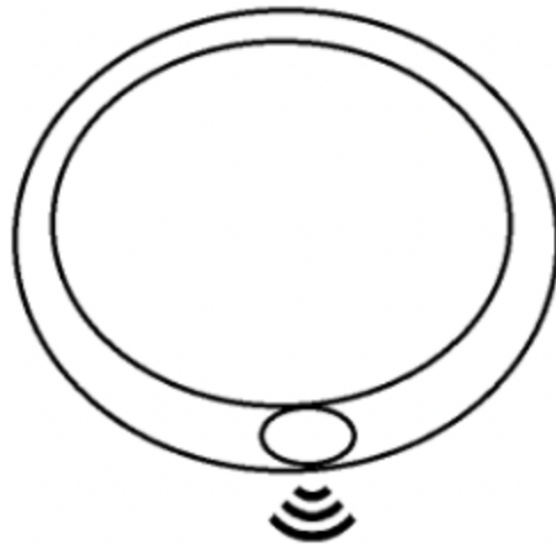


**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
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**ARCHITECTURAL DESIGN SPECIFICATION
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1 INTRODUCTION

The product Medical ID bracelet should store important medical information about a user that is helpful to medical professionals. This information includes name, date of birth, gender, allergies, medical background information, primary care physician, and any other important medical information. Our medical identification bracelet will use an NFC chip to hold the link to our website and a key to the user's account. Once the bracelet is tapped with a phone it will redirect them to our website and prompt either the user or the EMT to login to their account. If the user logs in, then it will take them to their account where they can either view or edit their information. If an EMT logs in, then it will just allow them to view the patient's medical information and not edit it. The user of our product will be medical professionals and the users who buy it to store their medical information on it.

2 SYSTEM OVERVIEW

The medical identification diagram has three main layers the first layer which is the tap function, once a phone taps the NFC chip in the medical identification bracelet it will redirect the user to our website and ask them for their credentials. This directs the user to the next layer which interact with the cloud or database, this is where all the user's information will be stored. This takes us to the final layer which is the user interface layer, this is where all the users data will be displayed to either the user or the medical professional.

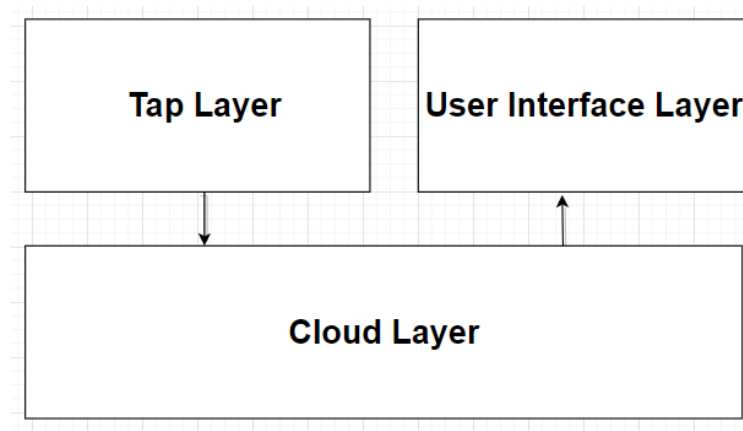


Figure 1: Architectural layer diagram

2.1 LAYER X DESCRIPTION

The first layer of the medical identification bracelet is the tap function. The tap function is where a user taps their phone on to the medical identification bracelet which has the NFC chip stored inside it. Once the phone senses the NFC chip it will read it and execute what is on it. The NFC chip will hold the link to our website and a key to the user's account. Thus, through taping the NFC chip it will redirect the user to our website which stores the patient's medical information.

2.2 LAYER Y DESCRIPTION

This second layer is where all the user's data is stored. All the patient's medical information will be stored in a database which will be written to from the Z layer. This layer will store all the information in order to validate a user and give them access to the medical information, additionally it will have encryption and decryption in order to keep the patients information secure.

2.3 LAYER Z DESCRIPTION

The third and final layer is the user interface, this is where the user will be able to see all medical information and edit it. This layer has two components to it, the first being the owner of the medical identification view of the user interface and the second component being the medical professionals view of the user interface. For the owner of the bracelet when they are redirected to our website, they will be asked to enter their login information, once verified the user will be able to see all their information that they had stored. Additionally, they will be able to edit their information and change what they have stored in the database. Once the medical professionals tap the bracelet they will be redirected to our website where they will be asked to login to their accounts. When they are verified, they will be logged in and will be able to see the patient's medical information only and will not be able to edit it. Once the medical professional is logged out they will no longer be able to see the patients information, in order to keep it secure.

3 SUBSYSTEM DEFINITIONS & DATA FLOW

Figure 1 demonstrates the different sub-layers involved in making the application work as a whole. The application involves the ability to tap on the device and allow it to redirect the user to a login page where they can verify that they are a trusted user. Furthermore, the application involves showcasing the user data and inputting user data.

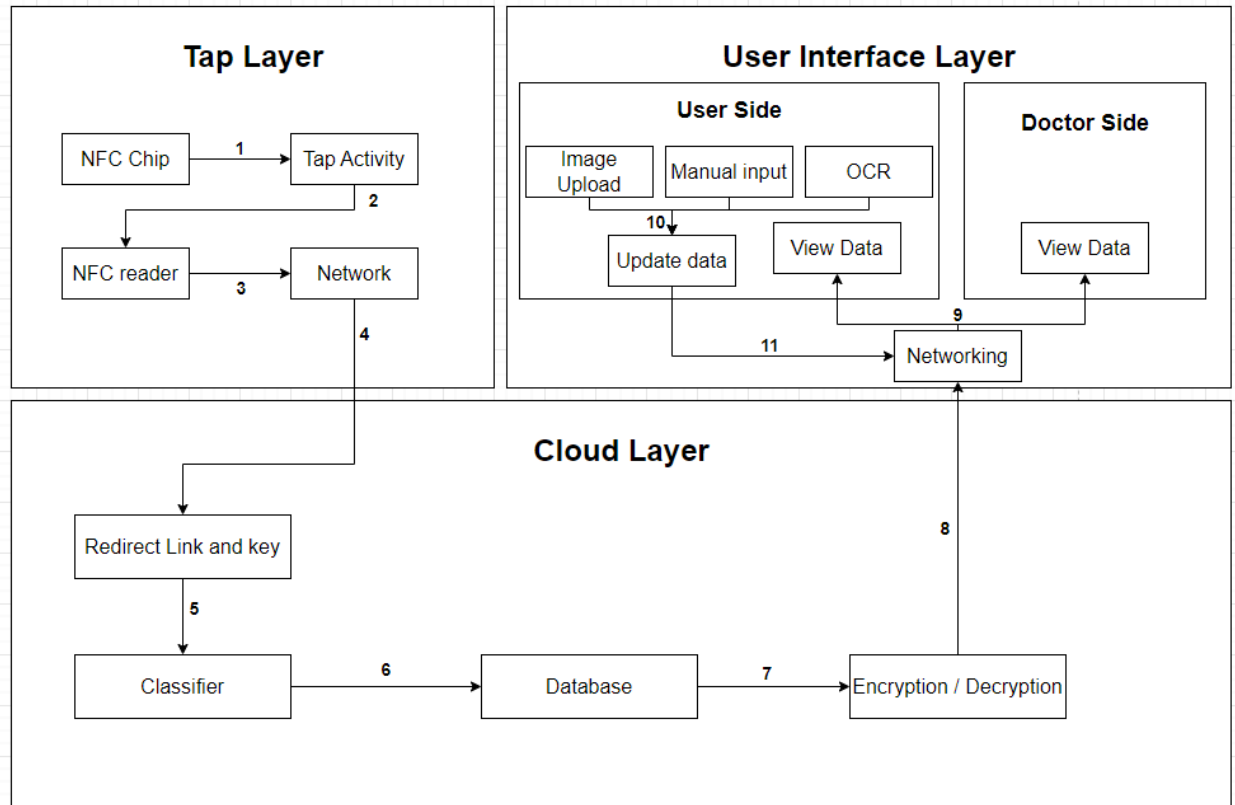


Figure 2: Data flow diagram

4 X LAYER SUBSYSTEMS

The Tap layer contains the NFC Chip, Tapping activity, NFC reader, and networking. This layer will manage the reading of the NFC chips to allow the users to access their information

4.1 NFC CHIP

The NFC chip will allow the user to access their information after tapping it to the NFC reader

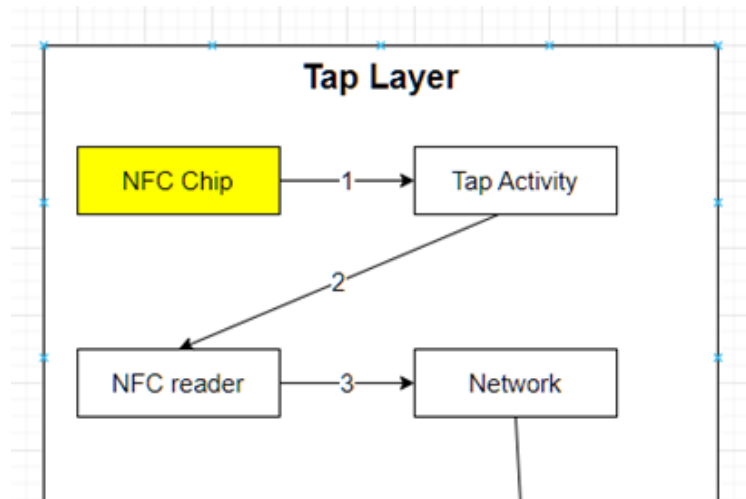


Figure 3: NFC chip and its Relation to Tap Layer Subsystem

4.1.1 ASSUMPTIONS

NFC Chip is required as it work as a kind of an ID for the reader to retrieve the information of the user from the cloud.

4.1.2 RESPONSIBILITIES

NFC Chip will be used by the user to tap on the NFC reader to retrieve the information of the user from the cloud.

4.1.3 SUBSYSTEM INTERFACES

Table 2: Subsystem interfaces

ID	Description	Inputs	Outputs
#1	NFC Chip tap on NFC reader	input 1 input 2	output 3

4.2 TAP ACTIVITY

This is the tapping activity between the NFC Chip and the NFC reader.

4.2.1 ASSUMPTIONS

After having a NFC Chips, to retrieve the data from the cloud, user need to tap the chip on the NFC reader to retrieve the information.

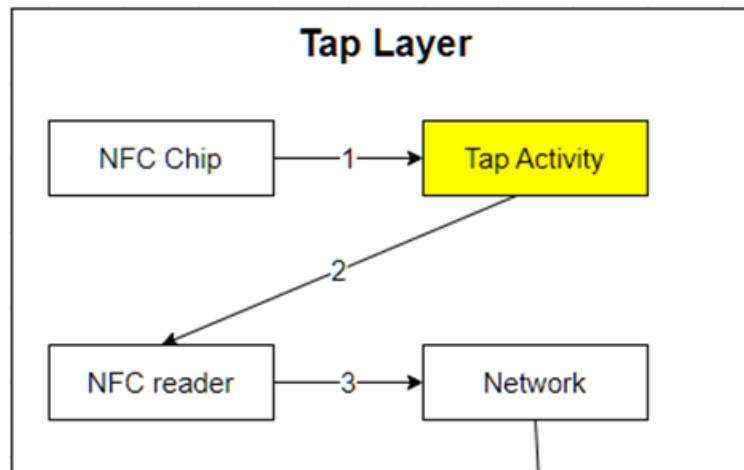


Figure 4: Tap activity and its Relation to Tap Layer Subsystem

4.2.2 RESPONSIBILITIES

Tapping activity of the NFC chip to the NFC reader to retrieve user's data.

4.2.3 SUBSYSTEM INTERFACES

Table 3: Subsystem interfaces

ID	Description	Inputs	Outputs
#2	using NFC chip tap on the NFC reader	input 1 input 2	output 3

4.3 NFC READER

NFC reader read the NFC chip from the user and send the information to the cloud to ask for access.

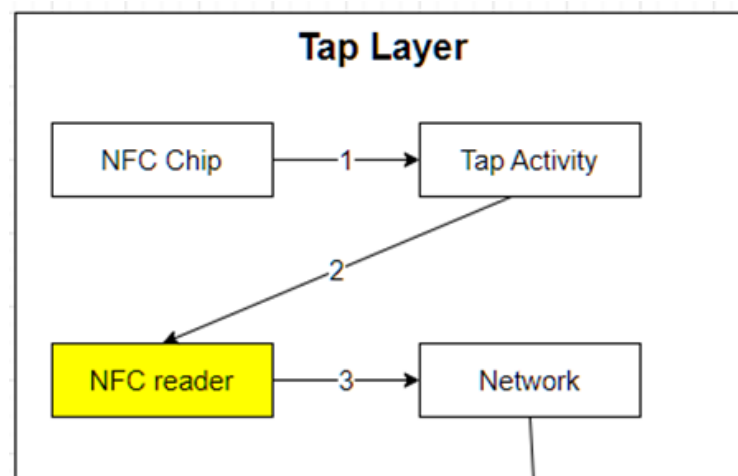


Figure 5: NFC reader and its Relation to Tap Layer Subsystem

4.3.1 ASSUMPTIONS

This is the NFC reader that use to scan the NFC Chip after the tap activity.

4.3.2 RESPONSIBILITIES

NFC reader read the NFC chip from the user and send the information to the cloud to ask for access and retrieve the information of the user.

4.3.3 SUBSYSTEM INTERFACES

Table 4: Subsystem interfaces

ID	Description	Inputs	Outputs
#3	read the NFC chip and retrieve user's data	input 1 input 2	output 3

4.4 NETWORKING

Network is required for the NFC reader to request user's data from the cloud.

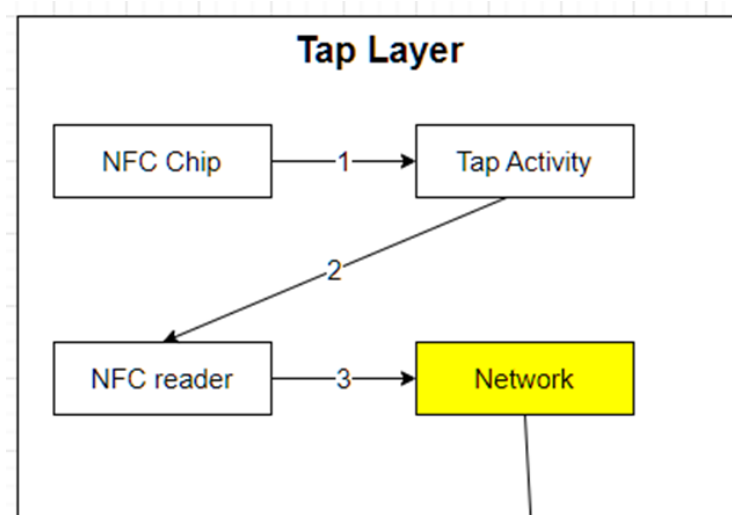


Figure 6: Network and its Relation to Tap Layer Subsystem

4.4.1 ASSUMPTIONS

Networking is required for the NFC reader to retrieve the user information from the cloud.

4.4.2 RESPONSIBILITIES

After NFC reader has been tapped with the NFC chip, the NFC reader will access the database with the help of networking to retrieve data of the user from the cloud.

4.4.3 SUBSYSTEM INTERFACES

Table 5: Subsystem interfaces

ID	Description	Inputs	Outputs
#4	Networking is required to access the database	input 3	output 4

5 Y LAYER SUBSYSTEMS

The UI Layer (Layer Y) consists of the reading and editing of patient data, as well as the networking communication to the database that connects to the site in order to store patient data for the bracelet user.

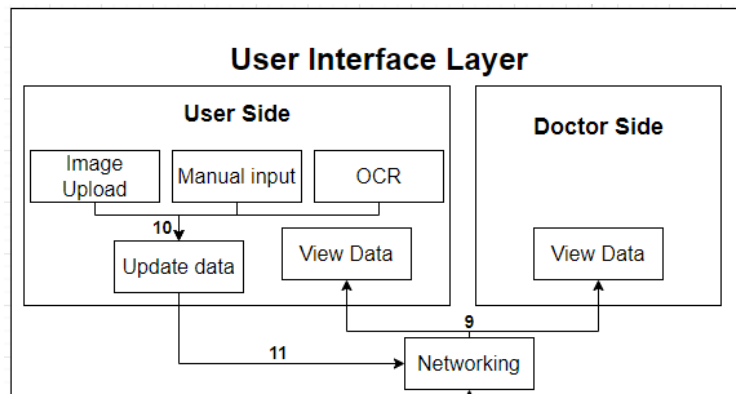


Figure 7: Diagram of UI Subsystem

5.1 READ PATIENT DATA

The reading of patient data is done by both users; EMT and User. This is done through different means based on the user type, and has different purposes based on the user type. The user views the data in order to verify its accuracy or fill in information for various needs, while EMT views patient data in order to gain knowledge on the medical or insurance information a specific patient has.

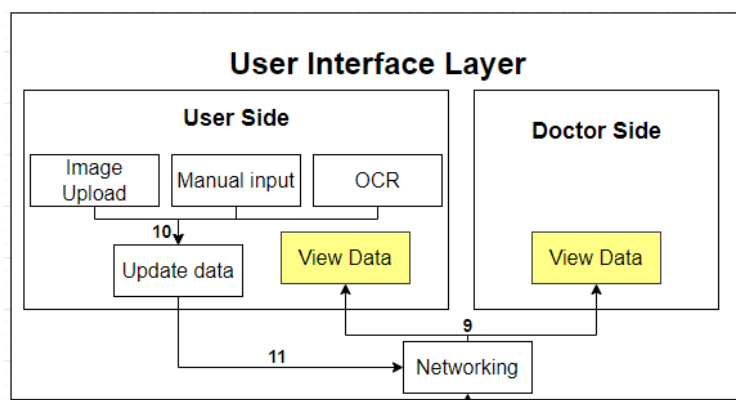


Figure 8: View Data Layer and its Relation to UI Layer Subsystem

5.1.1 ASSUMPTIONS

An established network must be active in order to view the user data. A verified EMT or the active user are the only users that are able to view the data.

5.1.2 RESPONSIBILITIES

This function gives EMT users a better understanding about the basic medical requirements and issues about a person, in case the patient is physically unable to personally give their medical information to the EMT in case of an emergency. The active user can also view their own patient data in order to get a

better understanding about what nutrition, medication, and protocol to take in order to preserve good health. Viewing user data also includes viewing insurance information for both types of users.

5.1.3 SUBSYSTEM INTERFACES

Table 6: Subsystem interfaces

ID	Description	Inputs	Outputs
#1	Active Network to View User Data from website	input 5	output 7

5.2 NETWORK FOR UI

The network connection allows for the UI of the website to be accessed, so that all types of users may access specific user data.

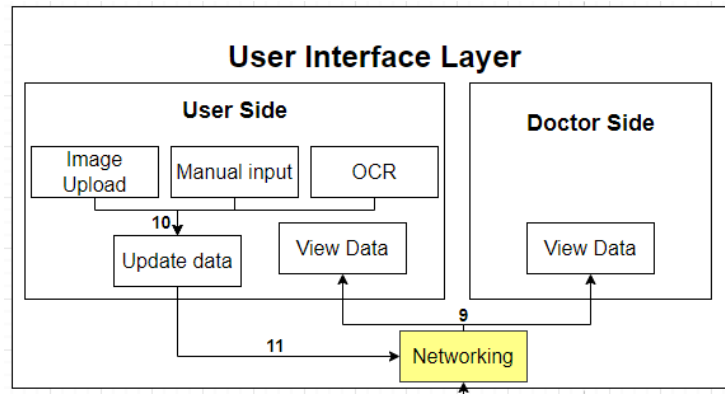


Figure 9: Networking Layer and its Relation to UI Layer Subsystem

5.2.1 ASSUMPTIONS

When the network connection is active, there is a constant connection with the database so that the patient user and EMT user can access data.

5.2.2 RESPONSIBILITIES

A network must be established to connect the website in order for the user to edit, add, and delete information from their account. A network must also be established so that the verified EMT can view patient data, and access the database of information of a user.

5.2.3 SUBSYSTEM INTERFACES

Table 7: Subsystem interfaces

ID	Description	Inputs	Outputs
#2	Active Network to View User Data from website	input 4	output 5
#3	Active Network to connect to database	input 5	output 6

5.3 UPDATE USER DATA

The verified patient (user) can update various medical information sections, which includes adding information, removing information, or changing information. This is then saved in the database using the user's appropriate key.

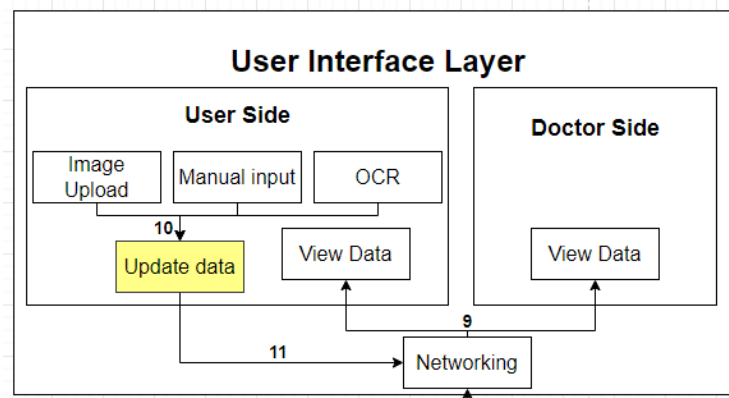


Figure 10: Update User Data Layer and its Relation to UI Layer Subsystem

5.3.1 ASSUMPTIONS

An established network must be active in order to save the updated user data. EMT users are not able to update user data, and only those with the individually assigned key and user login information can update patient information.

5.3.2 RESPONSIBILITIES

This function allows users to keep medical and insurance information up to date. Appropriate medical information can be added, removed, or updated if needed. The database will only save the most recent changes to user information to ensure the most accurate details about a patient.

5.3.3 SUBSYSTEM INTERFACES

Table 8: Subsystem interfaces

ID	Description	Inputs	Outputs
#4	Update user data to store into database connected to active network	input 1 input 2 input 3	output 4

5.4 OPTICAL CHARACTER RECOGNITION

OCR tools are optional and are used to read images uploaded by patients and input the data into an array that can be stored into the database as text. EMT can then view the contents of the image as an array of text which is stored in the database.

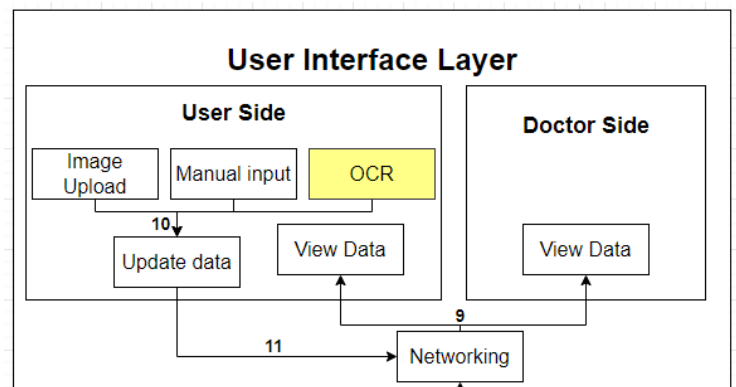


Figure 11: OCR Layer and its Relation to UI Layer Subsystem

5.4.1 ASSUMPTIONS

An established network must be active in order to upload images of the user data. Only those with the individually assigned key and user login information can update patient information which supports OCR tools.

5.4.2 RESPONSIBILITIES

This function concisely records images information into the database as an array of information assigned to a particular patient. This then allows the EMT to view the contents of the patient information without having to access individual images uploaded by the patient.

5.4.3 SUBSYSTEM INTERFACES

Table 9: Subsystem interfaces

ID	Description	Inputs	Outputs
#5	Read uploaded images and store as array of text values to update the user information	input 3	output 4

5.5 MANUAL INPUT

The user manually inputs values and information into their account details, which consists of various medical information and documents. The manual input is done when designated sections of medical information are requested by the EMT.

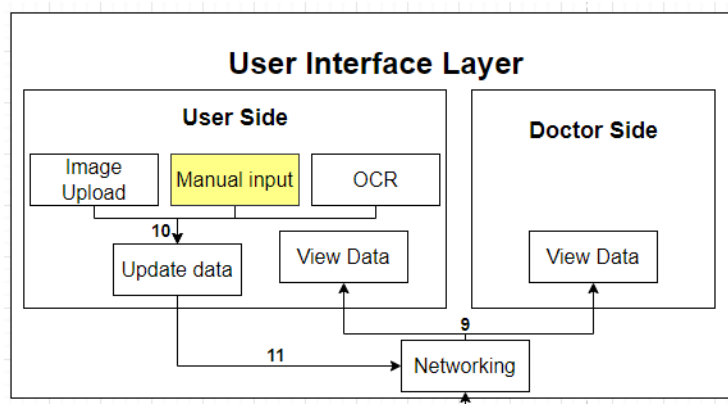


Figure 12: Manual Input Layer and its Relation to UI Layer Subsystem

5.5.1 ASSUMPTIONS

An established network must be active in order to manually input the user data. Only those with the individually assigned key and user login information can manually input patient information which supports.

5.5.2 RESPONSIBILITIES

This function allows the user to put their information in specified location designated for certain sub-sections of medical history or other information that may be needed by a verified EMT.

5.5.3 SUBSYSTEM INTERFACES

Table 10: Subsystem interfaces

ID	Description	Inputs	Outputs
#6	Manually input information to update the user information	input 2	output 4

5.6 IMAGE UPLOADING

Image uploading is for documents that verify medical or insurance information of the user, which can be viewed by the patient and verified EMT. Image uploading is done manually by the user.

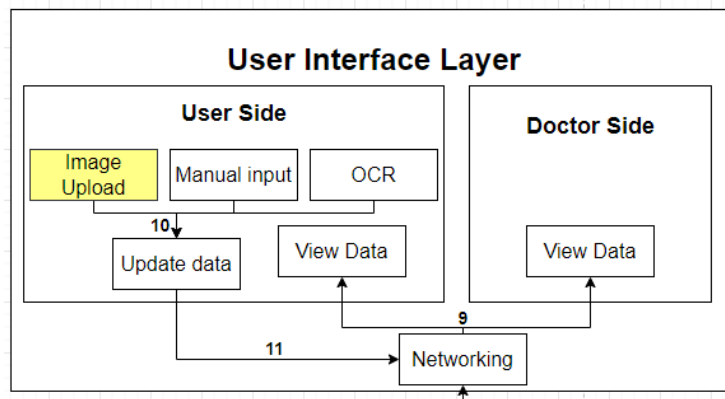


Figure 13: Image Uploading Layer and its Relation to UI Layer Subsystem

5.6.1 ASSUMPTIONS

An established network must be active in order to upload images of the user data. Only those with the individually assigned key and user login information can update patient information which supports image uploading.

5.6.2 RESPONSIBILITIES

This function concisely records images information into the database as an array of information assigned to a particular patient. This then allows the EMT to view the contents of the patient information without having to access individual images uploaded by the patient.

5.6.3 SUBSYSTEM INTERFACES

Table 11: Subsystem interfaces

ID	Description	Inputs	Outputs
#7	Upload and store images to update the user information	input 1	output 4

6 CLOUD LAYER SUBSYSTEMS

The Cloud layer contains the data of each patient that has created an account. Each patient is required to verify who they are and login to access their account and data. Login information is encrypted as a security precaution. The Cloud layer communicates with the Tap layer so that the link written in the NFC chip directs the device to the site login page. The Cloud layer also communicates with the User Interface layer, allowing the user to view data and possibly edit the data.

6.1 REDIRECT LINK AND KEY

The Tap layer starts communication with the cloud layer by giving the device a link that directs it to the Login page to access data in the cloud layer. The owner of the device would then have to use their login information to access and view the data. The user must be a registered user and their login information must match their encrypted login information saved in the database.

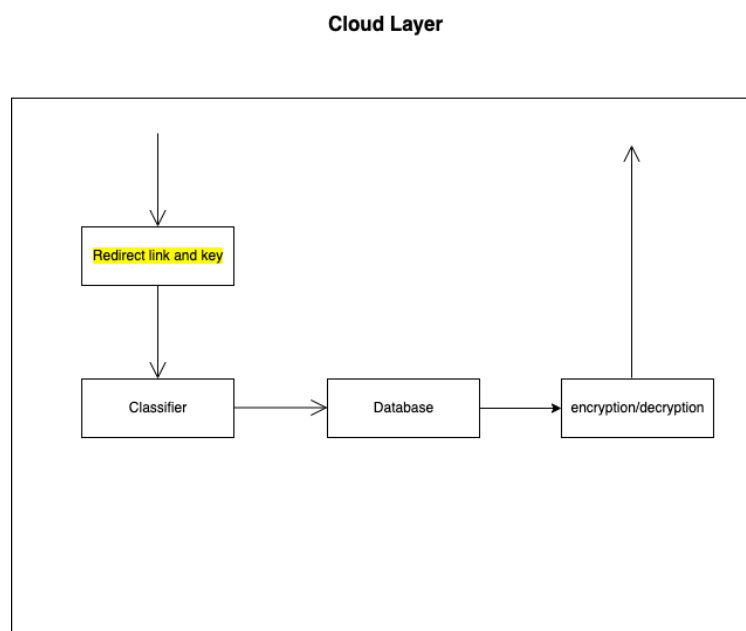


Figure 14: Redirect link and key and its Relation to Cloud Layer Subsystem

6.1.1 ASSUMPTIONS

Redirect link will work properly and lead the device to our login page. It will require a key as well as login information. The user should also already have been registered and have login credentials. Once logged in we expect data to be displayed to the user and that communication between the Cloud layer, User Interface layer, and Tap layer will allow the user to smoothly interact with the site.

6.1.2 RESPONSIBILITIES

Redirect link and key is responsible for directing the user's device to the login page. The device is sent a link when tapping the NFC chip that then requires a key code and login credentials. The website will be opened in the device's default web browser.

6.1.3 SUBSYSTEM INTERFACES

Each of the inputs and outputs for the subsystem are defined here. Create a table with an entry for each labelled interface that connects to this subsystem. For each entry, describe any incoming and outgoing

data elements will pass through this interface.

Table 12: Subsystem interfaces: Redirect Link and Key

ID	Description	Inputs	Outputs
#1	Redirect Link and Key	Redirect Link Key	Acknowledges link and key are correct
#2	Active Network to connect to database	N/A	N/A

6.2 CLASSIFIER

A unique classifier is given to each account made on the website. The patient classifier allows the user to edit their account data. The EMT and hospital personnel classifier allows for the viewing of patient data, but does not allow editing data.

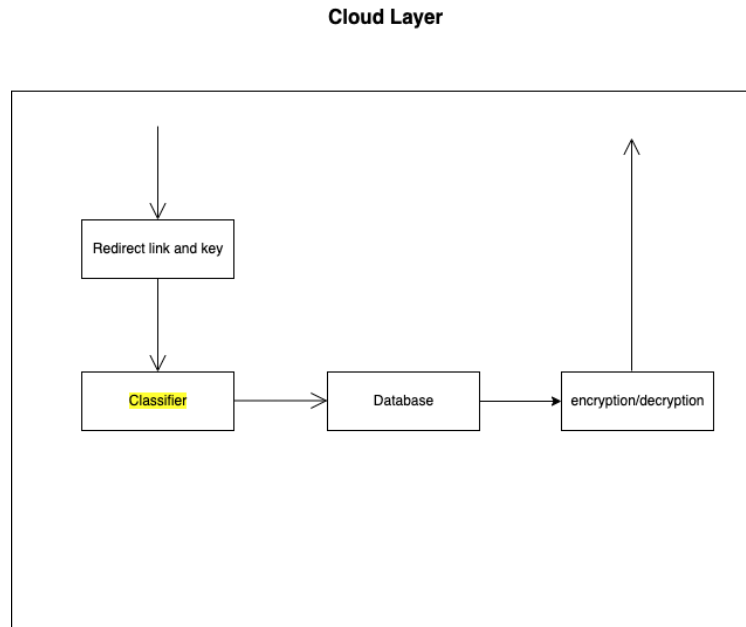


Figure 15: Classifier and its Relation to Cloud Layer Subsystem

6.2.1 ASSUMPTIONS

Each user is classified as a patient, EMT, doctor, or hospital staff. There is an active network connection that allows the Tap layer and User Interface layer to communicate with the Cloud layer.

6.2.2 RESPONSIBILITIES

The classifier is responsible for giving each user specific permissions to the data on the cloud layer. Patients are allowed to add and remove data, EMT and hospital personnel are only allowed to view data of a specific patient.

Table 13: Subsystem interfaces: Classifier

ID	Description	Inputs	Outputs
#1	Classifier	Classifier	Gives each user specific permissions
#2	Active Network to connect to Tap layer and UI layer	N/A	N/A

6.3 DATABASE

Database contains all information that the patient would like to upload to the website. These can include allergies, blood type, and medical history. All patient information will be protected to prevent sensitive information from being leaked

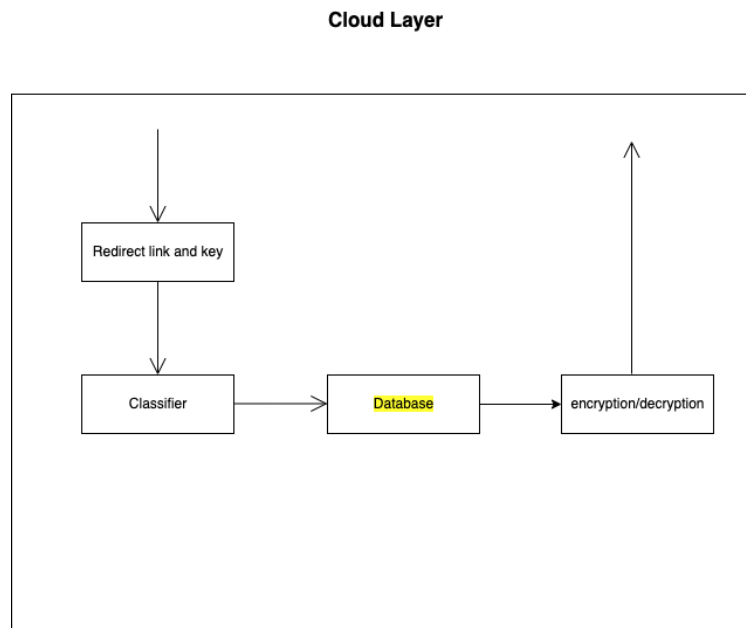


Figure 16: Database and its Relation to Cloud Layer Subsystem

6.3.1 ASSUMPTIONS

Contains all information that patients add to the database. Communicates with the UI layer in order to present the data of each user.

6.3.2 RESPONSIBILITIES

Contains all data that the patients want to add to their account. Can be viewed by the patient or healthcare professionals. Securely store each users data.

Table 14: Subsystem interfaces: Database

ID	Description	Inputs	Outputs
#1	Each account requests user data	Data request	Display's user data on the web page
#2	Active Network to connect to the UI layer	N/A	N/A

6.4 ENCRYPTION/DECRYPTION

Encrypts each patient's login credentials and well as secures each users data within the database so that it is unreadable. The patient's data will be later decrypted when the right personnel make a request and displayed on the User Interface layer.

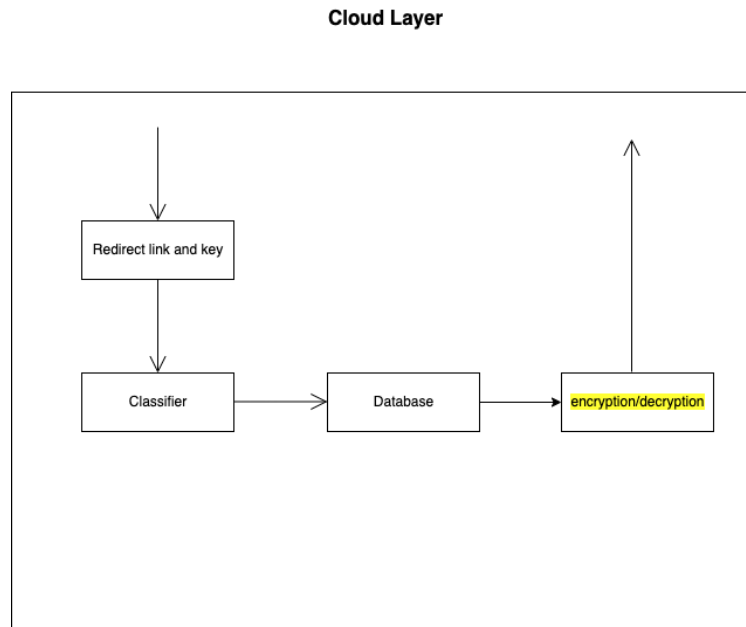


Figure 17: Encryption/decryption and its Relation to Cloud Layer Subsystem

6.4.1 ASSUMPTIONS

All patient data and login credentials will be encrypted and securely stored. Decrypts patient data when needed.

6.4.2 RESPONSIBILITIES

Securely store each patients information, protecting it from data breaches. Also decrypts patient data that is requested by the patient.

6.4.3 SUBSYSTEM INTERFACES

Table 15: Subsystem interfaces: Encryption/Decryption

ID	Description	Inputs	Outputs
#1	Encryption	Patient data	Encrypts patient data
#2	Active Network to connect to communicate with the UI layer	N/A	Readable data sent to User Interface

REFERENCES