WHITEBOARD

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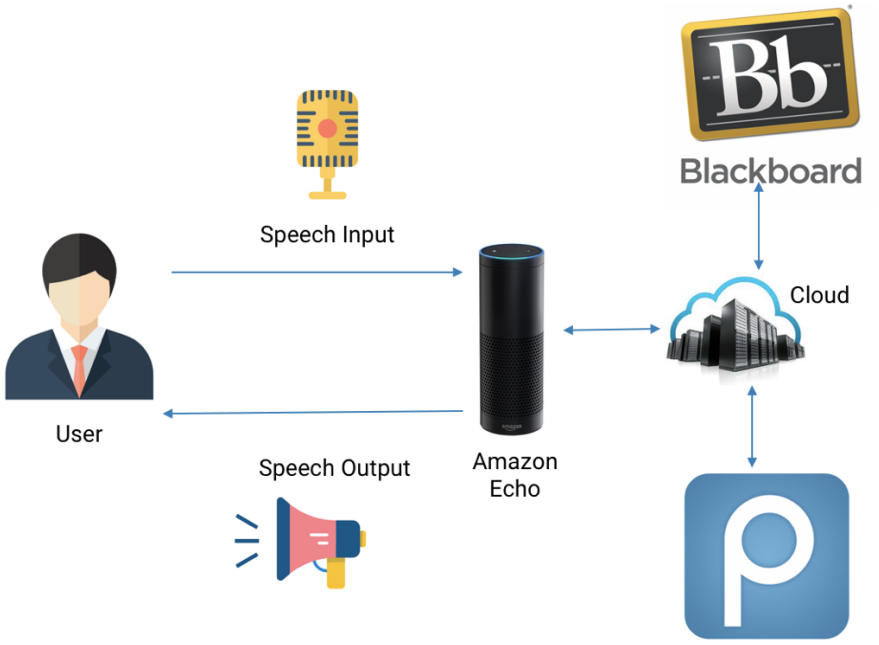
Whiteboard enhances the way students and instructors interact with a learning management system by allowing them to have a conversation with the voice assistant.

VISION

Our vision for Whiteboard is to enable natural interaction between the users (students and instructors) and the learning management system. People are increasingly interacting with devices using speech; they are even having conversations with voice assistants like Siri, Alexa, Cortana, Google Assistant etc.

The tasks like checking grades for a homework or assignment, checking the due date for the next deliverable, asking and answering questions on piazza, voting for a discussion poll can be accomplished using voice. Additional tasks like uploading course assignment, grades and reading material can be accomplished using the web interface.

CONCEPTUAL MODEL



USER PROFILES

The primary users are students and instructors.

- Student users are typically aged 18-35, studying in colleges or universities who use a learning management system like Blackboard and discussion platform like Piazza.
- Instructors can be professors, teachers or teaching assistants aged 20-60 who use a similar course management application to share course material and class slides, check student submissions, post updates, etc.

The secondary users are parents of K-12 students who want to play an active role in their child's education and use an application to look at their child's grades. The application

shares data with parents in accordance with the US Government's FERPA (Family Educational Rights and Privacy Act) laws that give custodial and noncustodial parents of children aged less than 18, the right to access their child's educational records and disclose personally identifiable information from those records.

USER REQUIREMENTS

- Users must be able to speak fluently in English. We aim to develop this application for English speakers only, though the concept can, in the future, be easily extended to other languages using Alexa's API.
- Users should not have any hearing impairment or difficulty.
- Users must own an Amazon Echo or Dot at their homes for their personal use.
- Users must be familiar with systems like Blackboard and Piazza and know to use a voice assistant like Siri, Google Voice Assistant, Cortana or Alexa.

LITERATURE REVIEW

- **Voice Interaction Design: Crafting the New Conversational Speech Systems** - Randy Allen Harris
- **A Unified Design for Human-Machine Voice Interaction** - Stefanie Shriver, Arthur Toth, Xiaojin Zhu, Alex Rudnieky, Roni Rosenfeld - CHI EA '01 CHI '01 Extended Abstracts on Human Factors in Computing Systems.

USER SCENARIOS

SCENARIO 1: Amy Scott, 28, is an Assistant Professor in CS department at UIC. She works from 9 AM to 5 PM every day and teaches a design course every Spring. She uses Blackboard to upload assignments and share lecture slides and reading material with her students. She also uses Blackboard to post grades for home works and assignments. She uses Piazza to facilitate discussions beyond the class.
She reaches home after a busy Monday and crashes into the couch in the living room. She wants to know if there were any questions on Piazza regarding the student presentations in class scheduled for Tuesday.
Amy: Alexa, ask WhiteBoard if there are any new questions in CS 522?
Alexa: "Yes Amy. John Doe asked a question on "length of talks".
"I can't remember what we settled on for the length of our talks tomorrow and Thursday."
"Would you like to give an answer to John Doe's question?"
Amy: Alexa, post an answer saying "It is 12 minutes for the presentation plus the Q and A session at the end."
Alexa: OK Amy. I'm posting "It is 12 minutes for the presentation plus the Q and A session at the end." Is this correct?
Amy: Yes, Alexa. It is correct. Post the answer.
Alexa: OK Amy. Posted successfully.

SCENARIO 2: John Doe, age 22 is a graduate student in Computer Science at UIC. He attends CS522 and CS480 this Spring semester. He uses Blackboard to submit his assignments and view his grades. He also checks if reading material and class lectures are available on Blackboard. He uses Piazza very frequently to participate in discussions after the class.

It's weekend and game day so he is watching the Super Bowl with great interest in his living room. Suddenly he remembers about Homework 2 in CS522 and wants to know when it is due. He doesn't have a laptop or phone near him.
John: Alexa, ask WhiteBoard when the second homework for CS522 is due.
Alexa: Sure. One moment.
Alexa: Homework 2 for CS522 is due on Tuesday, February 14 by 11:59 PM.
Alexa: "Would you like to set a reminder?"
John: Oh yes! Sure Alexa. Remind me two days in advance.
Alexa: OK John. Your reminder has been set for Sunday, February 12.

DESIGN FRAMEWORK: For our design, we plan to go with the participatory design framework. Since the user and his/her interaction with voice assistant and the web interface are key to our project success we plan on involving the user at each and every phase in our project.

USABILITY TESTING: For the voice based interaction we plan on Field testing our application. This is the best approach since Amazon Echo is a living room gadget. For the web interface we plan on going with discount usability testing with formative evaluation at the end of each phase and summative evaluation at the end of the design phase.

REQUIREMENT GATHERING

INTERVIEWS: To better understand the project requirements, we conduct interviews, sample interview questions would be:

- Would you like it if Blackboard had an option to set reminders about deadlines?
- What difficulties do you encounter when checking if there are new questions posted on Piazza?
- Which interface do you use to check your grades on Blackboard? (web/mobile) Why?
- Which interface do you prefer to post answers in Piazza? (web/mobile) Why?
- What is your experience using a voice assistant?
- What kind of tasks do you perform using your voice assistant?

USER SURVEY: For the quantitative results we perform a user survey (separate surveys for students and instructors). Sample questions would be:

- How often do you check your grades on Blackboard?
- Do you check your grades regularly or do you check them only when you see a notification that your grades are posted?
- How often do you call/text a friend to ask if there is an assignment/project deadline?
- How often do you contact a friend to ask if there is a reading due before next class?
- Do you prefer asking your friend about the assignment/project deadline instead of checking it on Blackboard? Why?
- How easy is it to post grades on blackboard? (on a scale of 1 to 5)
- How often do you answer questions on Piazza using web/mobile interface?

OBSERVATIONS: Since voice is a fairly new mode of interaction, we wanted to observe few aspects of voice interaction:

- How do people interact with voice assistants?

- What difficulties do they encounter while using a voice assistant?
- Are they satisfied after using the voice assistant for a particular task?

DEVELOPMENT OPTIONS: We will be developing an Alexa Skill, which will fetch data from a cloud server which in turn pulls data from Blackboard and Piazza. We plan on developing the web application with a nodejs backend and use plain HTML/CSS on the frontend.

FEEDBACK FROM CLASS PRESENTATION

INSTRUCTOR FEEDBACK: Grades of children should be disclosed in accordance with FERPA, we included this in user profiles. The tasks that can be performed by the users are mentioned after our vision statement. The kind of survey questions now will be more of easy recognition/recall oriented for the user than asking user creative questions. The other comment was for very long answers, or any unfinished instructions - can Alexa, send the draft/instructions to mobile? This will be a good feature to include in our web interface.

CLASSMATES' FEEDBACK: One of the concerns raised in class is about asking the user to confirm what was said before posting to Piazza. This is very important and we revised the user scenarios to include confirmation from Alexa by repeating what user said before posting it. One of the questions was about the reliability of the speech recognition of Alexa, that is a domain that we do not consider for the project, we go with the assumption that Alexa is 97% reliable in recognizing human voices.

REFERENCES

- **Shneiderman et al** - Chapters 4 and 5.
- **Emotion in user interface, voice interaction system** - V.Kostov; S. Fukuda Systems, Man, and Cybernetics, 2000 IEEE International Conference.
- **Generating Remote Control Interfaces for Complex Appliances** - Jeffrey Nichols , Brad A. Myers , Michael Higgins , Joseph Hughes , Thomas K. Harris , Roni Rosenfeld , Mathilde Pignol - UIST '02 Proceedings of the 15th annual ACM symposium on User interface software and technology.