

Requirements Document

iHuman Sepsis support for Google Glass

1. Brief Problem/System Summary

This project aims to use the Google Glass technology to provide clinical data and intelligent decision support to doctors in cases of sepsis so they can provide informed, quality care that can potentially save lives.

What is sepsis?

Sepsis is an overwhelming immune response to infection, which damages its own tissues and organs. It can happen at any age, regardless of health condition and many times from seemingly benign incidents (e.g. a playground scrape). Severe sepsis strikes 18 million people every year, 750,000 being Americans and it have very high mortality rate that ranges from 28% to 50%. It is the leading cause of ICU deaths, accounting for 60-80% deaths in developing countries. It kills more than 6 million infants and young children worldwide every year. Diagnosis of sepsis is often delayed due to its difficulty to diagnose despite the rapid deterioration of the patient. To summarize, sepsis is an ubiquitous omnipotent killer that literally and figuratively can cost us an arm and a leg, and does not discriminate against sex, ethnicity, social status or age.

The project consists of extending an existing back-end infrastructure to allow for scalable, encrypted and reliable storage of the patient data, building a Google Glass application that identifies patient IDs (QR code), projecting relevant data through an interactive GUI and implementing a communication protocol to allow encrypted data to be safely transmitted to and from the Google Glass and the back-end server.

Back-end server: We will convert the database from MS access to SQL. We need to implement code on the backend to handle requests from the Glass device. There will be Matlab code on the backend to compute necessary data based on the user request to generate graphs, charts. Depending on the needs of the project, this code may be re-implemented in another language. The graphs and charts will then be passed to the Glass.

Front-end display: We will create app on the Glass that will make server requests and using the response we will have to generate plots/graphs. Need to design an effective GUI for the Glass.

2. Stakeholders (including Users, funders, decision makers etc) Name the people, and contact information if available, and why should influence the requirements. Finally, who will be signing this document, and why.

- A. Users, these people will actually be using the Support Software to diagnose their patients.
 - a. Physicians in UCDCMC,
 - b. Ilias Tagkopoulos (itagkopoulos@ucdavis.edu), Client and Bioinformatics Professor
 - i. The clinical team will test the GUI and give feedback, then we might need

to change the GUI for the glass.

B. Decision Makers:

- a. Nasos Tsoukalas (nasos.tsoukalas@gmail.com), Post-doc Project Programmer
- b. Ilias Tagkopoulos (itagkopoulos@ucdavis.edu), Client and BioInformatics Professor

C. Signer: Ilias Tagkopoulos (itagkopoulos@ucdavis.edu)

D. Passive Users: Patients benefit from the use of but do not actively use the Decision Support application. Only Physicians use the Decision Support software.

3. External Ecosystem

A. Hardware/System Requirements (mobile? Laptop? Pad? Glass? Operating System?)

- a. Google glass (Android 4.0.3 Ice Cream Sandwich)
- b. A Back-end server

B. Other concerned systems(pre-existing servers? Web Services? Frameworks?)

- a. None

C. External critical data (Any pre-existing data you have to use?)

- a. SQL database with patients' information

D. User Interface guidelines. (Web pages?iOS/Android screens? Command line? Others?)

- a. Google glass GUI with clinical data
- b. Decision Support
- c. QR Code Patient Scan
- d. Patient Info Overlay
- e. Voice Commands to Queue Orders

4. FunctionalRequirements.

A. User Interface finalization (via prototypes? User studies?)

- a. Prototypes using powerpoint slides. Couldnt find any online sites to mockup GUI for the Google Glass.

B. Detailed Specs---via use cases,or other methods, as appropriate.

- a. Use cases is attached

C. How will the above be tested for?

- a. Will be tested by running our application directly on the Google Glass. Team iHuman and Ilias will test functionality.

5. Non-Functional Requirements.

A. Security (privacy, authentication, who is allowed to do what?)

- a. The physicians' Glass will be connected through a private network to the database and server. Only the physicians will be able to access the sensitive information.

B. Fault-tolerance? (What are the expected failures (hardware failures, software "upgrades" etc) what is the allowable rate and duration of failures?)

- a. There will be no fault tolerance for software failures due to our application, this is our responsibility. The Glass is still in development and hardware failures are a

possibility, but not within our scope.

- C. Performance Requirements? (typical response times, if applicable)
 - a. Data needs to be always up-to-date and show time of the last update.
- D. Scalability/Throughput requirements? (how many users?)
 - a. The throughput of the application is just the querying to the database since our main objective is to display the information not make calculations.
 - b. The number of users that access the application at a single time is not limited since the application is native to the Glass. The web service and database will be hosted by the professor and the number of users will be determined by the robustness of their server, which is out of our scope.
- E. How will you test for the above?
 - a. Throughput can be calculated by how much data the glass will be received over an interval of time.

6. Process Requirements.

- A. What must be done, when?

Sprint I

Wednesday April 16, midnight

- Welcome view
- Recent Patient view
- Overview/Summary view
- View Switching (Physical)

Sprint II

Wednesday April 23, midnight

- QR code scanner view
- Send/Receive information to Glass/Database

Sprint III

Wednesday April 30, midnight

- Vitals view
- Option view
- Policy view
- Event view

Sprint IV

Wednesday May 7, midnight

- Support view
- View Switcher (Motion control)
- Asynchronous Notifications

Sprint V

Wednesday May 14, midnight

- View Switcher (Voice Control)
- Possible Revisions to functionality
 - Encryption
- B. What will be delivered, and to whom?
 - a. Back-end API to handle and process requests
 - b. Google glass application for Sepsis Patient Decision Support
 - c. Will be delivered to Ilias Tagkopoulos
- C. In what form will it be delivered?
 - a. Server side code
 - b. Application package
- D. Who will sign off on when it's done?
 - a. Ilias Tagkopoulos (itagkopoulos@ucdavis.edu)

7. Summary

The project will consist of the major parts: (a) extend the current back-end infrastructure to allow for scalable, reliable storage of the patient data, (b) build a Google Glass application that will identify patient ID (QR code), project relevant data through an interactive GUI and (c) implement a communication protocol that will allow encrypted data to be safely transmit from/to the Google Glass and the back-end server.

8. Signatures

Ilias Tagkopoulos

Team iHuman

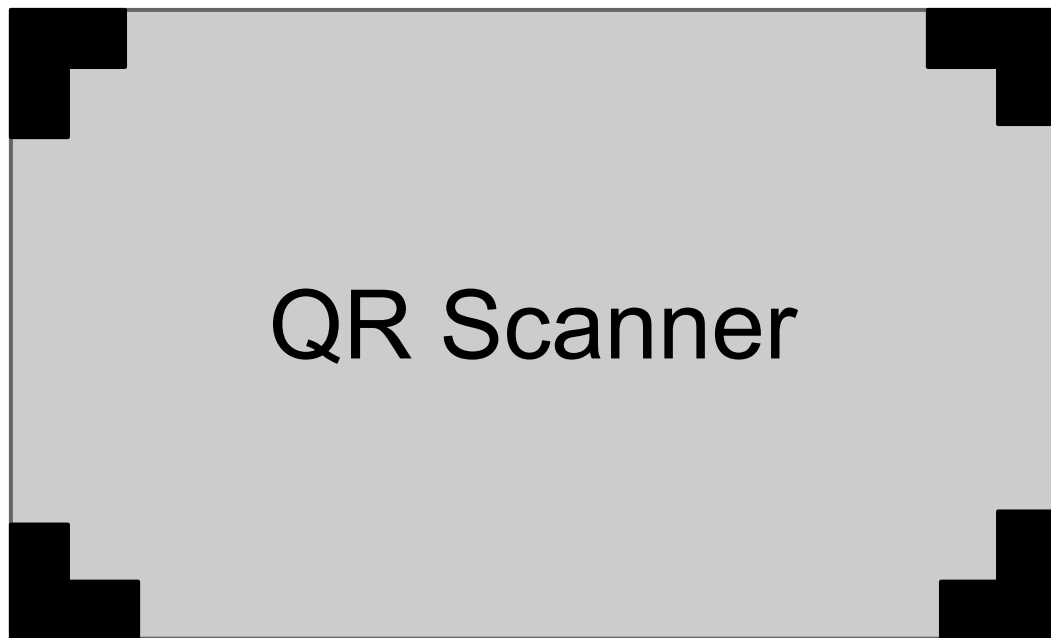
Welcome to Sepsis Support for Google Glass

tap to scan patients QR Code

Swipe Left

Tap

Swipe Right



Swipe Left

Tap

Swipe Right

Recent Patients

John Doe
Sarah Black
John Smith

...

Swipe Left

Tap

Swipe Right

John Doe #8589475

Hospital Admission Time: 9am, 02/12/14

Hospital Discharge Time: 12pm, 02/13/14

Encounter Number: 213

Sex: Male

ICU Days: 3

Overview

Support

Vitals

Events

Policy

Options

Swipe Left

Tap

Swipe Right

Support

tap to start sepsis decision support

Overview
Support
Vitals
Events
Policy
Options

Swipe Left

Tap

Swipe Right

Vitals

Overview

Support

Vitals

Events

Policy

Options

Swipe Left

Tap

Swipe Right

Events

Overview

Support

Vitals

Events

Policy

Options

Swipe Left

Tap

Swipe Right

Policy

Overview

Support

Vitals

Events

Policy

Options

Swipe Left

Tap

Swipe Right

Options

Overview

Support

Vitals

Events

Policy

Options

Swipe Left

Tap

Swipe Right