

Department of Computer Science and Engineering

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Senior Project 1

Standards and Constraints Assignment

Group 6

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1. **Introduction:**

In this report, we will present an overview and illustrative discussion on the engineering standards of the tools, technologies, and methodologies that we plan to integrate and implement in our senior project titled “ Classroom Monitoring Using AI ”. In addition to illustrating the constraints that we might have during the implementation and integration processes of the project, along with the proposed solutions and plans that can be implemented to overcome these constraints.

1. **Overview of The Used Engineering Standards:**
2. **Real Time Streaming Protocol (RTSP)**:

Integrating Real Time Streaming Protocol (RTSP) is a proposed solution in our project, since we are applying Computer Vision models to detect possible cheating incidents during examinations in classrooms. The idea of using this networking protocol is to stream the real time video that is broadcasted from a classroom to a central control room where it gets processed by the implemented model and the proctor is notified through a communication channel between the central control room and the classroom. RTSP is planned to be used since it offers multi-server capabilities where data can be received from different sources at a time, in addition to the streaming options such as play, pause, and record that can be also extended by the user.

Real Time Streaming Protocol (RTSP) Standard was maintained by Internet Engineering Task Force [IETF] under the standard number **RFC 2326** in April 1998.

1. **Standards for push notifications possible implementations**

Our design includes an important part which is push notifications for the invigilators to alert them of possible cheating incidents occurring in the exam hall. Since it is the last phase in our design, we are still unsure of what is the best method to do that. However, we have two possible methods to implement our push notifications design in our system architecture.

1. Email

One possible technique is Email. We can use the Email to alert proctors of a possible cheating incident that is happening in the room exam room.

The standard of using Email as our way to push notifications is **IETF RFC 821 “Simple Mail Transfer Protocol (SMTP)”.**

1. SMS

Another approach that we are considering is alerting the exam invigilators by sending SMS which was maintained by Internet Engineering Task Force “IETF” **RFC 5724 “Short Message Service or SMS messages standard”.**

1. **Standards for Cabling “Connecting centralized camera to control room”**

We have decided that we could use the Ethernet IEEE802.3 standard that defines the [physical layer](https://en.wikipedia.org/wiki/Physical_layer) and [data link layer](https://en.wikipedia.org/wiki/Data_link_layer)'s [media access control](https://en.wikipedia.org/wiki/Media_access_control) (MAC),of wired [Ethernet](https://en.wikipedia.org/wiki/Ethernet)..The standard has undergone many additions and the process is on-going. This enables the Ethernet standard to keep pace with current developments and remain a forerunner in the data communications and connectivity arenas.IEEE 802.3 working group, the standard is set to move forwards and keep up with the ever-increasing requirements placed upon it.

1. **Standards for Python “Programming language used in our model design”**

We are going to follow the best practices used by the tech community regarding the use of Python. Therefore we decided to go for **Python Enhancement Proposal 8, PEP 8,** as our guideline for writing Python code and enhancing its readability. According to PEP 8, naming conventions of types should be as follows, functions and methods should be a lowercase word or words separated by underscores, variables follow the same naming styles as functions however they can be a single letter as well. Constants follow the same naming styles as variables however constants have to be in upper case. Classes follow camel case style.

PEP 8 also recommends certain critereas for the layout of the code in order to make it more readable. The use of blank lines is really important in order to make the code look less overwhelming, however there also shouldn't be too much of it. According to PEP 8, we should surround top-level functions with two blank lines and method definitions inside classes with one blank line.

PEP 8 also stresses on the idea of adding comments to help the readers of the code understand it better. This can be in the form of block or inline comments. Block comments can be really useful when explaining a single action whereas inline comments are used more to explain a single statement. There are other important things that PEP 8 focuses on such as indentation, documentation, and programming recommendations.

1. **Overview of The Possible Constraints and proposed solutions:**
2. **Cost of the High Cost of Project Setup Including Security Camera and Storage:**

Since our project is based on detecting possible cheating incidents in classrooms using a video, the need for good quality video streaming is a high necessity. Thus, a high quality camera is needed to capture the video streaming in a classroom environment. Having a high quality security camera is a costly option for different users that might use our product in educational institutions. In order to tackle this problem, we have decided to choose a high quality security camera that we can control its output video quality and Frames per second to test it on different input streams of varying quality. To ensure that no matter the quality of the camera of potential customers they will have no issue with our product.

Furthermore, storing large amounts of video footage produced by the security camera takes a lot of storage space which results in high operating costs. To overcome this issue we are considering integrating efficient cloud storage such as AWS (Amazon S3) where data can efficiently and securely be stored at a lower cost than storing on physical storage.

1. **Class/hall size:**

Class size is a constraint on our project since we are intending to use one central camera for monitoring but if a class is so wide that it can't be caught by the camera then tracking these students would not be possible with a single camera. Also the depth of the room matters since the model at this point would not be able to characterise students so far back that are partially visible as people and even if it does then the model for detecting a possible instance of cheating would be constrained to the partially visible side of the student, affecting its accuracy.

1. **Getting permission to film actual classroom settings:**

If we want to test our software in real classrooms during actual exams in schools, we might end up needing to ask permission from the students’ parents so that they could allow us to film their kids since they are legally responsible for them if they are less than 18 years old. Seeking permissions from parents may be difficult since it might take time or some parents might refuse. If we are not able to get the permissions, we can try our best to mimic a school’s classroom environment during an exam.