FINAL PROJECT REPORT (DRAFT)

iitOnline+U

putting ^ in the classroom

IPRO 327: A Video Annotation and Indexing System

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Executive Summary

Search engines have change the way we use the Internet by allowing us to find virtually any text-based information we seek. However, there is no way to search video content. Because of the advances that have been made in online video technology and the explosion of online video websites, like YouTube and Hulu, much of the information now on the Web is not searchable. At the same time, distance education has grown; online video education is a part of that growth.

Over the fall 2009 semester, IPRO 327 sought to design and implement a Web-based video-viewing system that allows users to type in comments that are time-stamped to a point in the video. We believe that such a system will improve online video education. For example, instead of fast-forwarding and rewinding in an effort to find certain information buried within a video, you can simply search on the text comments associated with that video.

IPRO 327 conducted research to determine the features most required by users and to develop a competent user interface. The findings from this research were used to create the system. We have named this system iitOnline+u.

While IPRO 327 will not continue in the spring 2010 semester, work still needs to be completed on measuring the educational impact of iitOnline+u. In the coming semester, beta system deployment and testing will continue under the guidance of faculty advisor Wai Gen Yee.

Purpose and Objectives

IPRO 327's purpose was to improve online education. Current online education practice involves students passively watching videos that are posted online, then posting any questions that may arise in a separate Web discussion forum.

The problem with this practice is that it lacks the interactivity found in classrooms, potentially diminishing the impact of online education. There is no natural way for students to raise their hands or start a conversation with other students based on the course topics.

IPRO 327 believes that the problem of interactivity can be addressed by improving the technology used for watching videos. Specifically, we propose to add commenting features to an online video viewer. Thus, students may pose questions that were motivated by the lecture, which may lead to productive discussions. Additionally, teaching assistants and instructors may participate by moderating discussions, thereby sharpening the focus of discussions and improving productivity.

Our main objective was the rapid development of such a system. The name of the proposed system is iitOnline+u: The first part of the name, “iit”, is used because the system is a product of IIT students and faculty. The plus (+) references both the enhancement of the online experience and, in combination with the “u”, refers to the fact that we are adding you to the classroom.

Once iitOnline+u is beta tested and proof of positive educational impact determined, it is our goal to use this product to enhance education globally. Our target customer will be the entire educational community.

It should be noted that video annotation in the context of education isn’t a new concept. The Microsoft Research Annotation System (MRAS), developed in 1999, had the ability to correlate comments with specific time positions of a video (time-correlated comments). Unfortunately, the project was deemed a failure by its creators. However, we now believe that it was merely ten years ahead of its time.

For this semester, IPRO 327 focused on the rapid development of iitOnline+u.

Organization and Approach

Overview

IPRO 327 divided this project into three phases. The first phase was for planning: Goals and deadlines were determined for the second and third phases. The second phase comprised the bulk of the semester. In this phase, all research activities were conducted. Three teams were created: The School Liaison Team (SLT), the User Liaison Team (ULT), and the Development Team (DT). The

third phase of this project was devoted to documentation of the second phases' findings and code debugging.

In order to better understand the research activities conducted, a more thorough explanation of the second phase is required.

Phase Two

In the second phase, the School Liaison Team was to determine the functionality of the system. Once the functionality was determined, the User Liaison Team was to determine the best user interface for the system. Finally, the Development Team was to develop the system by implementing the desired functionality and connecting the front-end (user interface) with the back-end (the database).

School Liaison Team

The School Liaison Team determined the desired functionality of the iitOnline+u system and how to incorporate the system into IIT's workflow. Research activities conducted were an online survey and an informal interview with an IIT Online instructor. SLT also worked with John Salt of IIT Online Technical Services (OTS) to determine how to implement iitOnline+u at IIT in the spring 2010 semester.

The Survey

An online survey (i.e., Web-accessible) was conducted among IIT Online users—both students and faculty—to gauge their satisfaction with the current system and determine features they would like in a combined video/discussion prototype. The online survey was used to access a wider audience of IIT Online students, some of whom may not attend courses on the Main Campus. The survey was advertised in IIT Today and in an IPRO office e-mail. Possible participants were also contacted from online courses in which IPRO 327 are enrolled.

The Interview

An informal interview was conducted with a professor that is interested in using the system in the spring 2010 semester regarding the features he would like in such a system. We chose this directed surveying method because the response rate of faculty was low and because it gave us insight on the features necessary from a party that was invested in using the system.

Interaction with OTS

In-person meetings were conducted over the course of the semester with John Salt. The initial goal was to determine how to implement iitOnline+u in a way that would replace IIT Online. However, once it was determined that IIT Online was a fixture, the goal became how to use iitOnline+u to supplement IIT Online education. And, the focus shifted to getting permissions for access to IIT Online data, namely, statistics data and course videos.

User Liaison Team

The User Liaison Team designed, developed, tested, and modified the user interface (UI) to be implemented with the new system.

Flow Diagram

The first task completed by the User Liaison Team was the UI flow-diagram (see Appendices xxxii), developed based on an initial assumption of system usage. A UI flow-diagram allows the structured focus on user-system interaction, independent of interface appearance (Lieberman 2001). ULT determined where and when users would interact with the features in the interface.

User Interface Design and Coding

Design and coding of the interface began following the completion of the flow diagram. The design process was mostly an impromptu one: There was frequent discussion among members with each ULT member adding to drawings made on dry-erase boards. An initial mock-up was developed and presented to the entire IPRO team to garner feedback before major coding began (see Appendices xxxiii).

Metaphors

Employing metaphors was an important aspect in the design of the UI. A metaphor, in terms of interface design, calls upon other established systems (e.g. YouTube, Twitter, Digg) and uses those layouts or styles in such a way as to compel the majority of users to feel comfortable with the new system. A majority, by our definition, was 80%, and is a threshold commonly used in industry (Terry 2007).

Division of Work

While all four team members contributed to the design and layout of the UI, only two members had sufficient experience in coding, leading to the creation of sub-teams. As the second phase was only part of the whole IPRO, it was most efficient to allow two members to progress in the code, with one of those members laying a foundation and the other member adding lower priority features. The two members with less technical experience worked on the administrative and other deliverable tasks.

Development Team

The Development Team conducted research on topics relating to software engineering while creating the software product. The research was conducted through the use of online searches and the consultation of technical literature. Research areas were determined among DT members and primarily focused on the features that would be offered by the software. A list of features was compiled and all problems were approached in order of their importance. After the list was created and sorted, the connections between the different features were stated. By introducing these dependencies the research was narrowed down. This approach was essential because it helped the team focus on the problem and stay proactive.

Scheduling and Division of Work

An explicit schedule was created for completing the research activities and for summarizing the results. For urgent or problematic issues, two people would be assigned to that topic. In special cases, the entire DL team was assigned to conduct research on a topic due to its importance to the system as a whole.

Online Research

The Web-based research method was primarily chosen for the following reasons:

- iitOnline+u is an online system. Thus, in order to acquire information and ideas, other Web systems must be consulted.
- Research was often conducted during the programming process. While programming, quick searches were done to become familiar with the programming language and its framework.
- It is a quick and inexpensive method. Of course, there are flaws with this method that the developers were cautious about. Since anyone can post anything on the Web, the information collected and the source must be carefully examined.

Our main goal was to create something new and innovative but present it to the user in a form that is popular and intuitive. First, we found familiar online systems that provided the features that we were developing. Next, we got a general feel of what online users are used to and prefer based on the popularity of the online system. Finally, with the list of the dependencies taken into account, Web-based research was performed.

Technical Literature Research

Another method of research was reading through technical literature to determine solutions. This method was often used during the programming of iitOnline+u. From this research, system dependencies were determined that took system cost and security into account. This method was used for quick searches of information about programming languages. Sometimes this research method was preferred, due to the fact that books are better organized and the developer is already familiar with the source.

The findings of the research were summarized and the pros and cons of every possible solution were stated. These findings were communicated by posting results on the group wiki or presenting the results in class. Finally, DT would reach a consensus on the most suitable solution.

Analyses and Findings

School Liaison Team

Survey Findings

The survey was available online from September 25, 2009 to October 9, 2009. The survey was created using Google Docs. It was advertised on IIT Today, an IPRO e-mail office, and word of mouth (some IPRO 327 members are currently enrolled IIT Online courses).

The survey received 29 total responses, 24 were students who have taken an IIT Online course, and 5 were faculty who have taught an IIT Online course. The faculty surveyed were very familiar with IIT Online with 80% having taught 5 or more IIT Online courses. Alternately, most students (74%) had only taken one or two IIT Online courses.

In querying users about their likes and dislikes of the current system, SLT sought to determine the features that shouldn't go missing in a new system. The top three features of RealPlayer, IIT Online's video player, liked by students was the ability to pause and play the video, the ability to view slides and video side-by-side, and the quality of the video. The top three dislikes listed by student respondents were issues with loading and streaming of the video, poor video quality, and poor video production.

Questions were asked to determine the usefulness of having a separate discussion board, which is the current set-up for IIT Online. Blackboard is the discussion board software used in IIT Online. All of the faculty respondents reported minimal use of the Blackboard discussion board; 3 had never used the discussion board, 2 used the discussion board 1 or 2 times per semester. The majority of student respondents also reported minimal use of the Blackboard discussion board, with the exception of 2 respondents that use the discussion board 7 or more times per week.

Respondent level of satisfaction with the communication channels (discussion board and e-mail) varied widely with most responses (20) coming in the middle range (satisfaction levels 4–7). For the

4 teachers that responded, the average level of satisfaction was a 6. All student respondents provided a response to this question; the average level of satisfaction was 5.33.

Student respondents that were queried for additional communication channels currently available to IIT Online students responded that talking face-to-face (5) and talking by phone (3) were also utilized. Faculty respondents also use the following communication channels: groups like those on Yahoo! and Google (2), the telephone, and mailing lists.

When student respondents were queried on how they would improve the IIT Online system, the top response was to take away the dependence on the operating system. Faculty responses were sparse, but included: developing courses specifically for online use, using Usenet feeds, being able to view student PowerPoint presentations on the video, conferencing, and improving Blackboard's Digital Dropbox.

The number of respondents who would prefer Flash over RealPlayer was 25 with 11 of those respondents agreeing strongly; 4 respondents disagreed. Among faculty, all 5 agreed that Flash would be an improvement over RealPlayer with 2 faculty respondents agreeing strongly.

The number of respondents who thought that searching the video using text would be an improvement was 27 with 12 of those respondents agreeing strongly; 2 respondents disagreed. Among faculty, all 5 agreed that searching the video using text would be an improvement with 4 faculty respondents agreeing strongly.

The number of respondents who thought the ability to tie comments to specific times within the video would be a useful channel of communication for IIT Online students was 28 with 15 of those respondents agreeing strongly; 1 respondent disagreed. Among faculty, all 5 agreed that the ability to tie comments to specific times within the video would be a useful channel of communication for IIT Online students with 2 faculty respondents agreeing strongly.

When student respondents were shown a prototype of the system and asked what necessary features might be missing, their top responses were the ability to synchronize the lecture with slides, the ability to download the video, the ability to easily view and access comments, and the ability to view the video. Faculty respondents deemed the following short list of features necessary: speed and course development for the environment.

Interview Findings

An informal interview was conducted with Professor Beckman of the Computer Science department. Professor Beckman was recommended by John Salt, quality control technician for IIT Online Technical Services (OTS) as a top faculty user of IIT Online courses. The key points of the informal interview follow.

If the IIT Online interface is all on the Web (he runs Linux) and it isn't too much additional work, Professor Beckman would not mind using it. For his current courses, he is taped by OTS and has no involvement in the production or setup of the video. He also maintains a Google Groups account for discussion, but he will be moving to MailMan, a mailing list program. For our prototype he would like

- to only be e-mailed when a student is asking a question;
- for that question to be linked to the moment in the video;
- to only receive the initial e-mail, not the responses (he would also be open to a daily digest that includes all comment threads).

And because it is a Flash player, he might possibly record his own videos at times.

Professor Beckman would be interested in being a test volunteer for the spring 2010 semester using his CS 440 course.

User Liaison Team

To determine the efficacy and success of the UI, the user liaison team conducted a formative evaluation of the UI through user testing on three separate days, with minor modifications to the system between each test. Although, it is not desirable to alter systems between tests, it is believed that these minor modifications did not significantly contribute to the overall success of the UI as, generally, the same responses were observed in all three tests. User testing consisted of a pre-survey (results in Appendix IV, Table 1), then a task sequence for the subjects to complete using the system, followed by a post-survey (results in Appendix IV, Table 2). The pre-survey was used to gauge the users' familiarity with systems similar to our own and to see what sort of feature s they were expecting prior to a full description of the system. It was also used to justify the metaphors applied in the design of the UI.

The task sequence allowed the team to have the users operate the major functions of our system and report on any issues they may have encountered. During the user test, "think-aloud" protocol was employed in which users were asked to speak what they were thinking as they were using the system. For example, one might say "I am looking for the volume control and wish it were more obvious." This protocol reveals important clues about how participants are thinking of the system (Rubin 1994). Although the team recorded all of the users during testing, ULT did not have time to listen to the recordings and interpret the needs of the users expressed during this procedure. However, the team performed an informal summative evaluation through group discussion after each user test. These informal discussions proved to be a valuable resource, with many improvements coming from user suggestions and comments.

The majority (by our definition) of users have rated the UI easy to use, more excellent than poor, and more satisfying than frustrating. However, nearly half of the users (44%) were indifferent when asked if they found their experience more stimulating than dull. This is undoubtedly an area needing improvement, but thoughts are prevailing as to why this is the case. In the first user test, some of the features that the team intended to have completed were not yet implemented in the system and ULT thinks that this may have contributed to lower than desired results as 40% of users

from the first user test fell into this category. Also, the system utilized an introductory physics lecture from MIT's Open Courseware. As half of the users were graduate students, the basic educational content of the video may have contributed to a less than stimulating experience. With this said, the team is still unsure as to whether a switch to iitOnline+u is desirable.

When asked if they would remember how to use the system in one month's time, 100% of users rated this as a 4 on a scale from 1 (unlikely) to 5 (likely). No tutorial to the users during user testing and it was found that when solicited in the post-survey, 75% of users did not find the need for a tutorial. What this tells is that the team has created an intuitive and easy to use system. Supporting this claim is the result of 75% of users preferring to use our system over the current IIT Online.

Users were asked to list three things they liked and disliked about the system. The most often liked qualities of IITOnline+u were: 1) simple design, 2) quick commenting, and 3) interaction with the classmates. This last quality is of utmost importance because it was found that the main issue with current online education systems is the lack of interaction amongst fellow classmates and the professor. Our system allows its users to easily and quickly interact with others, pose questions, and receive feedback. The most often disliked qualities of IITOnline+u, surprisingly, dealt with issues somewhat beyond the team's control, namely video quality. Although the video was taken from MIT's Open Courseware, the quality was not much different than video quality on the current IITOnline. Commenting features of IITOnline+u help to compensate for this issue in that a user can ask for clarification of unclear segments of video, slightly enhancing the video without altering its physical quality. Other dislikes of IITOnline+u included the inability to sort comments and not being able to scroll using the comment timeline. Although these issues are easily fixed, they are of no less value because fixing the small things improves the overall success of the UI.

Development Team

The development team began the semester with a partially working prototype with a flash-based interface. This prototype was based on the Eduken code from toca LLC. This prototype already

contained some of the features listed by SLT and ULT: the ability to stream flash videos, the ability to comment on videos, and the ability to post comments correlated with some time in the video. However, several major problems existed with the prototype. The prototype front-end was written entirely in Flash ActionScript. Any changes to the front-end—adding features or changing the UI design—would have required the team to purchase Adobe Flash developer tools and spend a significant amount of time modifying the Eduken code. Because the Eduken system was the intellectual property of toca LLC and closed source, inclusion of the code into the final system would introduce legal and ethical issues. For example, the source code, even those parts written by IPRO 327 members, could not be freely distributed. After discussion with SLT and ULT, it was decided to move away from the original Eduken prototype while retaining some of its more compelling features.

One of the development team's goals was to implement the UI design created by ULT. An approach which separated the visual elements of our system from the business logic was desired. The model-view-controller (MVC) paradigm was used to separate the UI front-end from back-end functionality. "In the MVC paradigm the user input, the modeling of the external world, and the visual feedback to the user are explicitly separated and handled by three types of object, each specialized for its task." [1] The three parts of MVC are as follows: a) the model—the domain specific representation of the data. It usually refers to fields of a database, such as user names, comments, or crypted passwords; b) the view—the visual components of the system, in our case the visual components of the UI; and c) the controller—the components responsible for responding to user action by making appropriate changes to the model or rendering the appropriate view. The controller is sometimes referred to as the glue holding together the model and view. Using the MVC paradigm as a guide the development team would be responsible for working on the model while the User Interface team would work on the view, with the controller split between them.

Many Web development frameworks, including the popular Django and Ruby on Rails (http://rubyonrails.org/), enforce the MVC design pattern. Having a Web-based system, rather than a traditional desktop application, immediately eliminates many compatibility and accessibility issues.

For instance, the most popular Web browsers are available for all the major operating systems. Choosing to develop in a framework and choosing standard libraries for things like JavaScript further alleviates cross-compatibility issues between commonly-used browsers. The Development Team chose Ruby on Rails as our Web application framework for several reasons. “The Rails way” [2] promises accelerated development based on libraries that provide plenty of pre-built functionality and the use of a loosely typed, concise scripting language for the majority of the business logic. Rails actively encourage ease of use for the MVC design pattern through tools to manipulate and easily create models. Scripts called generators can create the basic structure for files, and an interactive Ruby console can help quickly debug/modify parts of the model. Additional tools for database management and testing are also available. Rails also support plug-ins, allowing users to extend functionality and the Development Team to do less work. Finally, Ruby on Rails is licensed under the open-source MIT license, allowing application developers to modify, distribute, and sell software built using Rails with the only restriction that the license be redistributed with the software.

Although a default Ruby on Rails installation provides plenty of functionality, it does not provide a way to stream video content over the internet. The open-source Flowplayer (http://flowplayer.org/) was chosen to stream and play Flash videos. Besides being open source, a major incentive to choose Flowplayer over other Flash video players was its scripting support, which allows the video to be controlled from outside the flash player via JavaScript function calls. This is necessary to implement a YouTube-style annotation system where comments can contain links to particular scenes in the video.

Content hosted on our system is the intellectual property of IIT and the professors creating said content. It is the responsibility of IPRO 327 to protect video lecture content from unauthorized access. With posted comments, system users are able to interact with other users just like in the physical classroom. The system is not anonymous and user accounts are tied to IIT email addresses. The system must therefore make sure that a person using the system is who they claim to be, given that “according to identity theft statistics over 9 million people have their identity stolen each year,”

most of the theft occurring online. [3] For these reasons an authentication protocol was created for our system. The authentication system of our Web application is using only a software implementation. It is based on encrypting the user's password and saving it in the database along with the other user information. The encryption of the password is done by the Digest::SHA1 algorithm. Digest::MD5, although still a popular algorithm, was not used because of known vulnerabilities. In order to secure the communication link to the server, the HTTPS protocol is used. This protocol encrypts the information when it is sent and decrypts it at the other end. There is still a possibility of an intruder that might spy on the link between the client and the server. To fix this issue, an SSL certificate must be purchased which ensures that the Web server is communicating with the client. Using all of these solutions, IPRO 327 was able to implement a robust Web authentication system.

Conclusions and Recommendations

Based on the SLT's survey responses and interaction with IIT faculty and staff, the following feature recommendations for iitOnline+u were made:

- Video that loads quickly and has no or minimal buffering or streaming issues.
- Video that includes the ability to play, pause, rewind and fast forward.
- A separate window for slides that can be played in sync with the video.
- High quality video that lacks fuzziness and has clear audio.
- Video that is not tied to any one operating system with cross-browser compatibility.
- The ability to download the content as video or audio.
- An e-mail notification system that can be customized by the user with a default setting that will only e-mail the faculty when a question is asked and with no further notifications on that topic. All e-mails should include links that go directly to the point of video in the video that is referenced.
- The ability for faculty to upload their own videos and special content.

Based on SLT's feature recommendations, ULT was able to design a system which implemented all the features stated in the *Purpose and Objectives* section. Since all of the major features identified this semester by the SLT's survey and internal class discussion have been implemented, further development on the user interface should be dependent primarily on the system's reception by classes using it. Future teams should actively solicit comments and suggestions from users for improving the user interface and act accordingly. Features that have not been implemented this semester but would greatly improve the application include: keyboard commands to control the video playback; updating the comments display in real-time as comments from other users are posted; and an administration interface for modifying class membership, editing/deleting comments, and uploading videos. Work also needs to be done to the codebase to make it more idiomatic, optimized, and cross-browser compatible as none of the ULT members were fluent in JavaScript or Web development. Finally, iitOnline+u should be subjected to a thorough security analysis, potentially including, but not limited to, full-scale penetration testing.

Based on the results from ULT's user testing, it can be said that the team developed a successful user interface. Much information was gathered during user testing and it was found that the majority (by our definition) of users have rated the UI easy to use, more excellent than poor, and more satisfying than frustrating. However, nearly half of the users (44%) were indifferent when asked if they found their experience more stimulating than dull, an area that will need improvement. Results indicate that we have also created an intuitive system and 75% of users would prefer to use our system over the current IIT Online system.

Using an MVC framework allowed development to be distributed between the ULT and DT. ULT created the system's user interface (views) while the development team worked on the system's back-end (model and controller).

Future work should be focused on adding features and integrating the system with IIT's infrastructure. Possible features to add include a settings page for users, multiple language support, keyboard shortcuts, and support for mass upload of slides and videos. To integrate with IIT, the

system will need to be modified to authenticate users using IIT's data store rather than a local database. The system will also need to be capable of accepting videos in Real format and converting them to Flash video, because all IIT Online lectures are recorded in Real format.

While a continuation of IPRO 327 could address this future work, the remaining tasks may be too small in scope for an IPRO. The system will need to be deployed and tested in a classroom long before it is integrated with IIT's infrastructure, so a continuing IPRO would be limited to developing new features. Regardless of whether it comes from the IPRO or another source, development work should be done on iitOnline+u to implement remaining important features.

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Appendices

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Ori Rawlings, Computer Science

Joshua Shaffer, Electrical Engineering

Antoinette Smith, Professional and Technical Communication

Andrew Yates, Computer Science

Expenses

Line Item	Budget Section	Price
Pizza for user testing	Incentives	$141.29
Headsets for user testing	Miscellaneous	$53.63
	Total	$194.92

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An Introduction to MRAS and Its Relationship to IPRO 327

The Microsoft Research Annotation System (MRAS) is a Web-based server/client application. The objective of this paper is to introduce the MRAS system and its practical implementation in an educational environment. The goal is to make sure that the IPRO327 problem is well understood and certain ideas for the needed system in this project are introduced. The information presented here is gathered from the paper “Annotations for Streaming Video on the Web: Design and Usage Studies” [1]. The presentation will go in the following order: introduction, importance, structure and functionality, experiments and results, and conclusion.

The MRAS prototype is created for an asynchronous collaboration though the annotation of video media. The system has many characteristics that are needed in order to complete the IPRO project. The basic goals are to create a system for online learning that is Web-based and allows the annotation of the media that is presented in the online learning process. This environment must be well structured for each of the different groups of clients such as: students, teacher assistants and instructors. MRAS provides the end client with a Web-based framework. Simply, everything is accessed though a Web page that communicates with the media, annotation and email servers. Figure 1 in the slides shows a diagram of the structure and the different protocols for communication in between.

Due to the fact that this project is in its starting phase a simpler diagram (Figure 2 in the slides) is created as a proposal for the basic structure of an annotation system. The idea behind it is similar to the MRAS system but simplified. The end user connects to the web server. The web server uses Rails framework to provide email communication, access to media and annotation database. The Rails application which is the actual web page has its own database which can be used for storing user credentials and tabulated information for linking the annotations to the media.

Back to the MRAS system, MRAS provides the basic functionalities for an annotation system. The prototype is made to annotate videos. There are two ways of annotating provided, annotation through text and annotation through audio. The Annotation Meta Data Server stores the user authentication credentials and the user groups. Adding, positioning, organizing and sending annotations through email are the first functions that are introduced. Adding an annotation to the video file is simple to a certain extent. While watching a video the user will click on the “Add” button present in the toolbar (Figure 3 in the slides). A window divided into three parts appears on the screen (Figure 4 in the slides). The first part is named as “Target”, starting with the URL of the video file (not necessary for the user) and the progress bar of the video file indicating the time when the “Add” function was accessed. This progress bar allows the user to select not just a position for his/her annotation but a time period. The next group is labeled “Annotation” and holds the Annotation set value, an option to email the annotation, a

text field for the summary and the actual annotation. The annotation type is specified at the bottom with a radio button.

The next function provided is to search for annotations. The user needs to specify the file, then the target period in which the annotations exist and so on as Figure 5 in the presentation shows. All the possible ways for searching are included in the Query Annotations window. The found annotations are shown in the View Annotations window (Figure 6 in the slides). Another way to get to this window would be to click on the MRAS toolbar on the “Show annotations” button while the user is watching a video file. The items that are in red in the view window show the nearest annotations to the time of the video at which the user submitted the query. Intuitively, the balls represent the text annotations and the loud speakers the audio annotations. The user has the possibility to play the video from the annotation time stamp, can reply to the annotation by either audio, text or both or can open the annotation. According to the credentials possessed the user can delete and edit an existing annotation.

The research team at Microsoft conducted two studies where they put a few users to work with the MRAS system. The first study was composed on six participants that were divided into two equal groups. Their objective was to watch a video and take notes. For the first half of the video three users were using pen and paper and the others used the MRAS annotation system. In the second half they switched roles. The results were quite interesting: the MRAS system made the participants change the way they take their notes. The hand written notes did not make much of a sense except for one user who recorded the time for each of his note (a user that firstly used the MRAS and then took notes on paper). Learning of the material was not measured by the Microsoft Research Team.

The second study involved 18 participants and the objective was to create a learning environment in which users share their annotations and reply to others, creating a threaded discussion. The text annotations were slightly preferred over the audio ones. Knowing that this research was conducted more than 10 years ago, it could be assumed that today everyone would prefer the text annotation type due to the ways of communication (instant messaging, cell phone text messages). A study conducted among college students shows that: “When asked which method they preferred, 59% of respondents said SMS texting, 17% said phone calls, 9% said IMs, and an abysmal 7% said e-mail. Curiously, social networking websites weren't named. You'd better bet those'd rank highly too.”[2] Another interesting result that can be seen in the study is that the addition of annotations increased over time and so the annotation replying. This trend can be seen on Figure “Subject Sequence” [1].

The MRAS prototype and research shows that an online learning can become as beneficial as participating in a class room, and in certain instances create a better learning environment. This prototype is a great source of ideas for the IPRO327 project. It is certainly a quite complicated system, the future goal would be to extract the best ideas and combine them with the research conducted for the IPRO in order to create a final working product in a timely fashion.

References

[1] Bargeron, D., Gupta, A., Grudin, J., Sanocki, E. Annotations for Streaming Video on the Web: Design and Usage Studies (Sept. 1998), available at http://research.microsoft.com/en-us/um/redmond/groups/coet/mras/www8/paper.htm

[2] Axon, S., College students overwhelmingly prefer text messages to phone calls, e-mail, and IMs (Mar 2009), available at http://www.obsessable.com/news/2009/03/30/college-students-overwhelmingly-prefer-text-messages-to-phone-calls-e-mail-and-ims/

Microsoft Research Annotation System (MRAS): An Insightful Failure

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September 14th, 2009

Introduction

Between 1998 and 2001, work had commenced on the Microsoft Research Annotation System (MRAS) [1]. Today, this system is considered a failure by its creators. Although, the history of the product and the insight gained by its team [2] will shed light on to the path faced by our team. The MRAS story will help us to predict and overcome pitfalls before we encounter them.

Aim

The MRAS application was designed to facilitate the process of asynchronous education. A student would log on to the system and watch a recording of a lecture. Alongside the lecture, the professor's slides would appear. Also alongside the lecture video, other students' notes, comments, questions, responses, or annotations would appear. The student can click on the slides or the various annotations to “seek” to the corresponding time in the lecture video. The student can post additional questions, comments, responses, etc., and link the additional annotation with a time in the audio-video stream. Other users, including the TA, professor, and selected students are notified via email that new annotations have been added to the lecture, thus allowing them to log on and post a response.

Initial Implementation and Early Revisions

The system was initially implemented in 1998. A general-purpose user interface (UI) was developed allowing users to watch the video, and add both text-based and audio annotations. The email-based notification system was also included in the system.

Studies were performed that compared the annotation system to traditional pen and paper note-taking. Additional experiments were conducted that studied users' activity with the system and the effects of sustained discussion. Feedback was gathered on the user interface.

MRAS was modified so that both the video, slides, and annotation system could all be configured within a webpage, while simultaneously adhering to the look-and-feel of that page. Extended studies also found a lack of interest in audio annotations. The system quickly evolved to include options to limit the types of media users can submit as annotations.

Field Studies

C Programming Courses

C Programming courses were taught internally at Microsoft to train interested employees. These courses were video-tapped and offered as an on-demand course using the MRAS application. Students only met face to face at the beginning and end of the course, and used MRAS for everything in-between. Professors and students cited a convenience in the system, but the lecturers missed interaction with students. Students also cited that they were able to ask less question then they would have otherwise, because they were able to see responses to other students questions.

Several problems were discovered. A programming course features many online demos, unsuitable for easy consumption via a single video camera filming a professor during lecture. To compensate, demos were filmed separately after lecture and added to MRAS as video annotations. One student complained

about the “Discussion” not accurately capturing the place to ask questions. Thus the tab was changed to “Questions”.

One serious problem was noted. Asynchronous participation allowed some students to procrastinate in watching the lectures. This hurt everyone. Overall discussion was reduced due to the limited time to ask and respond to questions once the stragglers had gotten around to watching the video.

The system was expanded to facilitate in small-group projects as a collaboration device. It worked well, but the study found a new feature request, the ability to link to other annotations. This functionality was added.

The system was also expanded to allow for quizzes to be administered via annotations. A question is presented to the user. Once the user has submitted a response the question, the annotation is linked to the place in the video explaining the correct answer.

Usability Engineers

Usability engineers collect video clips of user reactions or comments and present these reactions to a product team. The MRAS system was hypothesized to prove effective at facilitating this task.

This introduced a conceptual shift in the software. Annotations are to be presented in a certain order determined by the usability engineer, not in a sequence corresponding to the timeline of a single video. Thus the MRAS software was expanded to support the construction of playlists. Playlists are an ordered sequence of annotations occurring across one or more videos. This worked fine for supplementing a slide presentation during a meeting. Yet team member responses to the playlist during the live meeting are not captured by the system, and usability engineers decided not to use the system for this task.

The usability engineers like to distribute their annotations and video clips via email with team members. The MRAS software was also hypothesized to help with this task. Although, the usability engineers also found little use for the system here, as clips and annotations are best distributed as part of larger documents. Thus, the MRAS system was expanded to allow embedding inside of Word Documents.

Shakespeare

A professor at MIT desired to use the MRAS system to allow students to compare and contrast filmed performances of Shakespeare plays.

In order to accommodate this task the MRAS application was modified again. This time a second video player was added along with additional controls for fine-grained manipulation of video playback.

Modifying this supposedly general-purpose application proved to be substantial work. And ultimately, the work performed is unlikely to be usable by other courses and situations.

Goodbye Application, Hello Platform

A single interface for multimedia annotations proved unadaptable to various domains without significant, often times, incompatible modifications. This motivated the revamping of the MRAS work into a platform. Rather than a rigid application needing constant modification for deployment, new work focused on creating an multimedia annotation platform on top of which a variety of end interfaces could be placed.

The distilled requirements for the platform included support for creating, saving, retrieving, and deleting annotations among other common activities; the ability to customize end interfaces, the ability to extend annotation schema (add new data to annotations), providing storage flexibility, the ability to generate annotations of any media type on source content of any other media type, and providing compatibility between annotations created on any end interface being compatible with any other end interface.

This resulted in the creation of a simple API that supports all of the common annotation functions needed by a system. The API provides a client runtime and object model that abstracts the storage and retrieval details of the back-end.

Conclusion

I'd like to share one long quote in particular that illustrates the whole point of the paper relatively concisely:

> "The scientific ideal is that if studies are well-designed, we learn from any outcome. It is well known, however, that it is difficult to publish "negative results." Yet if we do not, other researchers will follow down the same path. This is true of systems research. If only one in five efforts succeeds and we only report the success, others will probably repeat the futile four. Even worse, if we report apparent successes immediately, before time allows a more sober assessment, we create overly rosy views that will lure future researchers into dead ends."

As system researchers, what we as an IPRO group need to take away is that, if we do not carefully evaluate our choices, we can and will be lured down a path failure. We need to deeply consider the experience the MRAS team endured. If we expect our work to result in success we need to understand the mistakes made by the MRAS team.

So what things did the MRAS team do wrong (that we can learn from)? How did they rectify those errors?

The MRAS team made a poor assumption that it was possible to build a simple, easy to use, general purpose annotation application. What they found was that each and every domain that engages in annotation has specific requirements. Some of these requirements are incompatible with the requirements of other domains, thus necessitating heavy modification of the system each time it is deployed.

The MRAS team rectified their error by abandoning the idea/hope that they could build a general purpose application, and instead realized that they could indeed build a general-purpose platform. By distilling the various requirements of different domains, a single, reusable platform could be utilized by a variety of customers.

So what does this mean for us? What should our plan of action be?

We need to evaluate the needs of our software, both within and outside of our specific IPRO. We need to answer the question, does it make more sense to build an application or a platform?

A platform will make the system more adaptable to changing needs and external requirements. A platform will present both the User Liaison and School Liaison teams with the most flexible system, facilitating their task of fulfilling user needs. With this flexibility the User Liaison team is able to make a potential greater

variety of user interface designs in the quest to discover something optimal for our users. With a platform, the User Liaison team would never need to make a choice between a quality user experience and technical limitations. For the School Liaison team a platform could potentially make the integration of our system with IIT systems an easier task. A platform approach will also allow the system to adapt to varying requirements posed by school administration. A platform also increases the reusability of our system by other developers looking to deploy similar functionality.

An application might make the implementation of the back-end of the system more straight-forward. An application approach may also streamline the architecture of the system and increase overall performance.

What the team as a whole needs to know now, is the current approach of the system. At this point, I think Andrew should give a presentation outlining the system architecture in detail, how the components interact, and demonstrate to us the current flexibility and generality of the system. At that point we will be able to make an informed decision about what direction we should head, taking into consideration what will be best for both the various teams, current users, school administration, and future users of the product.

References

1. David Bargeron, Anoop Gupta, Jonathan Grudin, and Elizabeth Sanocki, Annotations for Streaming Video on the Web: System Design and Usage Studies, In Proc. WWW Conference, 1999, http://research.microsoft.com/en-us/um/redmond/groups/coet/mras/www8/paper.htm
2. J. Grudin and D. Bargeron. Multimedia Annotation: An Unsuccessful Tool Becomes a Successful Framework. Communication and Collaboration Support Systems. K. Okada, T. Hoshi, and T. Inoue (Eds.). Ohmsha publishers. 2005.

IPRO 327—A VIDEO ANNOTATION AND INDEXING SYSTEM

PRELIMINARY USER QUESTIONNAIRE

1. In regards to IIT Online, which role(s) would best describe you?

☐ I am a student that is currently taking and/or has taken IIT Online courses.

☐ I am a professor that is currently teaching and/or has taught IIT Online courses.

2. How many IIT Online courses have you taken and/or taught? Include courses that you are currently taking and/or teaching. (Select one.)

☐ 1-2

☐ 3-4

☐ 5+

3. One of the features of the current IIT Online system is the ability to watch videos of the lecture online using RealPlayer.

Name three things you like about this feature.	Name three things you dislike about this feature.
1.	1.
2.	2.
3.	3.

4. Thinking of your IIT Online experience overall, how often do you typically use the Blackboard discussion board to communicate with students and/or professors? (Select one.)

☐ 1-2 times per week

☐ 3-4 times per week

☐5-6 times per week

☐7+ times per week

☐I have never used the Blackboard discussion board

5. On a scale from 1-10 where 1 is "Extremely dissatisfied" and 10 is "Extremely satisfied", how would you rate your level of satisfaction with the communication channels (i.e., Blackboard discussion board, e-mail) available to you as an IIT Online student?

_____ (Write a number between 1 and 10.)

6. The above question assumes that the Blackboard discussion board and e-mail are the only ways for professors and students to communicate in an IIT Online course. Do other channels of communication exist? If yes, please list them in the space below.

7. If you were given a mission to improve the IIT Online system, what would you change? (Write in space below.)

The above graphic depicts Prototype A, a system that features:

a. **Flash-based video (think: YouTube)**
b. **Searchable transcript of the video**
c. **The ability to post comments that are connected to a specific time within the video**

All of the above features are contained within one browser window.

Thinking of your likes and dislikes of the current IIT Online system's video and communications features…

8. Would a Flash-based video be preferable to a RealPlayer video? (Circle one.)

Yes No

9. In your opinion, is the ability to search the video using a text transcript an improvement to the current IIT Online system? (Circle one.)

Yes No

10. In your opinion, would the ability to tie comments to specific times within the video be a useful channel of communication for IIT Online students?

Yes No

11. If Prototype A were to replace the current IIT Online video system, what necessary features would be missing?

12. Please write any additional comments you have on this page.

School Liaison Team Feature Recommendations for iitOnline+u

The School Liaison team sought to determine the features necessary for iitOnline+u through an online questionnaire and face-to-face interviews with IIT faculty and staff.

IIT Online Questionnaire

The questionnaire was available online from September 25, 2009 to October 9, 2009. The questionnaire was advertised on IIT Today and in an e-mail from the IPRO office. Karthik Dhagam, school liaison team leader, and Chris Osswald, user liaison team member, also solicited responses from fellow students in their online courses.

What is your experience with IIT Online?

The questionnaire received 29 total responses, 24 were students who have taken online courses at IIT, and 5 were faculty who have taught online courses at IIT.

How many IIT Online courses have you taken and/or taught? Include courses that you are currently taking and/or teaching.

Of the faculty, 4 have taught 5 or more online courses at IIT, 1 has taught 1 or 2 courses. Of the students, 17 have taken 1 or 2 courses, 5 have taken 3 or 4 courses, and 1 has taken 5 or more courses. Figure 1 shows the total responses among faculty and student respondents.

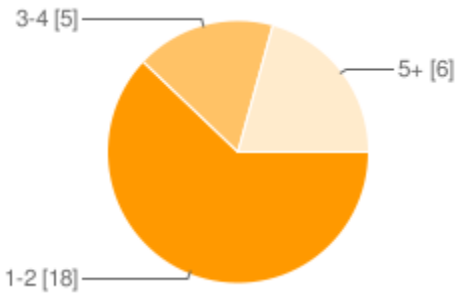


Figure 1. IIT Online courses taken or taught by IIT Online students and faculty.

One of the features of the current IIT Online system is the ability to watch videos of the lecture online using RealPlayer. List three things you like about this feature. List three things you dislike about this feature.

The features of RealPlayer liked by student respondents are shown in Table 1. The top 3 features liked by students was the ability to pause and play the video, the ability to view slides and video side-by-side, and the quality of the video. Full responses can be found in the Appendix.

Feature	Responses
Pause/Play	9
Synchronous slides and video	7
Video quality	6
Convenience	5
Available online	5
Replay	4
Brand confidence	3
Free	2
Video/slide swap	1
Simple/easy to use	1
Downloadable video	1
Ability to adjust column	1
Ability to learn from instructor	1

Table 1. Features of current video player liked by IIT Online students.

The features of RealPlayer liked by faculty are shown in Table 2. Full responses can be found in the Appendix.

Feature	Responses
Convenience/Availability	3
Synchronous slides and video	1

Table 2. Features of current video player liked by IIT Online faculty.

The features of RealPlayer disliked by student respondents are shown in Table 3. The top three dislikes listed by student respondents were issues with loading and streaming of the video, poor video quality, and poor video production. Full responses can be found in the Appendix.

Feature	Responses
Video loading/streaming	10
Video quality	6
Video production	6
Sound quality	5
Playback	5
The brand	4
Operating system compatibility	4
Inability to download video	4
Limited capabilities	3
Miscellaneous technical issues	3
Other	2
Interface	2
Inability to view all elements being used by instructor	1
Inability to access videos after course completed	1
Lack of standard usage	1

Table 3. Features of current video player disliked by IIT Online students.

The features of RealPlayer disliked by faculty are shown in Table 4. Full responses can be found in the Appendix.

Feature	Responses
Videos listed by week	1
Inability to download video	1
Inability to download audio	1
Viewable size	1
Ability to view previous course videos	1
Lack of video annotation	1
Video quality	1
The brand	1
Taping restrictions	1
Video loading	1

Table 4. Features of current video player disliked by IIT Online faculty.

Thinking of your IIT Online experience overall, how often do you typically use the Blackboard discussion board to communicate with students and/or professors?

All of the faculty respondents reported minimal use of the Blackboard discussion board; 3 had never used the discussion board, 2 used the discussion board 1 or 2 times per semester.

The majority of student respondents also reported minimal use of the Blackboard discussion board, with the exception of 2 respondents that use the discussion board 7 or more times per week. A pie chart of the student responses is shown in Figure 2 below.

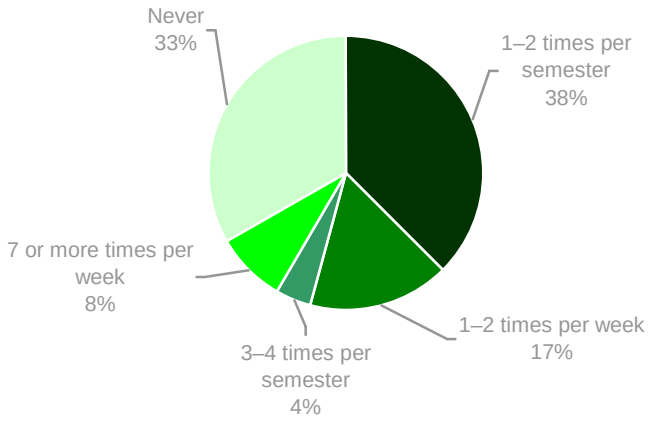


Figure 2. Blackboard discussion board use among IIT Online students.

How would you rate your level of satisfaction with the communication channels (i.e., Blackboard discussion board, e-mail) available to you as an IIT Online student?

Respondent level of satisfaction with the communication channels (discussion board and e-mail) varied widely with most responses (20) coming in the middle range (satisfaction levels 4–7). Figure 3 illustrates and Table 5 lists the data collected from the questionnaire. For the 4 teachers that responded, the average level of satisfaction was a 6. All student respondents

provided a response to this question; the average level of satisfaction was 5.33.

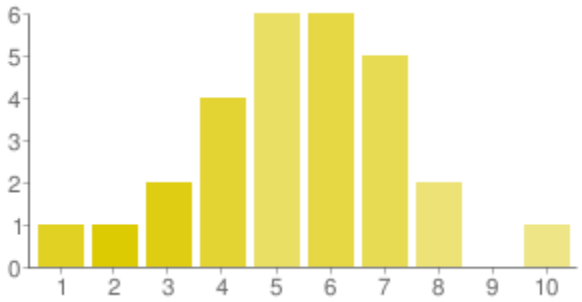


Figure 3. Level of satisfaction with IIT Online communication channels among students and faculty.

	Level of satisfaction	Responses	Percentage of responses
Extremely dissatisfied	1	1	4%
	2	1	4%
	3	2	7%
	4	4	14%
	5	6	21%
	6	6	21%
	7	5	18%
	8	2	7%
	9	0	0%
Extremely satisfied	10	1	4%

Table 5. Level of satisfaction with IIT Online communication channels among students and faculty.

The above question assumes that the Blackboard discussion board and e-mail are the only ways for professors and students to communicate in an IIT Online course. Do other channels of communication exist? If yes, please list them in the space below.

Student respondents that were queried for additional communication channels currently available to IIT Online students responded that talking face-to-face (5) and talking by phone (3) were also utilized. Faculty respondents also use the following communication channels: groups like those on Yahoo! and Google (2), the telephone, and mailing lists. See the Appendix for the complete set of responses.

If you were given a mission to improve the IIT Online system, what would you change?

When student respondents were queried on how they would improve the IIT Online system, the top response was to take away the dependence on the operating system; additional responses are listed in Table 6. Faculty responses were sparse, but included: developing courses specifically for online use, using Usenet feeds, being able to view student PowerPoint presentations on the video, conferencing, and improving Blackboard's Digital Dropbox. Complete responses can be seen in the Appendix.

Improvement	Responses
Operating System dependence	4
Q&A window/better discussion board	3
Video quality	3
Customization/Ease of use	3
More interactive	3
Download lectures	2
More interaction with professor	2
Standardized teaching	2
Ability to listen to class discussion	2
Download lectures	2
More interaction with professor	2
Flash video	1
Zoom in/zoom out	1
Availability	1
Video player that doesn't open in browser	1
Course availability	1
Third-party/alternate existing system	1
Password change	1
Ability to view multiple channels	1
Live lecture streaming	1

Table 6. How IIT Online students would improve the IIT Online system.

Would a Flash-based video be preferable to a RealPlayer video?

When shown a prototype of the system, the number of respondents who would prefer Flash over RealPlayer was 25 with 11 of those respondents agreeing strongly; 4 respondents disagreed. Among faculty, all 5 agreed that Flash would be an improvement over RealPlayer with 2 faculty respondents agreeing strongly. Overall responses are illustrated in Figure 4.

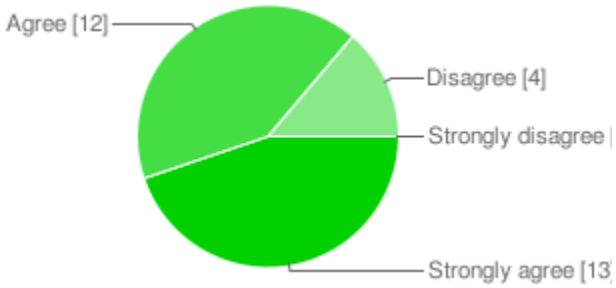


Figure 4. IIT Online student and faculty that would prefer Flash over RealPlayer.

In your opinion, is the ability to search the video using a text transcript an improvement to the current IIT Online system?

When shown a prototype of the system, the number of respondents who thought that searching the video using text would be an improvement was 27 with 12 of those respondents agreeing strongly; 2 respondents disagreed. Among faculty, all 5 agreed that searching the video using text would be an improvement with 4 faculty respondents agreeing strongly. Overall responses are illustrated in Figure 5.

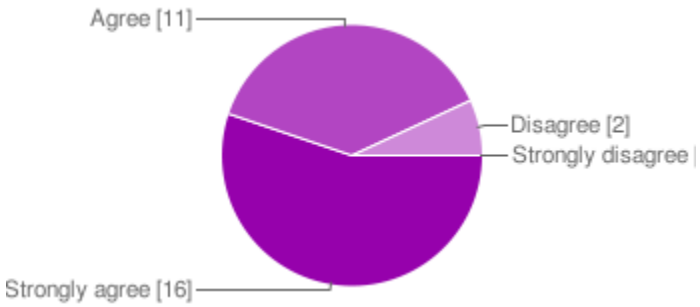


Figure 5. IIT Online students and faculty thoughts on whether the ability to make text searches on video would be an improvement.

In your opinion, would the ability to tie comments to specific times within the video be a useful channel of communication for IIT Online students?

When shown a prototype of the system, the number of respondents who thought the ability to tie comments to specific times within the video would be a useful channel of communication for IIT Online students was 28 with 15 of those respondents agreeing strongly; 1 respondent disagreed. Among faculty, all 5 agreed that the ability to tie comments to specific times within the video would be a useful channel of communication for IIT Online students with 2 faculty respondents agreeing strongly. Overall responses are illustrated in Figure 6.

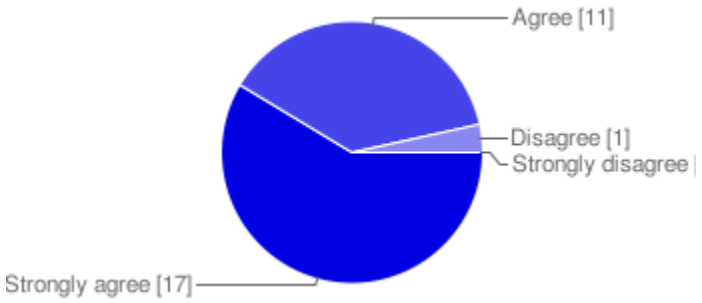


Figure 6. IIT Online students and faculty thoughts on usefulness of tying comments to video.

If Prototype A were to replace the current IIT Online video system, what necessary features would be missing?

When student respondents were shown a prototype of the system and asked what necessary features might be missing, their top responses were the ability to synchronize the lecture with slides, the ability to download the video, the ability to easily view and access comments, and the ability to view the video. Additional student responses are shown in Table 7. Faculty respondents deemed the following short list of features necessary: course development for the environment and speed. Full responses for students and faculty can be found in the Appendix.

Feature	Responses
Lecture/slide sync	3
Downloadable	2
Ease/availability of comments	2
Ability to view video	2
Comment search	1
Play video with Internet	1
Speed	1
Compatibility	1
Cooperation from professors	1
Chapters in video	1
Comprehensive views	1

Table 7. Necessary prototype features as determined by IIT Online students.

Interview with IIT Online Professor

Karthik Dhagam and Antoinette Smith conducted an informal interview with Professor Beckman of the computer science department. Professor Beckman was recommended by John Salt, quality control technician for IIT Online Technical Services (OTS) as a top faculty user of IIT Online courses. The key points of the informal interview follow.

If the IIT Online interface is all on the web (he runs Linux) and it isn't too much additional work, Professor Beckman wouldn't mind using it. For his current courses, he is taped by OTS and has no involvement in the production or setup of the video. He also maintains a Google group account for discussion, but he will be moving to MailMan, a mailing list program. For our prototype he would like

- To only be e-mailed when a student is asking a question

- For that question to be linked to the moment in the video
- To only receive the initial e-mail, not the responses (he would also be open to a daily digest that includes all comment threads)

And because it is a Flash player, he might possibly record his own videos at times.

Professor Beckman would be interested in being a test volunteer for the spring 2010 semester using his CS 440 course.

Recommendations

Based on the questionnaire data and the insight gleaned from an interview with IIT Online instructor Professor Beckman, the School Liaison team makes the following feature recommendations for the iitOnline+u system

- Video that loads quickly and has no or minimal buffering or streaming issues
- Video that includes the ability to play, pause, rewind and fast forward
- A separate window for slides that can be played in sync with the video
- High quality video that lacks fuzziness and has clear audio
- Video that is not tied to any one operating system with cross-browser compatibility
- The ability to download the content as video or audio
- An e-mail notification system that can be customized by the user with a default setting that will only e-mail the faculty when a question is asked and with no further notifications on that topic. All e-mails should include links that go directly to the point of video in the video that is referenced.
- The ability for faculty to upload their own videos and special content.

These feature recommendations are independent of the core features of the system. The School Liaison team assumes these core features—the ability to leave comments, the ability to search for comments, the ability for all course participants to view the comments, the ability to timestamp a comment—will be included in the system, especially since many of them were mentioned favorably by at least one questionnaire respondent.

These features were chosen based on the responses that were most consistently voiced by respondents and the input of Professor Beckman. Professor Beckman's suggestions were given additional weight due to his experience teaching online courses and his interest in being a test case for the spring 2010 semester.

The School Liaison team is not against any of the additional feature recommendations made by faculty or staff that was not listed as part of our final recommendations, but we believe that in the interest of time and with the lack of consistency with which many of these recommendations were voiced, these features are best left to be implemented in a future IPRO.

Appendix

On the following pages are all of the responses left to the open-ended questions in the survey.

CHANGES NEEDED IN CURRENT IIT ONLINE SYSTEM

Faculty

- Course development (for online)-

-1-

courses should be developed specifically for the online environment, instead of just capturing the old teacher at blackboard format. this is not a comment for iit online, but for the academic colleges.

-Usenet feeds-

-1-

I would add usenet feeds. They can be accessed in many different ways, so as to not lock you into using blackboard.

- View student PowerPoint presentations-

-1-

An easy way to present student presentations as video using PowerPoint

-Conferencing-

-1-

Create a conference hook-up so people can talk with each other in groups or individuals. Also, add feature to view a screen while in the conference. Viewing each other is not that necessary. Could use Net-Meeting or Second Life features.

-Conf w/screen-

-1-

Create a conference hook-up so people can talk with each other in groups or individuals. Also, add feature to view a screen while in the conference. Viewing each other is not that necessary. Could use Net-Meeting or Second Life features.

-Improve digital dropbox management-

-1-

Some features of the blackboard such as organizing the dropbox, marking submissions to the drop box etc.

FEATURES MISSING FROM PROTOTYPE A

Faculty

-Course development-

-1-

course developed for the environment

-Speed-

-1-

Quick response, as it might get slower

-General-

-1-

Unsure. I am currently editing my files using Camtasia and syncing up the video of myself with the PowerPoint. This file could be used on YouTube if I produced it that way. This is for Com 580 - Communicating Science

Students

- Lecture/slide sync-

-1-

Synchronization of slides and lecture

-2-

view of notes/ powerpoint slides alongside the video

-3-

The lecture notes/slides would still need to be tied to the lecture as well. I'm not sure beyond that from just a screen shot.

- Ability to view video -

-1-

not being able to open the video in real player

-2-

I can't view Flash player videos at my work. Options for alternate video styles are needed. Not all library, work, and personal computers are supplied with RealPlayer and/or Flash players.

- Play video w/internet -

-1-

ability to play video w/ internet

- Speed -

-1-

The speed of loading

- Compatibility -

-1-

make sure positioning is correct and that the system works across all browsers and operating systems

- Cooperation from professors -

-1-

well the teacher would need to comment the video and not alot would do it i think. This is because it would be a timely manner unless they were organized enough to make it easy on themselves

- Comprehensive views -

-1-

The ability to see everything at once.

-Chapters-

-1-

Chapters in the video to define where the lecture switches focus from one topic to another.

End of survey comments

-1-

If it is about the IIT online system in total.. then please read below..

A lot. I believe that there is no integration with the different portals/channels of IIT. What i mean is one account should reflect everything. for e.g. There should be one and only one calender and not different calenders like the email calendar and my iit calendar and then the blacboard calendar.

Also the calendars should be synchronized automatically with the events pertaining to the student. e.g. A student should be able to view all the important dates and deadlines for his/her account at the beginning of the semester according to the registered courses and not have to create a planner or events manually. e.g. calendar should show that one has an exam coming up or a presentation is due in the near by date and things like that. Thinking of just calendar synchronizing there are tons of ideas that i have only if anyone wants to take a serious look at it.

One of the major disadvantage of the system is that it is not being used by the professors. A student would look forward to a system only if professors use them, i mean if they post grades, put up assignments, labs and etc. Else student have no motivation whatsoever to use them.

Discussion board interface too isnt very friendly as compared to other discussion boards available in the industry. A student should be able to create his/her own discussion forums with friends regardless in the class or outside as long as the other person has an iit account. this will allow friends of same class but different sections to communicate. Also allow for uploading and viewing doc files in the discussion. Or add a chat feature to it.

With the advancement of technologies, and IIT being a tech school, the level of technology systems and its integration is really poor or requires a lot changes. After all shouldnt a tech school be setting an example by providing the services that are a class apart.

-2-

In the time specific comments, it would be nice if instructors would relate examples done in class to specific problems in the book.

-3-

online streaming videos can never be perfect, but the current system needs great improvement in the ability to play and load correctly and fast.

-4-

Flash based video lectures would be bad

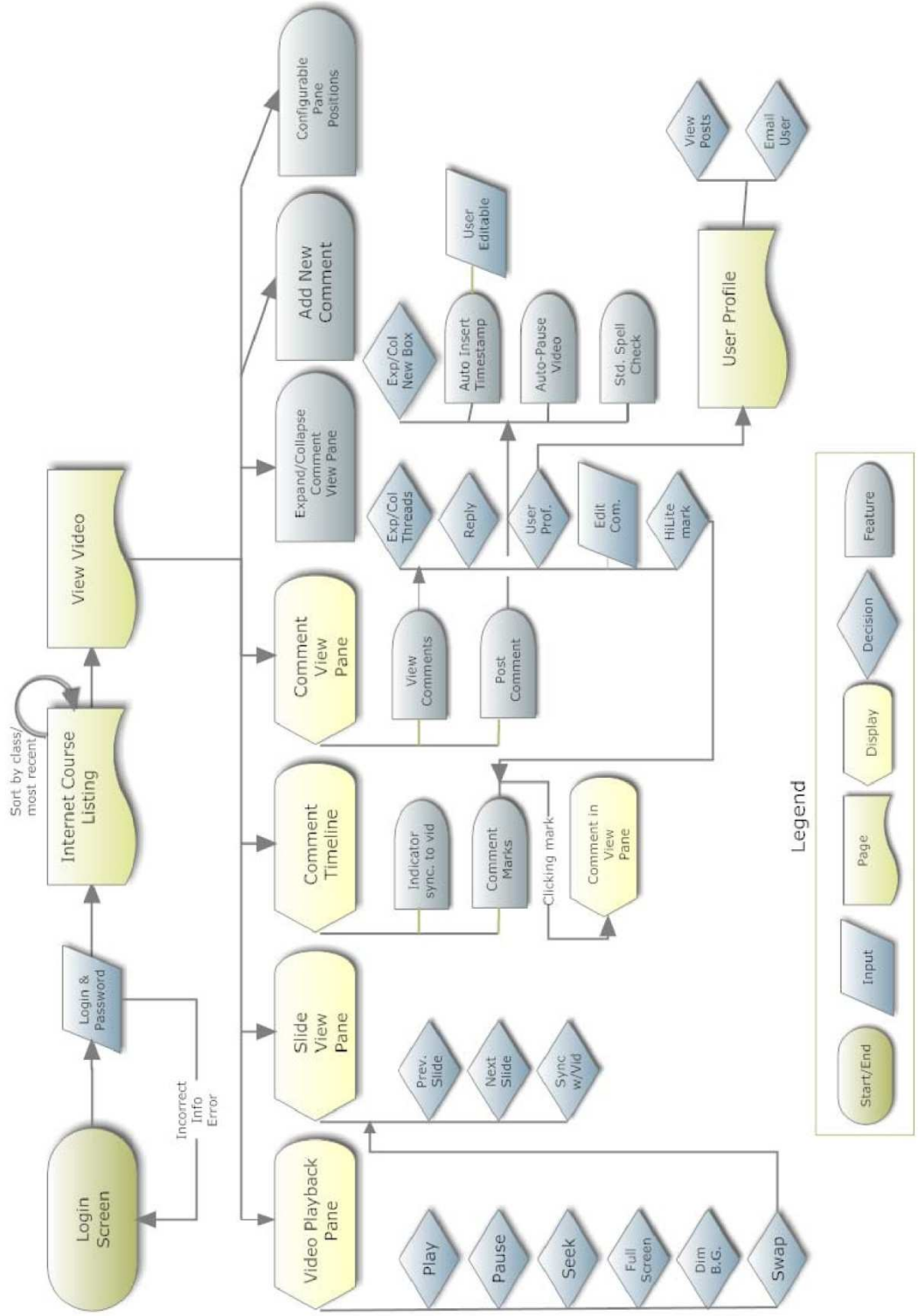
-5-

IIT Online and its videos are a great tool and I believe more should have and use them.

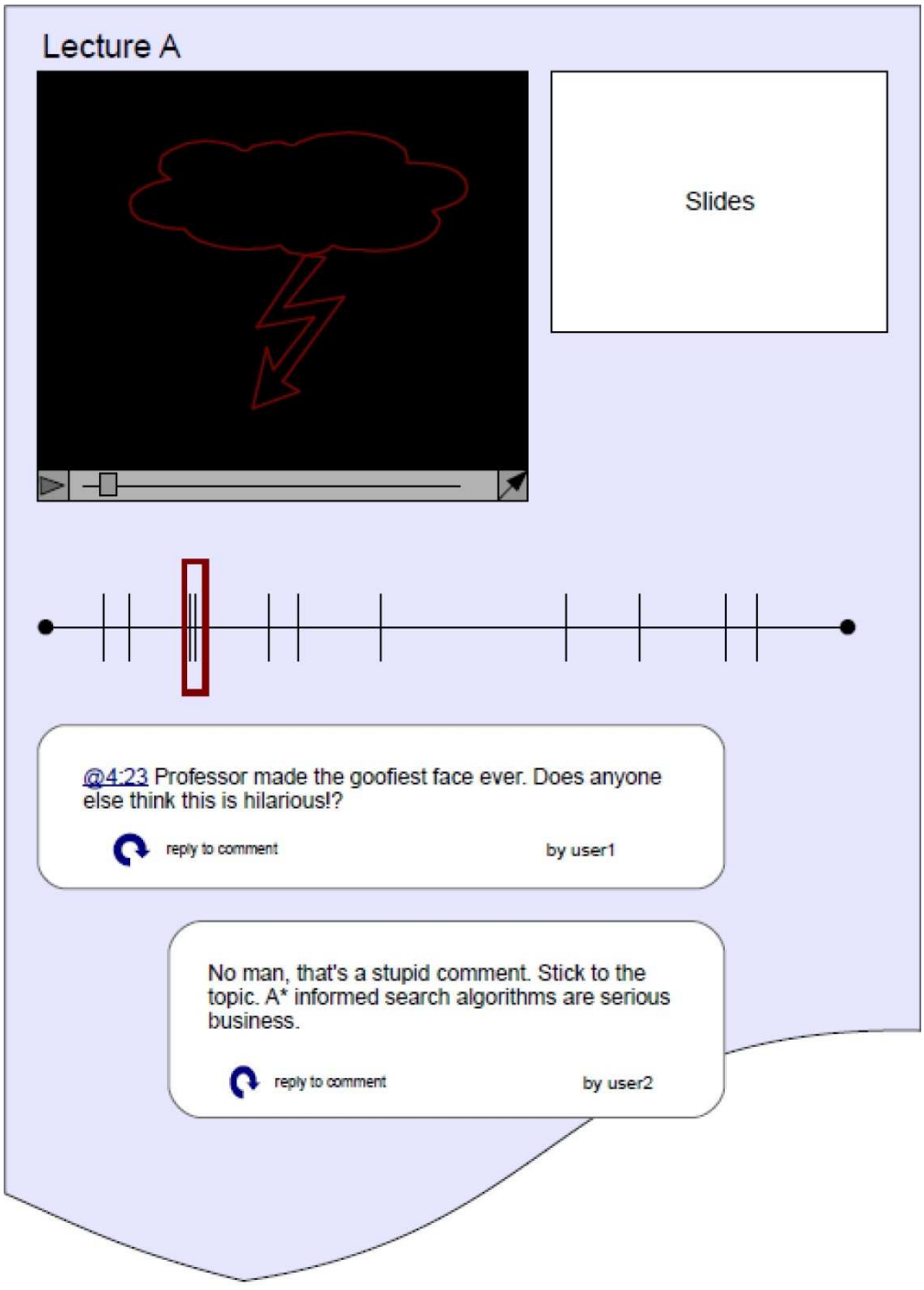
-6-

The problems that occur with IIT Online don't necesarily fall to the computer programs selected. Not being able to hear questions asked in classes, failure to follow professors when they move between sections of white boards, fuzzy pictures and slides, etc, are the problems with IIT Online. As an IPRO, maybe these things could be addressed as well.

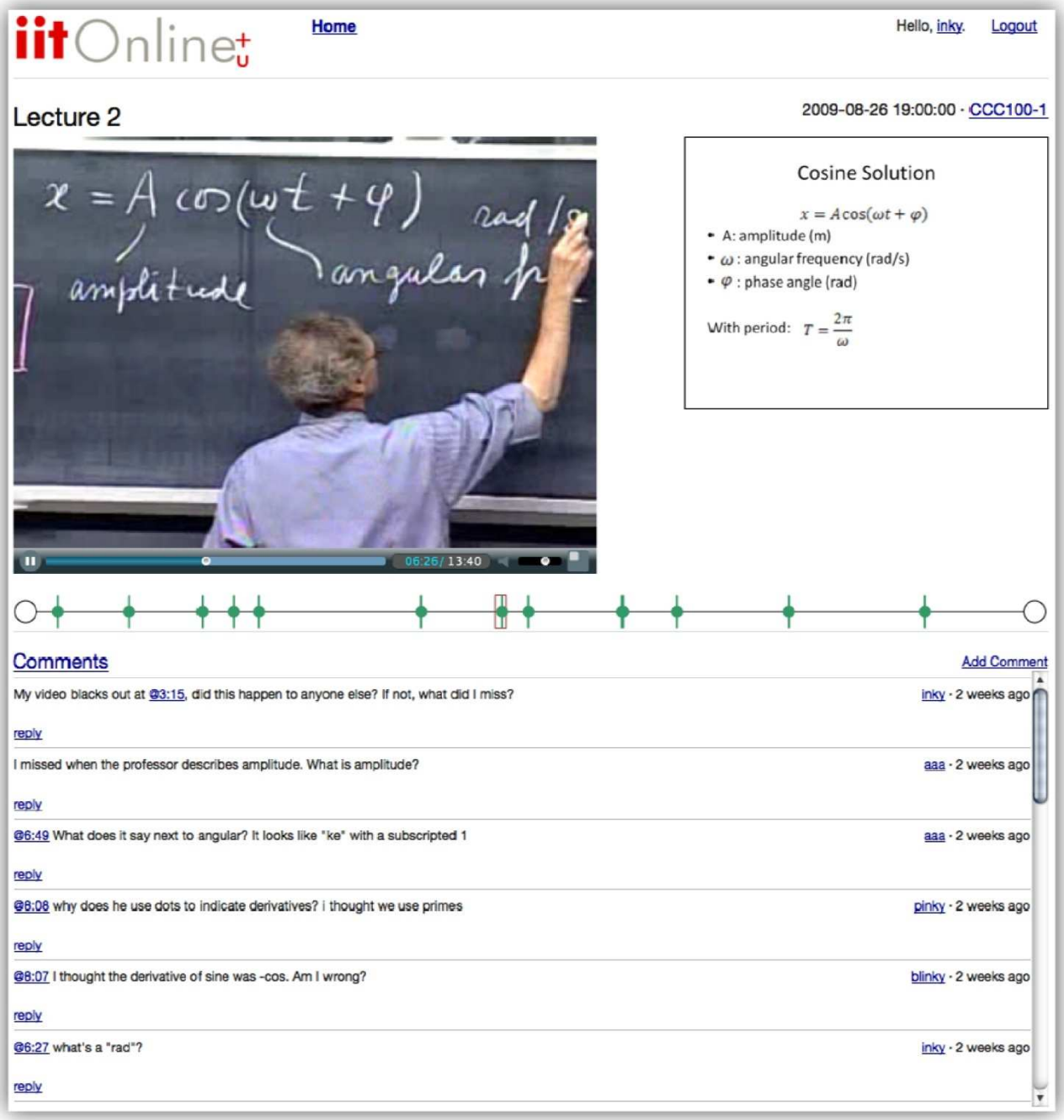
User Interface Flow Diagram



Initial Interface Mock-up



Prototype Interface



The prototype has not diverged far from the initial mock -up (Append ix II). The users are presented with a video and slides underscored by a comment timeline, allowing users to see that comments correlate with specific times in the video. Users can also leave comments that do not correlate to a time in the video.

Raw Data from User Testing

Table 1 – Pre-Survey Raw Data

What kind of student are you?	*Undergraduate*	*Graduate*	*Continuing Education*		
	8	8	0		
How often do you use the Blackboard *discussion* board?					
	3+ times/week	*1-2 times/week*	*1-2 times/month*	*1-2 times/semester*	*Never*
	6	1	1	2	6
Have you used the IIT Online system before?				*Yes*	*No*
				14	2
If so, how satisfied are you with the current system?					
Dissatisfied	*1*	*2*	*3*	*4*	*5*	*Satisfied*
	0	2	5	6	1	
Which of these video services have you used? (check all that apply)					
	YouTube	*Hulu*	*Vimeo*	*Break*	*DailyMotion*
	15	10	4	1	4
On which of these video services have you used the commenting functionality? (check all that apply)					
	YouTube	*Hulu*	*Vimeo*	*Break*	*DailyMotion*
	9	1	0	0	0

Table 2 – Post-Survey Raw Data

		1	*2*	*3*	*4*	*5*	
Please rate your overall experience with our system.							
	Poor	0	0	3	10	3	*Excellent*
	Difficult	0	0	0	8	8	*Easy*
	Frustrating	0	0	3	11	2	*Satisfying*
	Dull	0	0	7	7	2	*Stimulating*
How would you rate finding and watching videos?							
	Difficult	0	1	4	5	6	*Easy*
How would you rate reading and posting comments?							
	Difficult	0	1	3	7	5	*Easy*
How likely are you to remember how to perform these tasks in a month?							
	Unlikely	0	0	0	7	9	Likely
If you were given the option, how likely would you be to use our system instead of the existing IITOnline system?	*Unlikely*	0	1	3	5	7	*Likely*
If a tutorial describing how to use our system were provided, would you have seen a need to use it?							
	Unlikely	5	7	1	2	0	Likely