Design of a Learning Support System with the Application of Wifi-Based Multimedia

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Abstract: One of the impacts caused by the COVID-19 outbreak is the disruption of the teaching and learning process, both in schools and campuses. The learning process shifts from offline implementation to online implementation. Various obstacles faced in the implementation of online teaching. One of the obstacles faced is the difficulty in guiding practice. The development of multimedia and network technology has a very important role in supporting online learning. For teaching materials in the form of theories or explanations of concepts, it can be done using computer media with online video facilities. For teaching material in the form of practice requires supervision and guidance so that the implementation of online learning is more difficult to do. Practical learning for each field of knowledge/skills is different in terms of the equipment used, the place of implementation and the mechanism for implementing the practice. Some forms of practice such as computer networks, computer installations, electrical installations, and practices that can be carried out independently but need supervision and guidance, require a system that can support the implementation of the practice. A support service that can assist in monitoring, and guiding the implementation of the practice is needed.

1 INTRODUCTION

Video streaming is very popularly applied as one of the multimedia uses. Video data is sent through distribution media in the form of wired or wireless networks. The width of the video data transmission path is large enough that it requires settings in the distribution of the data.

The application of video streaming is often used in the fields of security and entertainment. In the field of security, video data processing is developed with the addition of artificial intelligence methods. In the entertainment sector, there are two ways to handle video data, namely broadcast transmission and pair to pair transmission.

In this study, pair to pair transmission is used but involves more than one client which can be selected through the application in the host unit (lecturer).

2 RELATED WORK

Video streaming is widely used in various applications. Various methods are used to optimize data transmission. Ryzki researched by implementing The Real Time Streaming Protocol (RTSP) method is used as a way of distributing video data (Ryzki, 2020).

In addition, it is also applied to online meetings or seminars. Distribution media in the form of wireless networks are used for long-distance communication. Shafqat Ur Rehman (Shafqat, 2011) researched by combining multicast data video straming and wireless network The application of Multicast Video Streaming over WiFi Networks is one of the applications of video data distribution through wireless network media.

Several other studies that use wireless for distributing data video streaming in interesting implementation multimedia aplication.

3 METHODOLOGY

SDLC is a methodology regarding software development, this model is known as the waterfall model or software life cycle. The principal stages of the model is illustrated in Figure 1 (Ian Sommerville, 2010).

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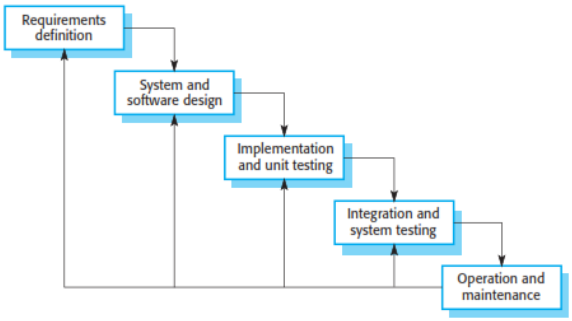

Figure 1: The Software Life cycle.

Five fundamental development activities:

1. *Requirements Analysis and Definition.* Consultation with system users is needed to obtain system's services, constraints and goals. Then it is stated in detailed system specifications.
2. *System and Software Design.* The System design includes hardware and software design and relationships.
3. *Implementation and Unit Testing.* Software design is realized as a set of programs or program units.
4. *Integration and System Testing.* The Application (individual program units or programs) are tested as a complete system.
5. *Operation and Maintenance.* The system is installed and put into practical use.

The advantages of the waterfall model are that documentation is produced at each phase and that it fits with other engineering process models.

4 DESIGN SYSTEM

4.1 Unit Requirement

The elements involved in this practical learning support system are lecturers and students as practitioners. The mechanism used is to build equipment which is grouped into two.

The first group, known as the host unit, functions to regulate and monitor the practice process. The system used is a computer connected to a wifi/internet network and a web-based application as the host application.

The second group is the client unit consisting of a camera, microphone and call button. client unit is used by students / practitioners whose function is to send video data and establish interaction with the host computer.

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4.3 Architecture System

The device architecture needed in the designed system can be seen in Figure 2. The architecture of the practical learning support system with the application of multimedia describes the equipment or units and the relationship between the equipment in the system.

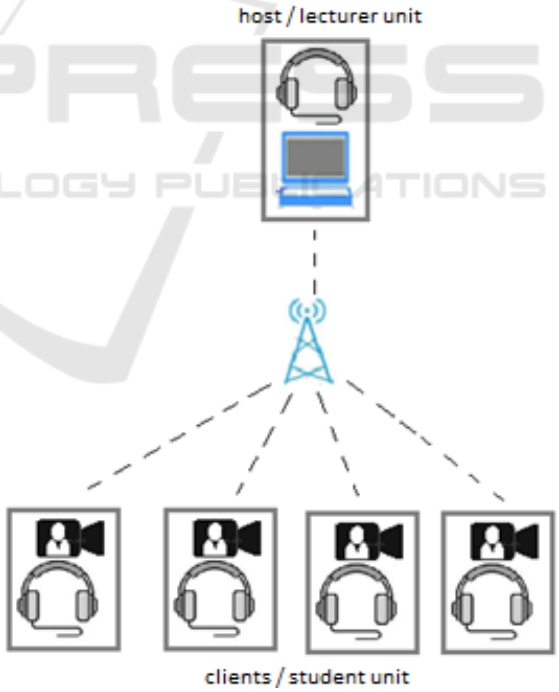

Figure 2: Practical Learning Support System Architecture.

This application involves equipment in the form of computers supported by wifi network facilities, as well as camera units and sound support. Software development consists of two important parts, namely software on the host computer and software on the

microcontroller unit (client). This application provides practical management services, video viewing, host-client interaction services

4.4 Use Case Diagram System

This section contains an explanation of who and what can be done in the system. There are two actors in this application, namely the Lecturer as an administrative manager with the main activity of Student Management, Activity Monitoring and Interaction.

The second actor is the Student, that can interact with lecturer via camera and sound device.

Learning Support System provide facilities to monitoring and interact between lecturer and students. Use Case Diagram System can be seen in Figure 3.

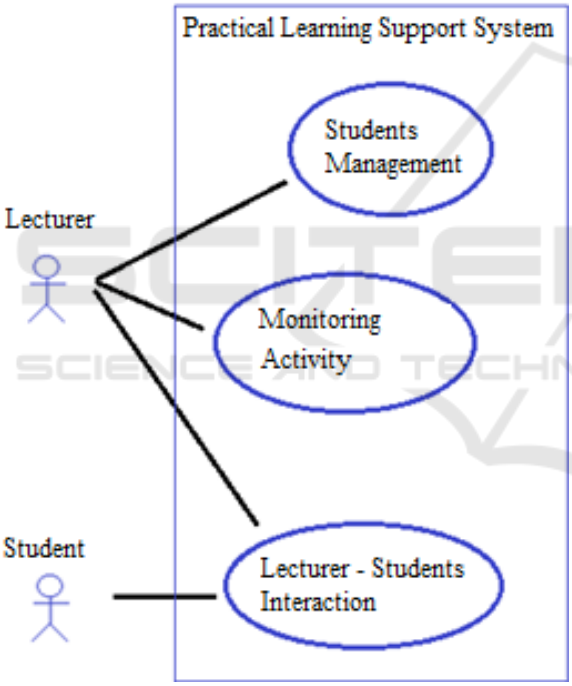

Figure 3: Use Case Diagram System.

4.5 Microcontroller Unit

The design of the flow and processing of information is carried out to prepare the interface and functions for data processing. Figure 4 shows the equipment architecture of a microcontroller unit connected to a wifi network.

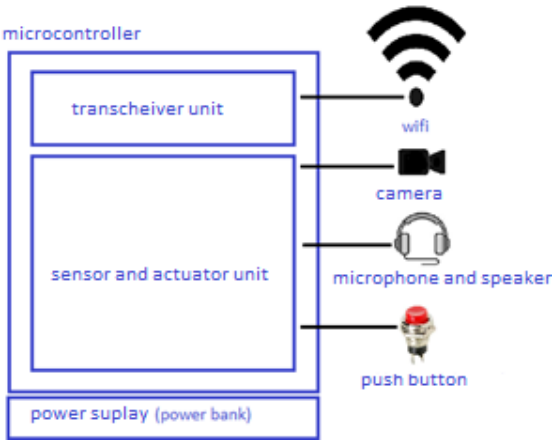

Figure 4: Equipment Architecture of a Microcontroller.

4.6 Result and Discussion

The design of a practical learning support system with the application of multimedia can be implemented into a programming language and test the system functions using the black box method.

The selection of Practitioners (students) can run well and with a video display from the camera placed on the headset.

The videos are shown according to the IP of each practitioner. The interaction between the host (teacher) and the client (student) can run well.

Figure 5 shows the display on the host computer (lecturer). The application on the host computer displays the results of sending video data from one of the clients according to the selection on the host computer application display.

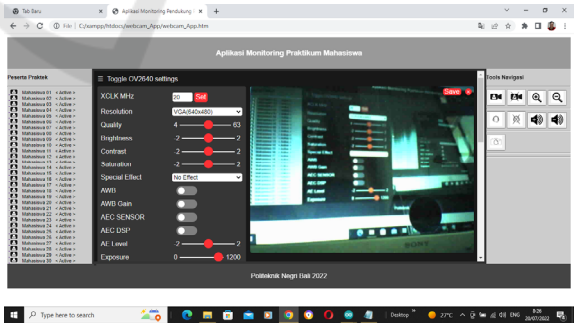

Figure 5: host computer application (lecturer).

5 CONCLUSIONS

The design of a practical learning support system with the application of wifi-based multimedia is divided into two groups, namely the host unit as a supervisor and regulates the course of the practicum

and the client unit (student) which functions to send information in the form of video to the host unit.

This application can run well and provide convenience in managing practice on campus. Lecturers can provide direction to students without having to be close to the practitioner, but can still interact well. Students can interact with lecturers and can move freely without being obstructed by cables as video connectors.

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