IDAT7219 Smart Building Technology

http://ibse.hk/IDAT7219/

Assignment 01 – Basic Principles of Smart Building Technology (2023-2024)

A smart building is a structure based on advanced digital and control technologies that uses hardware, software, and connectivity to manage HVAC (heating, ventilation & air-conditioning), lighting, security and other building services systems so as to create a comfortable and safe environment for occupants. Smart building technology can be used to monitor, analyse, and optimise the way buildings run in order to enhance productivity, efficiency, safety and sustainability.

Objective

To develop a better understanding of the basic principles and application skills of smart building technology.

Methodology

This assignment is intended to strengthen what you have learned during the lectures, by investigating the related topics further and by relating your learning to practical situations. Students are recommended to apply the knowledge and information obtained from the lectures to critically evaluate the applications in real life.

The University of Hong Kong is planning to apply smart building technology for the following building complex at the main campus to enhance its building performance. As the specialist consultant of the project, you are required to study the feasibility and provide professional advice to the client on the planning process, design strategies, and important considerations.

HKU Graduate House 香港大學研究生堂https://www.gradhse.hku.hk/

The HKU Graduate House, completed in March 1998, was awarded a Silver Medal - the highest recognition of architectural design excellence by the Hong Kong Institute of Architects. It is a composite building consisting of a residential complex, a conference centre and an amenities centre. The residential complex offers accommodation to full-time postgraduate students from all over the world. It has 188 single rooms, all of which have a

bathroom shared between the adjacent rooms and 9 double rooms with private bathrooms for married students without children. The amenities centre houses the Postgraduate Hub, the Graduate School Office and other sub-offices of the University. The conference centre consists of Wang Gungwu Lecture Hall and two seminar rooms. Further information about the building design can be found on the following websites.

Case Studies on Sustainable Buildings - HKU Graduate House
http://ibse.hk/sbe/case_study/case/hk/graduate/graduate.htm

Project information from Rocco Design Architects:
https://www.rocco.hk/?lang=en&view=projects,all&p=graduate-house-the-university-of-hong-kong

Figure 1. Location map of HKU Graduate House (source: http://hk.centamap.com/)

You should carefully study the building characteristics and users' requirements in order to develop the planning and design of smart building technology to be applied to the project and evaluate the key success factors. Essential assumptions can be made for the project to develop the necessary information and facilitate the selection and design of appropriate technologies and configuration within a reasonable budget.

Report Submission

Each student shall prepare a technical report of not more than twenty (20) A4 pages to explain the findings of the investigation in a systematic and logical manner. The contents of the report shall address the following aspects. Other important issues may also be included.

(a) Basic concepts and principles of smart building technology to be applied to the project
(b) Key technologies and major components proposed for the building
(c) Building automation and control system suggested with description of the key features
(d) Appropriate techniques and strategies for enhancing the building performance and quality
(e) Important considerations for the design and operation of the smart building technology

Detailed calculations and technical information are not required, but essential data, diagrams and illustration are useful to effectively present the findings and enhance the understanding. If appropriate, a list of references and proper citations should be provided to avoid plagiarism.

The report shall be submitted in electronic PDF format. The assessment criteria of the report include quality of the content, organization, clarity of thought, and report writing skills. The report will be evaluated on synthesis of information during the course and from your own reading/study, and evidence that you have thought about the subject and the lecture topics in some depth. A clear structure and a logical argument is important and you should provide evidence of critical thinking, originality and effective writing.

Useful References

Bakker R., 2020. *Smart Buildings: Technology and the Design of the Built Environment*, RIBA Publishing.

Bali M., Half D. A., Polle D. & Spitz J., 2018. *Smart Building Design: Conception, Planning, Realization, and Operation*, Birkhauser.

Dodson K. R. & Kincaid B., 2022. *The Guide to Smart Building Technologies*, Cisco. https://www.cisco.com/c/en/us/solutions/collateral/nb-06-smart-building-technologies-guide.pdf

Habibi S., 2020. *Building Automation and Digital Technologies*, Woodhead Publishing, Cambridge, MA & Kidlington, UK.

HKGBC, 2021. *Hong Kong Smart Green Building Design Best Practice Guidebook*, Hong Kong Green Building Council Limited (HKGBC). https://www.hkgbc.org.hk/eng/resources/publications/Files/HKGBC_Smart-Green-Building-Design-Best-Practice-Guidebook.pdf

Hu M., 2021. *Smart Technologies and Design for Healthy Built Environments*, Springer, Cham, Switzerland.

Jadhav N. Y., 2016. *Green and Smart Buildings Advanced Technology Options*, Springer, Singapore.

Sinopoli J., 2016. *Advanced Technology for Smart Buildings*, Artech House, Boston.