

## SCAMS - Smart Campus System

The university is going to build a smart campus system (SCAMS) to make the university smart. In 2019, the system is for the lecture halls, to control the doors, lights, fans, sound systems, projectors, and camera automatically based on the room schedule and the detecting of human.

For the schedule of the rooms, this system (SCAMS) can access to the Room Management Service (ROMS) of the university by calling the provided web services such as

<i>Schedule</i> <b>get_room_schedule</b> ( <i>room_id, date</i> )	<i>Return the schedule of the room in a particular date, which contains list of 24 hours with the occupancy information.</i>
<i>bool</i> <b>update_room_schedule</b> ( <i>room_id, date, Schedule</i> )	<i>Update the schedule into the ROMS with the Schedule of the room. Used for registering a booking.</i>

We have to provide a web application and a mobile application for everyone in the university, including lecturers, students, staffs, and guesses. The user can easily search for the schedule of any room and the direction to that room. Moreover, the system will allow the lecturers to book a room if it is free directly on the web application or mobile application.

The system has to make sure that the doors of a room will be opened and its electrical devices such as lights, sound system, fans, projectors will be turned on automatically 15 minutes before the beginning of the lecture, if they are off. The electrical devices will be off and the doors will be closed after the end of the lecture and after the last person left the room if there is no next lecture in the same room. A sound will be alarmed at if there is still some person in the room after the closed hour of the university (around 9:00 PM).

The security staffs can still access to any room using their key cards and turn any light on or off through the mobile app or (control) pannel attached to each room, corridor and building.

To detect human, the camera signals and the human detector signals will be sent to an external AI service provided by the ABC company. The AI service is as follows.

<i>int</i> <b>get_human_in_area</b> ( <i>video_footage, sensor_data</i> )	<i>Return the number of person in the area based on a video footage and the human detector data, all of them are at least 30 seconds.</i>
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To reduce the used energy, at the night, the lights in corridors will be turned on only for human or when the rooms in that area are in used.

Reports about the usage of the electrical devices (working hours, etc.) of a room, a level of a building, a building and the whole campus within a period (day, week, month, year, date to date) can be seen at any time. A monthly report will be generated and sent automatically to the Admin and the Board of Rectors via email.

**1. Team & teamwork**

- a. Teams are formed freely by students.
- b. Each team member has to perform all works, including requirement specification, architectural design and detail design.
- c. At the end of the semester, team members have to give feedback to each others and evaluation the individual and team performance

**2. Team meeting & meeting minutes**

- a. Team meetings should be carried out one a week
- b. The first meeting should be focus on the team communication, commitment, common problems/risks and solving mechanisms ...
- c. Meeting minutes are used to keep track of all works.
- d. The first meeting minutes should be handed to the lecturer on week 3

**3. Submissions**

- a. There are 04 individual documents:
  - i. #1- requirement document: Functional/Non-Functional requirement and Use-case diagram.
  - ii. #2- requirement document: Sequence/Activity or State-chart diagrams
  - iii. #3-design document: Architectural design
  - iv. #4-design document: Class and Method design, Class diagram, a demonstration.
- b. All submissions are in .pdf format.
- c. Deadlines will be announced on the course e-learning site.

**4. Submission #1 detail**

Students have to submit the following contents:

- Functional requirements:
  - + Use-case diagram for the whole system (group work)
  - + Use-case detail/scenario for use-case the student is in-charged
  - + Other non-interactive functional requirement (bonus)
- Non-functional requirements:
  - + General non-functional requirements for the whole system (group work)
  - + Other non-functional requirements the student is in-charged
- Use-case diagram

**5. Submission #2 detail**

Students have to submit the following contents:

- Sequence diagrams:
- Activity diagrams:
- State-chart diagrams

**6. Submission #3 detail**

Students have to submit the following contents:

- Deployment view (group work)
- Development/Implementation view (individual work)

(references: <https://sites.google.com/site/softwarearchitectureinpractice/9-documenting-software-architecture/d-allocation-views/a-deployment-view>)

**7. Submission #4 detail**

Students have to submit the following contents by only 01 pdf file:

- Module interface: programming interfaces use among modules
- Class diagram
- Method descriptions: for all methods in the class diagram
- Sequence diagram: at least one diagram at detail level to explain how your system work (a sequence of interactions by calling methods)
- Activity or state-chart diagram: at detail level to explain how your system work
- (Bonus) Design pattern: show how some design patterns have been applied to your design
- A working demonstration (by sequence of screens)