

# CueMeIn - Product Requirements Document

## About the Team

**Team Name:** Runtime Terror

**Company:** LogMeIn

**Team Members:**

Mason Corey (Lead)

Javier Jimenez (Scribe)

Juan Mendoza-Martinez

Leena Shankar

Armaan Shah

## Introduction

*What is the problem?*

Nearly 1 in 4 people in the United States live with a disability that impacts major life activities. Certain disabilities - specifically intellectual or developmental ones - can cause limitations in cognitive function and abilities and even result in weakened communication skills. As the world shifts towards technologization and online interaction becomes more standard, communication is made more challenging when interacting through video chat, conference calling, and other similar online platforms. Individuals with certain cognitive disabilities can have difficulties connecting effectively over video chat, as communication protocols are different online and may be too subtle to pick up on. It is often difficult for these individuals to read social cues or understand facial expressions and emotional content in an online environment.

Given the current COVID pandemic, the standard mode of communication - be it social, academic, or official - has almost completely shifted to virtual. It is very probable that virtual communication in all areas will continue long-term; consequently, it becomes even more urgent to make this transition easier for people with disabilities.

*How is the problem addressed today?*

As of right now, there are a few applications available that enhance communication for people with disabilities by means of improving social and emotional capabilities; however, there are no customizable tools that focus specifically on improving the video conferencing experience. Some of the existing available technologies include:

- SayWAT - A wearable technology that can assist and deliver feedback to individuals during face-to-face conversations to aid with communication issues
- Learn With Rufus - An iOS application that assists children and adults with autism in understanding, interpreting, and portraying emotions
- Affectiva SDK - An AI company that focuses on emotional recognition through the use of facial recognition, facial feature extraction, and emotional classification

## **Objective, Implementation, and Assumptions**

*What is our objective and who will benefit from it?*

Our objective is to develop a unique tool for the Special Olympics - a non-profit organization that provides sports training and athletic competition for children and adults with intellectual disabilities - that enhances virtual communication for people with disabilities. This tool will be designed for people with intellectual and cognitive disabilities that prevent them from effectively recognizing and interpreting facial

expressions during video conferencing. Autism and fragile X syndrome are examples of two such developmental disabilities that are commonly seen in Special Olympics athletes.

### *How will we implement our solution?*

We intend to read the emotional state of the active ‘dominant’ speaker in a conference call and display that emotion on the screen as a readable popup, so people with cognitive disabilities can practice recognizing and interpreting emotions in real-time. This will be achieved by using the Twilio APIs to obtain the audio and video inputs of the current active speaker and passing these inputs to machine learning models - specifically, IBM Watson and Microsoft Computer Vision for video processing and Google NLP for natural language processing. The sentimental analysis output will then be displayed to the user through the front end user interface which will be constructed using ReactJS. Within the front-end UI, there will be a toolbar that has links to various pages on the website: a home page, a create account page, and a login page. Once logged in, a control panel page will appear that gives the user access to a page that allows the user to host or join a video conferencing room.

To host the application, we will be utilizing an AWS server which will be connected to the Twilio REST API using NodeJS. The MySQL database is a compatible relational database that will be used to connect to the server through the REST APIs in order to store and retrieve user credentials and data obtained from the call. For instance, once a user creates an account, that user will be assigned an account ID. We plan to use a database to store input and output user information. MySQL was chosen because it allows for flexible connectivity to the AWS server and this data can be accessed in many different ways without reorganizing the database tables themselves.

### *What are the necessary assumptions to be made?*

This application will only be available for conference calls hosted on a server, and will only be available as a web application. Each user will need a unique account to login and enable access to host or join a video conferencing room.

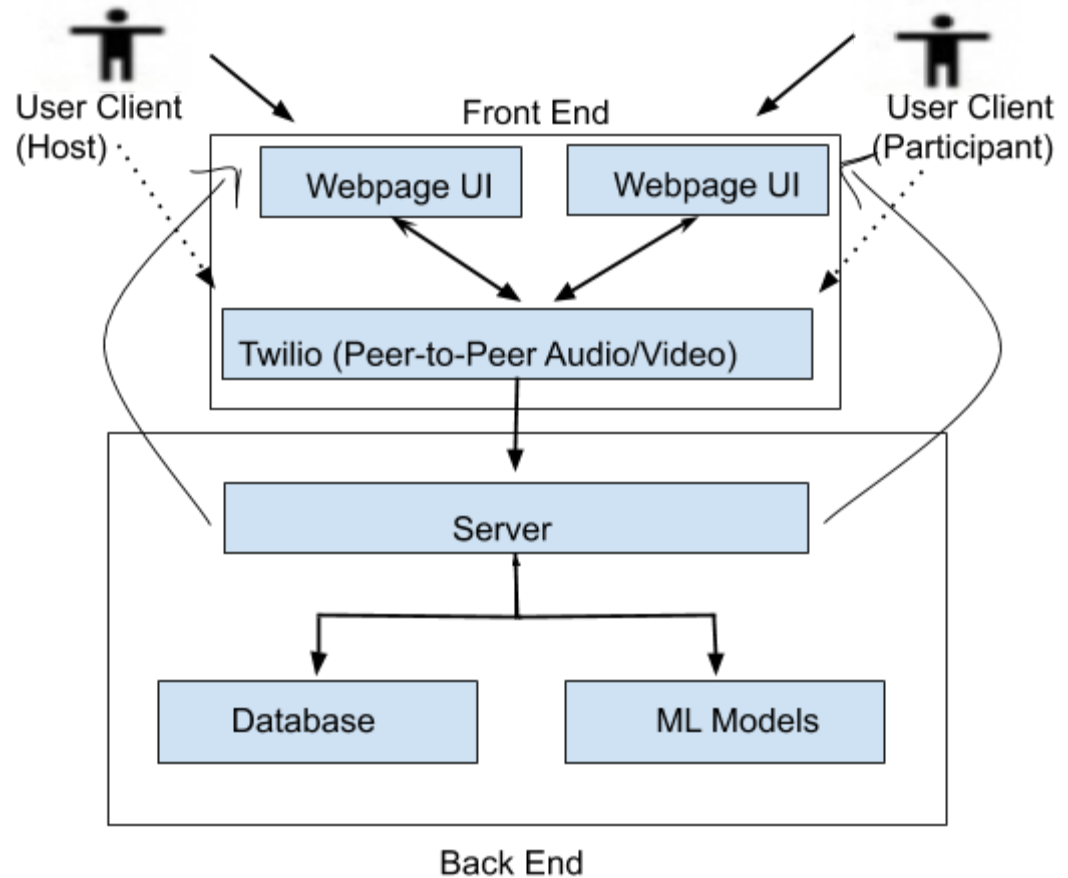
## System Architecture Overview

The diagram to the right depicts how the flow of data starts and ends. At the beginning, the user will be interfacing via the frontend, which will mainly consist of usage of the Twilio API for audio and video

input/output. The user will have a login for the application that we will store in our database so they can sign in as well as speak to other users.

Now interfacing with our backend, we will be taking the audio/video inputs and using multiple APIs for the purpose of video processing, natural language

processing, and sentiment analysis. The outputs we take from these APIs will be passed to the frontend so the user can interact with or visualize what the other users are saying and feeling.



## User Stories

As a user, I can visit the Home Page so that I can exit out of whatever page I'm currently on and have a base page to navigate from

Github links (issues):

<https://github.com/themason2011/CS189A-LogMeIn-Team-/issues/1>

- **Scenario 1:** The user clicks the Home Page from an ongoing video call
  - The user gets a prompt asking if they would like to leave the current page and if they click yes, get redirected to the Home Page
- **Scenario 2:** The user clicks the Home Page in any other scenario
  - Whatever forms the user already entered are cleared and the user gets redirected to the Home Page.

As a user, I can access the toolbar so I can navigate to different pages on the website

Github links (issues):

<https://github.com/themason2011/CS189A-LogMeIn-Team-/issues/2>

- **Scenario 1:** The user is logged into their account
  - The user can access the Home, Host a Room, Join a Room, and Logout pages via the toolbar (in that order).
- **Scenario 2:** The user is not logged into an account yet
  - The user can access the Home, Login, Create an Account, and the Join a Room pages via the toolbar (in that order). A user that hasn't been logged in cannot host a video call.

As a user, I can create an account so I can login and start a video call

Github links (issues):

<https://github.com/themason2011/CS189A-LogMeIn-Team-/issues/5>

- **Scenario 1:** There is no existing account associated with the email address provided

- User can access the “create account” page via the toolbar
- User can create a username and a password (minimum of 8 characters for a strong password)
- User will be able to create an account successfully and fail creation if credentials are invalid
- **Scenario 2:** There is an existing account with the email address provided
  - User will encounter an error page that says an account already exists
  - User will be able to reset password to that existing account

As a user, I can log in to my existing CueMeIn account so that I can start a video call

Github links (issues):

<https://github.com/themason2011/CS189A-LogMeIn-Team-/issues/4>

- **Scenario 1:** The login credentials match the json file on our backend and the Twilio login succeeds
  - User can access their account
  - User will be able to host a room
- **Scenario 2:** The login credentials do not match the json file on our backend and the Twilio login fails
  - User will get an error message saying their credentials are invalid
  - User will be told to attempt login again

As a user, I can Host a Video Call from the Control Panel Page so I can start a Video Call

Git Issue: <https://github.com/themason2011/CS189A-LogMeIn-Team-/issues/3>

- **Scenario 1:** User is prompted to the Host a Room Page after Login Credentials Succeed
  - Given the user login credentials are valid
  - After logging in through the Login page
  - Host a Room Page appears; Room and Name are required to join session

- **Scenario 2:** User is not prompted to the Host a Room Page after Login Credentials Fail
  - Given the user login credentials are not valid
  - After logging in through the Login page
  - Host a Room Page is not prompted
  - Error message is displayed

As a user, I can request to host a meeting so that I can communicate with my group via video call

Github Issue: <https://github.com/themason2011/CS189A-LogMeIn-Team-/issues/6>

- **Scenario 1:** User clicks on “Host Meeting” to host a meeting
  - Given the user has created a Twilio account
  - Given “Host Meeting” is selected
  - Twilio API is called to create Meeting ID
  - Twilio REST API connects to server to host meeting
  - User is prompted to meeting room page
  - User can invite others to join with Meeting ID
- **Scenario 2:** User does not have a Twilio account set up
  - Error message is displayed

As a User, I can request to join a meeting so that I can communicate with my group via video call

Github Issue: <https://github.com/themason2011/CS189A-LogMeIn-Team-/issues/7>

- **Scenario 1:** User successfully enters the meeting
  - The host or participant must have requested a meeting with one or more participants.
  - Given the meeting ID, user can join with the camera and audio on
  - Use the twilio API to make the connection/video feed.
- **Scenario 2:** User is not prompted to the meeting

- Meeting ID was incorrectly given
- Prompt a message that the ID is invalid
  - Error message is displayed

As a User, I can leave the meeting.

Git Issue: <https://github.com/themason2011/CS189A-LogMeIn-Team-/issues/8>

- **Scenario 1:** User leaves the meeting as a host
  - The host must have requested a meeting with one or more participants.
  - The button to leave the meeting will send you back to the Host a Room Page
  - The participants will also be forced to leave the meeting and return to the Join a Room Page.
- **Scenario 2:** User leaves the meeting as a participant
  - The participant must have requested a meeting with one or more participants.
  - The button to leave the meeting will send you back to the Join a Room Page

As a user, I can see the video from the other participants, so that I can see their faces when they are talking

Github links (issues):

<https://github.com/themason2011/CS189A-LogMeIn-Team-/issues/8>

- **Scenario 1:** Video is successfully transmitted from another participant
  - Given the user and the other participant are in the same session
  - The user will be able to see the other participant's video stream in the window for that participant's video.
- **Scenario 2:** Video is not successfully transmitted from another participant
  - Given the user and the other participant are in the same session
  - The user will see a black screen with an error symbol where the participant's video stream should be



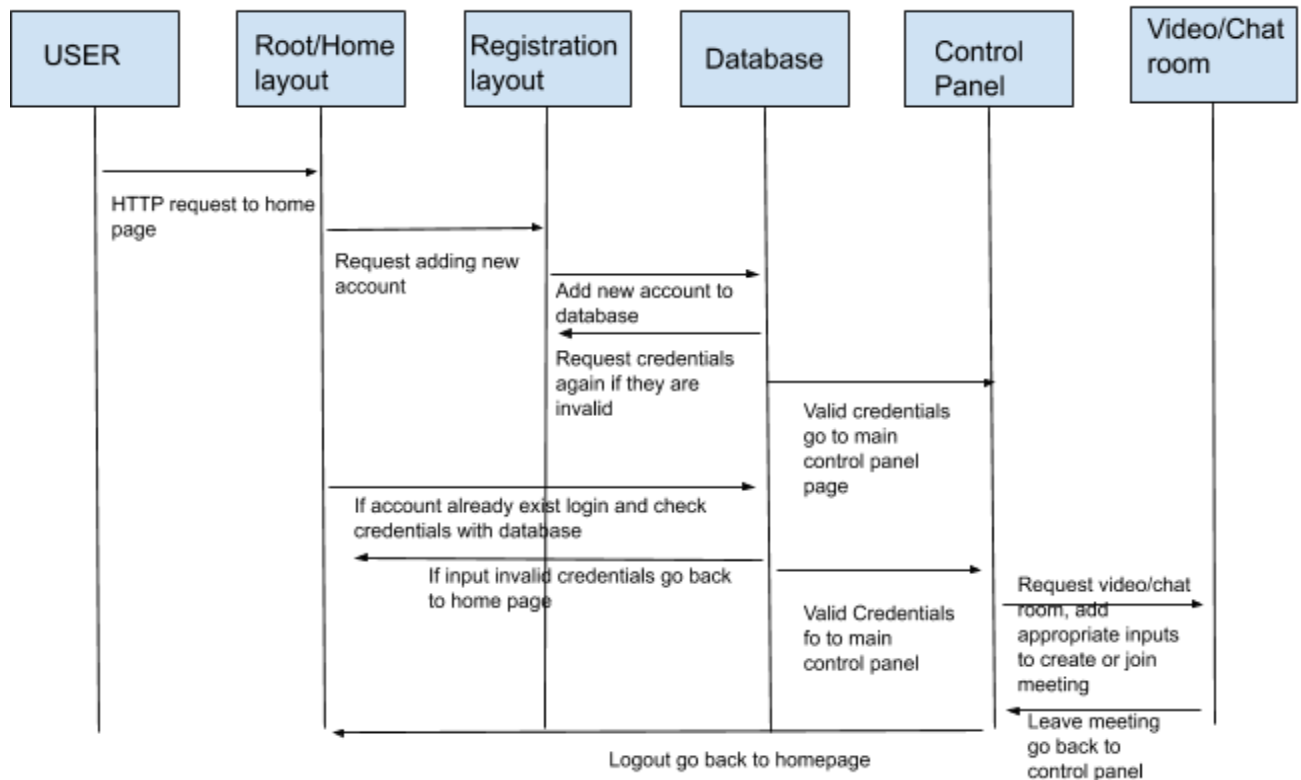
As a user, I receive the audio streams from the other participants, so that I can hear them when they are talking

Github links (issues):

<https://github.com/themason2011/CS189A-LogMeIn-Team-/issues/8>

- **Scenario 1:** Audio is successfully transmitted from another participant
  - Given the user and the other participant are in the same session
  - The user will be able to hear the other participant's audio, mixed with all the other audio inputs
- **Scenario 2:** Audio is not successfully transmitted from another participant
  - Given the user and the other participant are in the same session
  - The user will see an error symbol in the corner of the participant's video stream view that will have a mic symbol and an error (exclamation point) next to it

## Sequential Model



## Technologies Employed

- Frontend:
  - React (JS)
  - React-Bootstrap
- Backend:
  - Node.js
  - Google NLP: <https://cloud.google.com/natural-language/docs/basics>
  - Twilio (API)
  - Microsoft Computer Vision:  
<https://azure.microsoft.com/en-us/services/cognitive-services/#features>
  - IBM Watson: <https://www.ibm.com/watson/products-services>
- Database:

- MySQL