exposure project risks

14 Documentation & Reporting

14.1 Major Documentation Deliverables

14.1.1 Project Charter

The project charter will be updated after every sprint based on changes to the project and how those changes affect projections in the project charter or by request of the project sponsor. The product owner will be responsible for updating the document. The final version will be delivered upon project closeout.

14.1.2 System Requirements Specification

The system requirements specification will be updated after every sprint when new requirements are identified by the team. The product owner will be responsible for updating the document. The final version will be delivered upon project closeout.

14.1.3 Architectural Design Specification

The architectural design specification will be updated after every sprint if necessary changes to the system design, system architecture, components, connections, or constraints are identified by the team. The product owner will be responsible for updating the document. The final version will be delivered upon project closeout.

14.1.4 Detailed Design Specification

The detailed design specification will be updated after any changes to software functionality implementation are identified during the course of building the project. The product owner will be responsible for updating the document. The final version will be delivered upon project closeout.

14.2 Recurring Sprint Items

14.2.1 Product Backlog

The items that are categorized as functional requirements will be added to the product backlog from the system requirements specification. These items will be prioritized by importance to a working product. The items will be chosen and prioritized by a group vote. Some kind of software will be used to maintain and update the product backlog.

14.2.2 Sprint Planning

Before each sprint, a team meeting will be held to plan the upcoming sprint. The scrum master will be responsible for leading planning during the meeting. There will be a total of 8 sprints.

14.2.3 Sprint Goal

The sprint goal will be decided as a group during the sprint plan meeting. A meeting will be held between the client and the team after every sprint to update the client on progress and receive input for the next sprint.

14.2.4 Sprint Backlog

During the sprint planning meeting, items will be chosen from the product backlog for the sprint backlog by a group vote. The sprint backlog will also be maintained and updated by some kind of software.

14.2.5 Task Breakdown

Individual tasks will be voluntarily chosen by the team members throughout the sprint. The leader will be responsible for communicating with each team member and documenting the time spent on tasks.

14.2.6 Sprint Burn Down Charts

The leader will be responsible for generating the burn down charts for each sprint. A shared spreadsheet between the team members will be used for team members to update their amount of effort (by hours) expended. The sprint burn down chart will use a line chart with markers format.

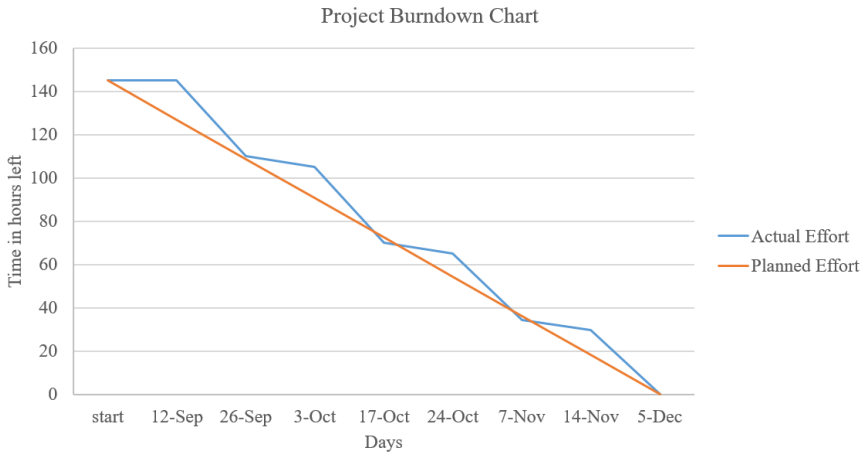

Figure 2: Sprint burn down chart

14.2.7 Sprint Retrospective

The sprint retrospective will be held before the sprint planning meeting. The discussion will be an open format, where all team members will discuss their thoughts about the previous sprint. The team will also discuss and document what they should start, stop, and continue doing.

14.2.8 Individual Status Reports

The status reports will be individually reported by each team member. The report will include the individualâs opinion on the progress of the project and also any concerns the individual has with the team. There will be individual status reports after every sprint.

14.2.9 Engineering Notebooks

The engineering notebook will be updated during every discussion involving anything that has to do with the project.

14.3 Closeout Materials

14.3.1 System Prototype

The final system prototype will include all source code and the bracelet.

14.3.2 Project Poster

The project poster will include a description of the Medical ID Bracelet and how it works.

14.3.3 Web Page

The project web page will include a description of the project and what the system is trying to accomplish. It will also include a description of the bracelet and steps of using it. The web page will just be delivered upon project closeout.

14.3.4 Demo Video

The demo video will demonstrate how to access the webpage with the bracelet.

14.3.5 Source Code

The source code will be maintained on a private repository on GitHub. The source code will be provided to the client for future groups to build upon the functionality of this project. The project will not be open sourced to the general public.

14.3.6 Source Code Documentation

The source code documentation will include the structure of the code, what the code does, and how the code does it. This documentation will also include how to use the code for external users. Doxygen will be used for source code documentation. The final source code documentation will be presented in PDF.

14.3.7 Hardware Schematics

The hardware will consist of 3D print parts to assemble the medical bracelet.

14.3.8 CAD Files

Not applicable to project.

14.3.9 Installation Scripts

Installation scripts will not be provided since is a website we are making.

14.3.10 User Manual

A digital user manual will be provided for the client on how the bracelet and website works.

REFERENCES

[1] Robyn Albertyn. 6 unusual practical uses for the qr code bracelet.

[2] Rod Brouhard. What should be on a medical id bracelet?

[3] Ben Flamber. Qr codes on hospital bracelets to ensure patient safety and identification.

[4] Medicalert.org. Medicalert foundation uses qr code technology to improve access to personal health records.

[5] Andrew F Smith. Wristbands as aids to reduce misidentification: an ethnographically guided task analysis.