

MedicalDossier

Number of Team Members: 2

Overview

MedicalDossier puts the power of your medical history in your hands.

MedicalDossier will allow individual patients to access and assign access to their own personal medical records in a read only format, this will be held on a secure encrypted public ledger based on existing Blockchain technology.

It will only allow patients and verified medical professionals to access individual patient data. Patients will know who and when someone is accessing their medical history and have a right to decline access.

Combined with extra security and putting the power of an individual's medical history in their hands, patients will also be able to access their data on the go.

Project Description

MedicalDossier puts the power of your medical history in your hands.

MedicalDossier is an app that will allow individual patients to access and assign access to their own personal medical records in a read only format, this will be held on a secure encrypted public ledger based on existing Blockchain technology.

Benefits For The End User

Right now, if a patient wanted to access their own personal medical history, whether that be to allow a private medical professional access, or even to review their own medical history they would have to go through a long and unnecessary process.

This process involves the patient making a request in writing to the data controller at the NHS organisation where your records are held - for example, the hospital that treated you, or your GP surgery, once this has been completed you will then receive an appointment to see your records.

This process could take up to 2 weeks based on the availability of doctors.

Furthermore, if a patient wishes to take their own personal medical history away with them it would cost £10 for records that are only held electronically and up to £50 for those records that are not available in electronic form.

The solution to this unnecessary issue is to use an application based on Blockchain technologies, by incorporating blockchain methods the MedicalDossier will decentralise the support from one source.

The application will take advantage of public & private key encryption to have individualised ledgers for patients containing all their medical information. These blockchains of a patient medical history is secure and can be continually added to by medical professionals.

A client signed up to this process will then be able to scrape public records or have a doctor signed up to process input into the record.

The client can then accept the new content about their medical record on the chain.

The NHS currently has a centralised system installed. All this data has the potential to be imported into your account. The benefits of this move could also save the NHS server space in storing all these personal files replacing it with encrypted public ledgers for all individuals. These ledgers then have the potential to be implemented into a BitTorrent protocol, having only the upkeep of servers for access speeds required.

The main points this solution will address are:

- Your medical records being easily instantly accessible anywhere in the world in a read-only format as long as you have Wi-Fi – removing the 3rd party constraint
- Removing all fee's which you currently must pay to take your medical records away - £10 for records that are only held electronically and up to £50 for those records that are not available in electronic form
- Adding security – enabling medical records to be more secure – you can see when someone is accessing your medical records with automated emails sent to your address whenever someone accesses your records
- Alerts are also sent when suspicious activity is recorded relating to your account
- You can allow people to view your medical records for a short amount of time or whenever they want
- Only doctors can make any changes your medical records – this is enforced due to the security
- Remove the hassle of having to see your doctor and book an appointment just to see your own medical history

Technical Details

Our chosen platform is the mobile market. This includes iOS, Android & windows devices.

This will best maximize the accessibility to users worldwide whenever medical data is needed. All devices would request a public private key pair generation.

Having a device centered approach allows the user to manage their own private keys in regards to their data, allowing more encryption to be done user side leading to less dependency on our systems.

The app will be developed on Xamarin using C# and Xamarin.forms. The use of Xamarin will allow us to port to iOS, Android and Windows devices, using Xamarin will allow a rapid prototype development on interfaces for all devices.

This also lends more focus on the blockchain implementation using Ethereum API. Managing the blockchain using Ethereum API allows the creation of individualised medical records to be implemented in a blockchain.

Ethereum is a world class API, pioneering blockchain.

Ethereum utilises one of the world's most advanced encryption algorithms supported by a strong community and has cross platform plugins and a supported .NET framework called Nethereum, which also allows development with Xamarin.

The individual contracts ledgers will consist of blocks of medical data and new amendments will be added on to this chain.

Views and additions from doctors are also added to the chain and all history is stored through the nature of the blockchain.

Each of these blocks will have a protocol format of the device address, user details and access location. This adds clear traceability of who is viewing the data and enables further implementation of alerts once suspicious access is viewed.

Finally, the public ledgers will initially be stored on a server written in MySQL and using the Ethereum api. Clients can pull their contract medical histories to view or share, which can later lead to BitTorrent protocols, enabling the ledgers to be torrented, migrating the need for our server storage.

Figure1. An example of a medical record block chain

This diagram shows what is on a medical record block chain.

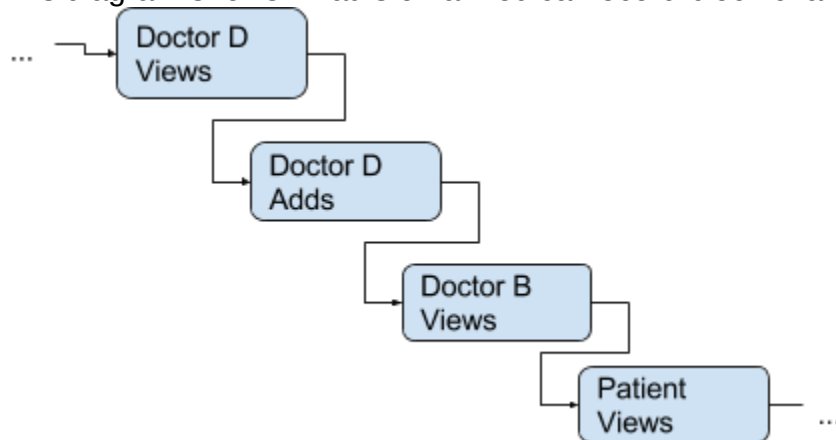
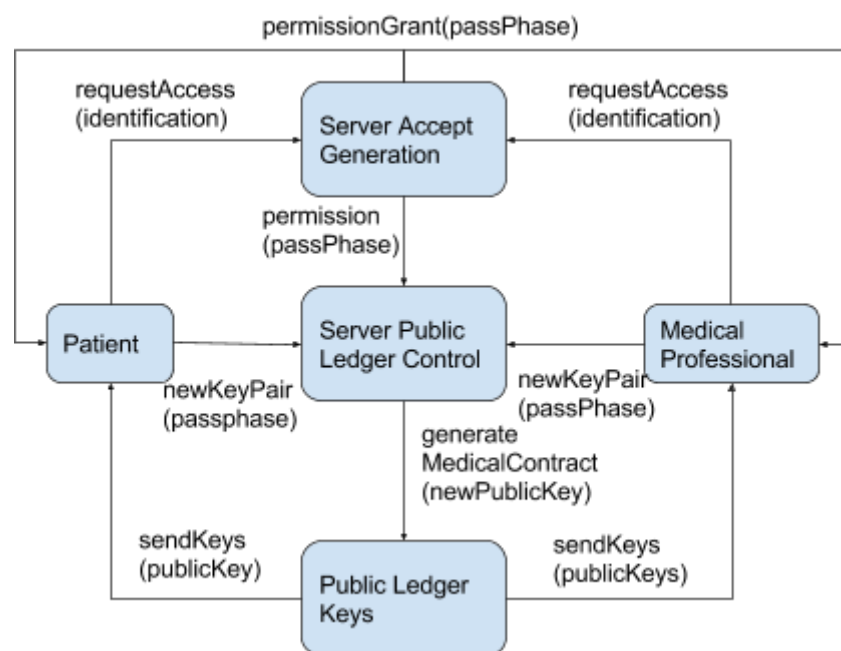


Figure2. An overview of the server-client architecture

This diagram shows an overview of the server-client architecture for generating access:



The Business Model

As medical records are already very hard to access and require a fee to take away we are solving a lot of issues.

Our business model would be to monetise the access to patients medical records. Whenever you wish to view your medical records you will have to pay a fee of 99p, that fee will allow unlimited access to view and share your medical records for a whole year (365 days) from the date of payment or you can pay a one off fee of £20 for unlimited access for a lifetime.

We will charge an annual fee to medical professionals and medical providers but the charge will be cheaper than the current maintenance of the system incentivizing them to collaborate with us.

We aim to collaborate with the major data holders of medical records around the world to enable us to obtain each medical records for free or at a discounted price. In return for this we will charge a cheaper rate for major data holder of medical records, an annual subscription payment allowing unlimited access to all medical records for a whole year.

We aim to generate revenue based on the fact patients will want to access their data at least once or twice in their whole life and an annual subscription by the medical professionals will be a necessity in their job.

Patients will not hesitate to pay 99p to access their own real time medical records electronically for a whole year as opposed to £10-£50 for a one time printout which could easily be lost or destroyed, and for patients who prefer convenience a £20 one off payment for a lifetime is not a large amount.

A verified doctor is able to view any medical records of all patients as long as he is employed by a medical institution that has paid the fee's.

A private institution will pay an annual subscription cost relative to the amount of medical records they require access to.

Our initial startup costs and maintenance will be low due to the system being self managing and once the initial system is up, the main cost will be improvements as the blockchain will be self managing.

Considering over 3.2 billion people have access to the internet if 50,000 people pay a one off payment of £20 for lifetime access a million pound is generated and a one off payment off 99p from a million patients is just shy of 1 million pound.

The fact that at least every patient in the world with a working internet connection will want access to their medical records at least once in their life and new patients are born everyday guarantees a steady stream of income.

Furthermore a potential business partner could be the major data holder of medical records, as they would benefit from a service like this, due to less money being spent to maintain servers and to process medical records. The data they house is also vulnerable to security attacks whereas if it was implemented onto a blockchain it would be more secure.

Demonstrator

The blockchain will house all of the patients medical records and patients will be able to access and share their medical records with whomever they like on MedicalDossier.

All of this data will be migrated from current systems to a blockchain format, an account will be created for each medical record and be assigned to that patient, the patient's private key can only be used on their account adding an extra layer of security.

Essentially, MedicalDossier will act as the API between the user and the blockchain. New patients will have the option to sign up but only by going through their GP and each new addition to the blockchain from a GP will need to be verified.

A breakdown of Methods of Access

Once a user is on the application and have paid the annual payment or the fixed one time payment they have to option to:

1. View their own real time electronic medical record an unlimited amount of times
2. Allow their medical records to be sent to their email address to be printed or shared with whomever they please

Once a Doctor is part of an verified medical institution that has paid the annual subscription fee they have the option to:

1. View any patient record
2. Edit patient records

Once a private verified medical institution has paid the annual subscription fee (relative to the amount of records they wish to access) they have the option to:

1. View any patient record verified by the patient registered to the private medical institution
2. Edit any patient records registered to the private medical institution

References:

- Choices, N. (2016) *Your health and care records*. Available at: <http://www.nhs.uk/NHSEngland/thenhs/records/healthrecords/Pages/overview.aspx> (Accessed: 30 November 2016).
- Ethereum, *Ethereum project*. Available at: <https://www.ethereum.org/> (Accessed: 30 November 2016).
- Nethereum (2016) *Nethereum/Nethereum*. Available at: <https://github.com/Nethereum/Nethereum/tree/master/src/Nethereum.Web.Sample> (Accessed: 30 November 2016).