Project Title:

DIGITIZED LECTURE SYSTEM

## List of Group Members:

* 2016-CS-105
* 2016-CS-122
* 2016-CS-152
* 2016-CS-178

Abstract:

Digitized lecture system is a size efficient, bandwidth saving lecture recording system. It can record lecture, providing automated google search of handwritten words. Provides on the spot wiki. Lecture text notes can be generated automatically. Lecture can be named and divided into topics and subtopics automatically. According to a survey, 94% students go for online help of recently attended lectures because they can’t fully grab the concepts. Recorded lectures as video format require so much internet bandwidth to play. In most cases, large sized videos are difficult to handle or download. Because students mostly don’t have huge amount of extra space available especially for the CSE students, as they already use bulky software and also students don’t have large amount of bandwidth of internet available. Some highlights of the project are described as follow

1. In a typical classroom, more than half of students **cannot concentrate on lecture** due to jotting down the lecture. They can’t grab the concepts fully. They can’t even listen to the instructor properly while jotting down speedily. The students, that don’t note down lecture at all, face trouble in quizzes and exams. They have to manage to get lecture notes and all that stuff that their leading fellows have.
2. Many students don’t have a healthy internet connection to **stream the video live**. Live streaming requires a healthy internet connection. There is need to reduce bandwidth requirements of live video view.
3. Many educational institutions that implement the lecture recording system **rely on traditional video recording system.** Thus, a typical video of a 1-hour lecture takes space up to 3 Gigabyte. A typical student has 80 Gigabyte of free space in average. He cannot manage to download even some of the lectures to watch later. Storage is the problem for traditional lecture recording systems.
4. **Online lecturers and youtubers** have to record lecture in minimum space in orders to save their storage assets such as bandwidth and also their uploading and downloading time. There is also need to provide a uniform recording platform to the online lectures that make the lecture recording easy. Not only lecturers, it is the need of designers, animators and artists as well.
5. Many students especially back benchers **cannot fully read the handwriting of instructor**. They often stop the instructor in between the lecture and the flow of the lecture is disturbed. Many of them don’t stop the instructor at all. They use to ask their fellows to tell what exactly is written on the board.
6. Students when not fully grab a concept in the classroom then they try a **google search** for the word written on the board. Many students cannot do it because use of mobile phone is prohibited in a typical classroom. So, there is need to have an integrated google search embedded in the board.
7. Using artificial intelligence and machine learning, **Lecture notes can be generated automatically.** Lecture animation with subtitle and their explanation according to google is to be generated.
8. **Instructor can annotate** the video lectures. He can add subtitles, video timeline tags so that he can partition the lecture animation. Student can easily jump to the required topic and start watching the video.

Digitized Lecture System is an innovation and need of the hour because it is solving the basic problem of all students in society because it saves their time to note the lecture and they can concentrate on the topic completely. It is a readymade wiki. Implementing machine learning, system can recognize a hand drawn objects on whiteboard. Student can easily understand what is written on the white board. As most of the student lost their concentration while writing the detailed lecture. Moreover, sometimes we skip important part of our lecture in the effort of writing whole details on our notebook. So, digitized lecture system is leading-edge to solve all these Issues. It has some potential for having positive effect on student learning.

It will increase students learning ability because if they hear everything teacher say they can think about it clearly and understand it. The main advantage of the digitized lecture system is that it will also helpful for the students to get better grades even if they miss lectures. Moreover, teacher will get rid of repeating the lecture. So it will be icing on the cake. It is actually a real time lecturing system to provide easiness for the learners in the different location.

It resides in the domain of image processing and vision. By image processing, we can extract all the necessary data needed to get the exact results so it is undeniable that Digitized Lecture System will provide sample of benefits for the learners. Digitized lecture system will have online stream feature as well. It will require much less internet bandwidth as compared to regular video stream.

Brief Summary:

The motivation and purpose to do this project is to minimize the use of resources that are used in lecture systems now a days working in all over the world i.e. video lecture recording and streaming through internet. The first motivation is to deal with the large amount of storage that normally video lectures take. This system is not based on video recording but on recording the writing on the board with marker. It will record the position of the marker as the coordinates of board where marker touches and store it in the text file (which will later be converted and played like a video). This will take minimum amount of database storage to store this kind of data on a website. The second motivation to do this project is to use less internet resources for accessing the lectures. Normally the video lectures of different institutes worldwide are very large and to download those on the system through internet requires large amount of resources which are normally difficult for students to get and to download it in high quality even more resources are required. The lectures for recording are very low in memory as compared to normal video recording and will require very minimum resources to download on the system. The third motivation is for example a power failure occurred during the lecture and you cannot clearly see the board but teacher is still writing and erases the board after some time, this may result in not getting proper notes or missing the important point of lecture. Moreover, students can get benefit by seeing the lecture again and again if they missed any concept or if they were absent minded or not attending lecture. These few are the reasons which motivated us to do this project.

Digitized lecture system has the following modules.

* **Bandwidth Efficient Lecture Recording –** As compared to regular video recording, Digitized lecture system will have bandwidth efficiency of up to **100X**. Now lecture videos can be viewed can be viewed live on even extremely low-quality internet connection as well. All students far or close can attend lecture virtually. Also, it records the lecture as animation and provides the illusion of lecture video. The most valuable feature of this project is that no one have to change its routing work to engage with system.
* **HWR (Handwriting recognition) –** Handwritten lecture on the board can be recognized as sperate words. Lecture is readable to all students. Lecture keywords are now in regular text format and can be used for many purposes e.g. Google search.
* **Lecture Annotations and Auto Generated Text Notes–** Lecture notes can be generated automatically. Lecture is automatically divided in Topics and Subtopics. Lecture animations can be edited and annotated. Students can easily find the answer of their query in the lecture animation without scrolling and manual searching in the whole video.

In this system, whatever written on the white board can be recorded i.e. lectures as well as presentations of any kind and live streamed at up to 100X size efficiency, in a text file by storing the position of marker running on the board. Live stream can take place on an average internet connection, so even if the internet connection is not strong live stream can take place. Lecture frame is a framework that is sensitive to anything that is residing in its boundary. It includes Touch Frame, a pre-processing phase controller and software.

Using lecture frame, an ordinary white board will be turned into a touch surface. Anything written on White Board will be recorded and a lecture file which will be text file is generated as well as live streamed on network. Students that are not in the class can attend live lecture either on their laptops or can listen it later using lecture file which will be helpful in their exam’s preparation also.

Video output viewed by a student will be same as real video lecture (e.g. on Khan Academy). Everything written on the white board will be recorded and will be saved in the lecture file. Lecture file will be the text file have very low memory space. Whole lecture will be recorded and processed once after that we will make a compressed version of each frame and save the data in a text file which will decrease its size almost 100 times to minimize the use of memory. So, we can record many lectures and provide them to students without need of a database of petabytes size. So that students can save all the lectures within the small amount of the memory.

We will provide an application for students to view all the lectures easily. Student can get any lecture of any subject from this application. Students of other institutes can also get benefit from this application. It will be helpful for the learners at different locations. Environment of lecture frame will be different for each board we will setup that environment as it requires some software as well as hardware. All the measurements will be according to the board we are providing and on the basis of those measurements we will extract data from each image frame.

We will build it in such a way that it works efficiently in every situation and it will also easy to handle. This is advancement and improvement in lecture system currently used all over the world and will be a great help for students.

Possible Applications:

* **Educational Institutions:**

All the educational institutions can use it for the better learning of their students.

* **Online Tutorials:**

Online tutors can use it to upload their lectures on our application with a very low space and cost.

* **Business Presentation:**

Digitized Lecture System can also be used in the different companies to record the business related presentations that may be helpful in the future.

**Business Model**:

* B to B
* B to C

**B to B:**

Business to business model. Education institutions such as graduate colleges will buy it. VC or chairperson of department will pay for hardware.

**B to C**:

Business to customer model. Online lecturers and artists will pay as individual customers. Companies will also buy it for personal use.

# SWOT Analysis

## Strengths

* Digitized Lecture System is efficient up to that much extent that it can record Lecture with saving of storage up to a hundred times of typical Lecture Recording.
* Handwritten lecture on the board can be recognized as sperate words.
* Lecture is readable to all students. Lecture keywords are now in regular text format and can be used for many purposes e.g. Google search.
* Lecture notes can be generated automatically. Lecture is automatically divided in Topics and Subtopics.
* Lecture animations can be edited and annotated. Students can easily find the answer of their query in the lecture animation without scrolling and manual searching in the whole video
* It does not require a high bandwidth internet connection for online streaming, uploading and downloading of Lecture animations.
* It has fast, secure and easy to use software application.
* It will require cheap and easy to install, easily available hardware.
* Lecturer do not have to change his routine or to learn much to be use to with Digitized Lecture System.
* Students can focus on writing board and can note down the important points only that teacher has said.
* Digitized Lecture System will not have any negative impact to classroom environment as no one have to change his/her routine work much.

## Weakness

* Digitized Lecture System maybe a slightly inaccurate.
* Much Research maybe done before the actual implementation and development of the project.

## Opportunities

* Education institutions that do not use any technology to record Lectures.
* Education institutions that may be using the expensive or inefficient Technology.
* Online Lecturers and youtubers can record Lectures as animation and upload easily.
* Artists and Hobbyists can use Digitized Lecture System.
* Digitized Lecture System can be used as Motion Sensing Technology such as Mo-Cap.

## Threats

* Students can be lazy and sluggish.
* The ratio of absentees may be increased.
* Little or no face-to-face interaction and less coordination with instructor.