WebBoard: An Online Interactive Tutoring system

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Abstract -

This project is to meet the necessary requirements of online lectures and to make it easier for the instructors and the students to communicate more effectively and interactively, especially for remote students. WebBoard is an integrated tutoring application. During the presentation, the instructor can write on the application interface called WebBoard, the content of which is replicated to all the students in their webBoards. It comes with a Question & Answer feature which allows students to ask questions in a manner that can be accessed by students participating in the class. The instructor can easily switch among the slides, video and the WebBoard. While elaborating on the concepts, the instructor can annotate the content of slides, without modifying them which makes it easier for students to understand the concepts. The lectures are recorded in the class rooms and are available to all the students later on the cloud.

Keywords — webRTC, Vlab, Node.js, Video conferencing, Screen sharing, WebBoard, tutoring, VP8.

INTRODUCTION

a. **Problem:** Rigid Nature of the hybrid classes and online lectures, current hybrid/online classes and challenges faced by students/instructors.

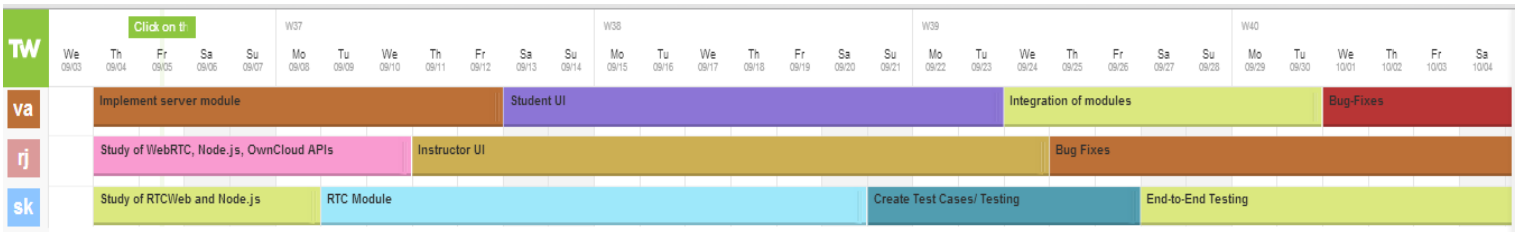
b. **Why it is important:** It gives a single system which allows the students to communicate with the instructors and other students. The lectures will be more interactive as the professor can ask some questions to the students who are remotely accessing the lectures to answer or vice-versa. The videos of the lectures would be stored on cloud so that it is easily accessible to students to recollect concepts taught in the class room. Moreover they get a classroom feel while watching the video streaming. Students can take their personal notes for the slides or video which they can store for later use. Instructor can use the Web Board functionality to annotate on some concepts which they might do on a White board in classrooms so that even her explanatory notes can be available to all the users after the class on the cloud.

c. **Technologies used:** Cloud, WebRTC, Node.js, Javascript, HTML and PHP.

d. Expected outcomes of this projects:

1) Software would have the following main features -
   a) Video recording and storing in cloud
   b) WebBoard (Similar to White Board) for instructors
   c) Paper Presentation (PPT) sharing tool
   d) Note Taking Tool for students.
2) On instructor side: She can start the session. Session can be started on Tablet using web or Android app. She can upload PPT or PDF file. This PPT or PDF is internally converted into images. She can scribble on the image and undo them. She can also switch to White Board Mode where she can draw diagrams or write notes.
3) On Student Side: They can join the session started by the instructor. They can also view the pre-recorded session. On a live session, they can ask questions using the WebBoard. If allowed by the instructor, they can write on the WebBoard of the instructor and their question becomes available to everyone.

e. **Project management plan (timeline, and group members, etc.)**



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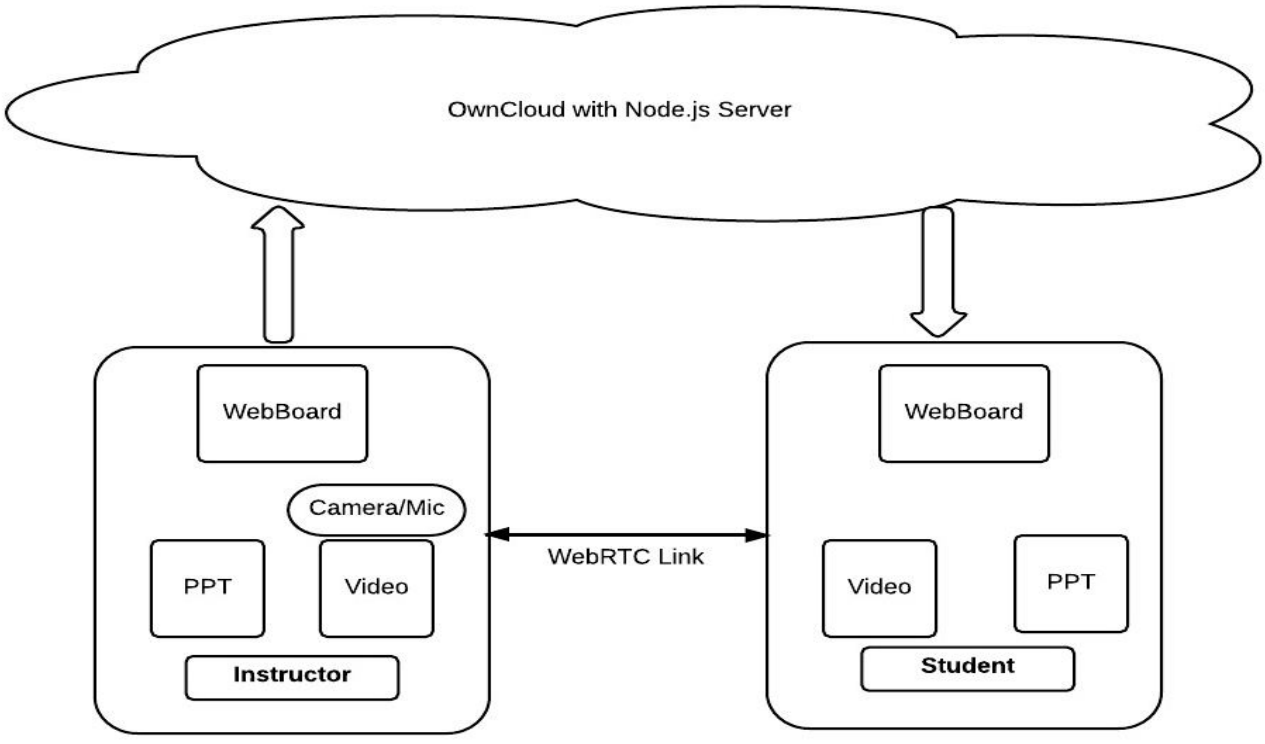
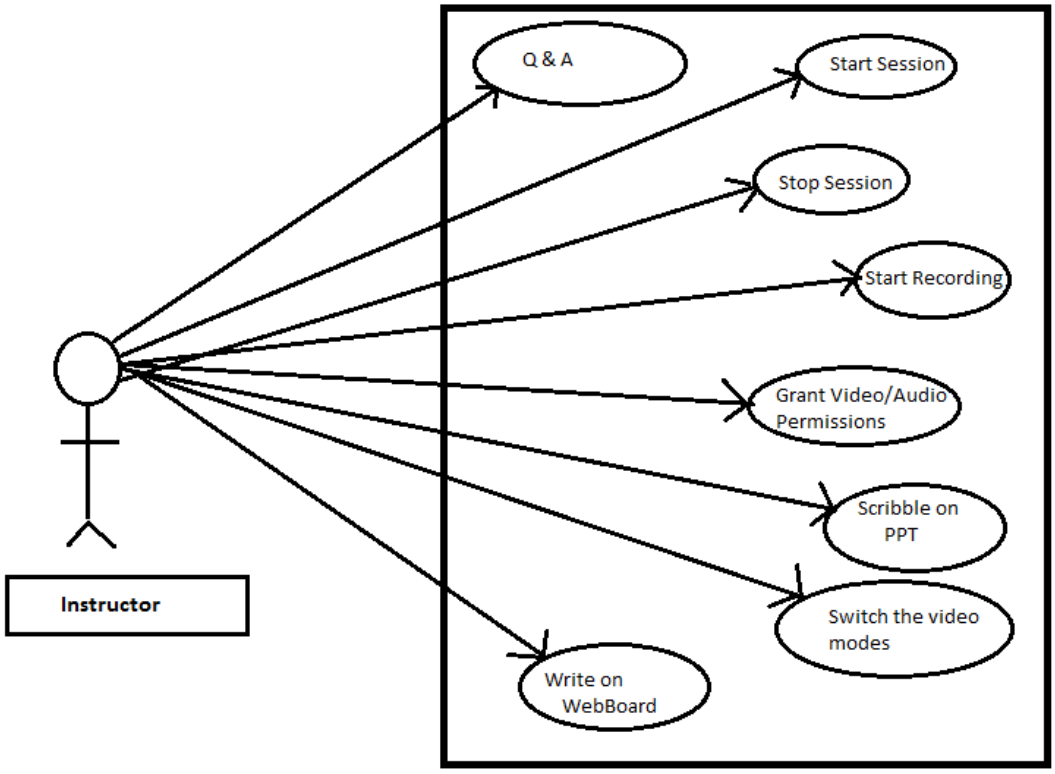
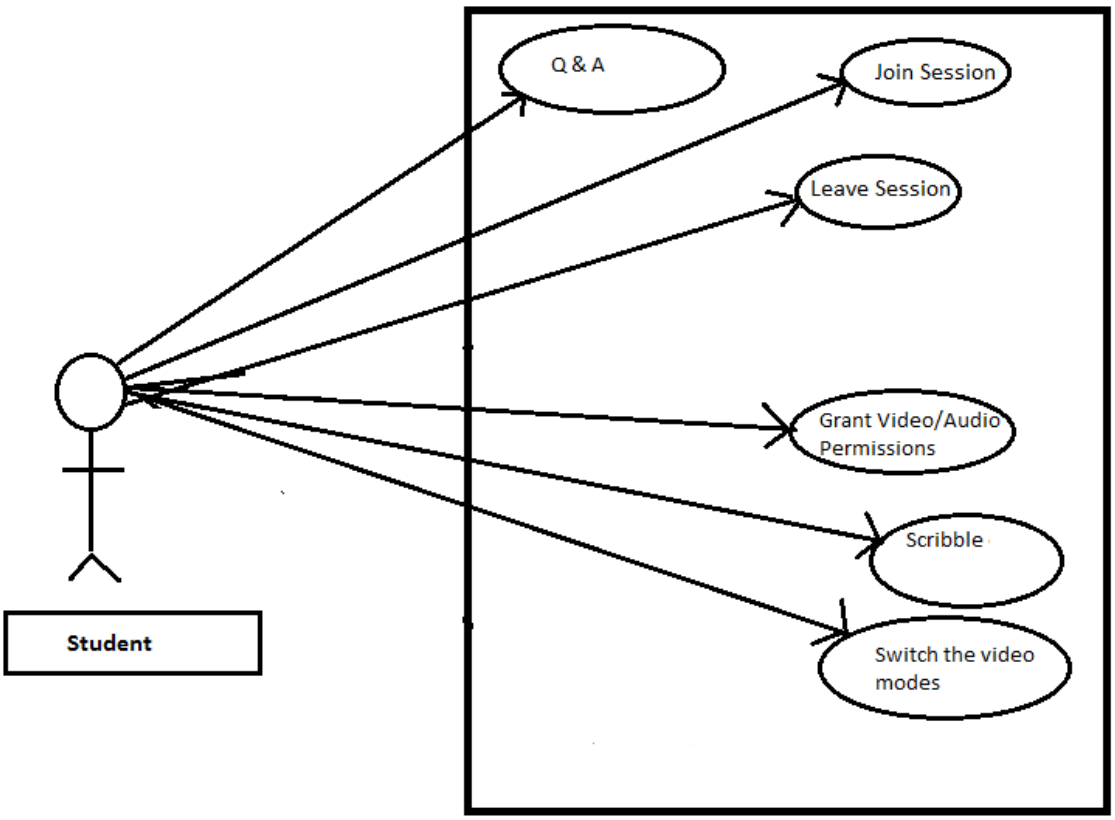
SYSTEM MODELS

a) System Model



WebBoard: Block Diagram


Q & A
Start Session
Stop Session
Start Recording
Grant Video/Audio Permissions
Scribble on PPT
Switch the video modes
Write on WebBoard
Instructor


Q & A
Join Session
Leave Session
Grant Video/Audio Permissions
Scribble
Switch the video modes
Student

b) Software

Tools: Eclipse or Sublime Text, Emacs, Git

APIs: OwnCloud, WebRTC, Node.js

Language: JavaScript, PHP, HTML & CSS.

PROJECT DESCRIPTION

a) Project Overview

a. **Task 1: Study WebRTC, Own Cloud, and Node.js -** We shall research on the above topics and start with implementing some of them.
b. **Task 2: Implement server module -** We shall install Node.js server on OwnCloud with some server side business logic.
c. **Task 3: RTC Module -** Implement webRTC module.
d. **Task 4: Instructor GUI:** Implement Instructor Graphical user interface by using web languages.
e. **Task 5: Student GUI:** Implement Student Graphical user interface by using web languages.
f. **Task 6: Create Test Cases.**
g. **Task 7: Integration of modules.**
h. **Task 8: Test the application.**
i. **Task 9: Fixing Bugs.**

b) Project Task Allocation

Name/Task	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Task 8	Task 9
Ravinsingh Jain	Owner	Co-owner	Co-owner	Owner	Co-owner	Co-owner	Co-owner	Co-owner	Owner
Ashwin Vasani	Co-owner	Owner	Co-owner	Co-owner	Owner	Co-owner	Owner	Co-owner	Co-owner
Sagar Kalburgi	Co-owner	Co-owner	Owner	Co-owner	Co-owner	owner	Co-owner	Owner	Co-owner

c) Deliverables

It is a web application which enables the instructor to use WebBoard in order to give lucid presentations. The instructor can seamlessly switch among the presentation slides, explanatory notes and video. The students, especially those who use remote access, would benefit greatly since they can ask real time questions using the WebBoard. Additionally, a student can also take separate personal notes and store them in cloud. She may also share her notes with her classmates, leading to healthy exchange of ideas.

d) Project Timeline

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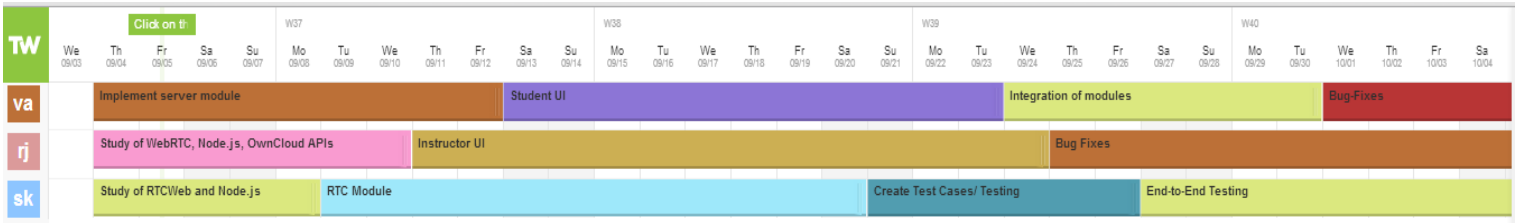

RISK MANAGEMENT OF THE PROJECT

Risk Factor	Description	Workaround
Bandwidth	Requires high bandwidth	Can optimize the camera resolution accordingly.
Security	Network security for the streaming	Private secure stream can be deployed.
WebRTC for native application	It is under development	AppRTC and JNI can be used at some level

CONCLUSION

Considering the limitations of the current online learning technologies, our WebBoard system aims to better the classroom experience, thus ensuring that the students and the instructors are on the same page, especially for remote students.

Future prospects:

- A Student may use a real time language translator in case she doesn't know the medium of instruction.
- Hearing impaired students can be provided with subtitles.
- The application can be integrated with native applications
- Many to many interaction can be provided.

ACKNOWLEDGMENT

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