Design of IoT-based Telemonitoring System for Network Engineering Course Learning based on Information Technology

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Abstract. Courses related to internet networks need to be updated according to technological developments. In this research, an IoT-based telemonitoring system was designed and implemented that is directly integrated with the learning system at the Sriwijaya State Polytechnic. The IoT device design in this research uses the NodemMCU ESP32 microcontroller and the DHT11 Temperature and Humidity Sensor. The IoT platform chosen is Blynk. The job-sheet for student practice is designed similar to what is done in this research, from hardware design untill website integration design from the IoT cloud to a specific website. The result of this research is an IoT-based telemonitoring system that is integrated with the learning website. The test results show that this system runs as it should. The practical application can be viewed in https://p3ai.polsri.ac.id/pengembangan_pembelajaran/project-1/

Keywords: Internet of Things, ESP32, Sensor DHT11, Arduino IDE, html.

1. Introduction

The learning content of courses related to internet networks needs to be updated in accordance with technological developments. In this research, one course was chosen, namely Information Technology-based Network Engineering, to be designed into a learning model that will include IoT as one of its study materials. Students must be equipped with theory and direct practice practically and efficiently with a limited number of learning hours. In this research, an IoT-based telemonitoring system was designed and implemented that was directly integrated with the learning system at the Sriwijaya State Polytechnic. The scope of this study includes the Design of a learning website that contains IoT practices, network design that supports IoT device connectivity, network topology, selection of communication protocols such as MQTT or CoAP, and selection and use of the IoT Platform. The security side is limited to restricting access to certain menus and does not discuss the implementation of encryption, device authentication, and threat detection systems.

N. L. Husni et al. (eds.), *Proceedings of the 8th FIRST 2024 International Conference on Global Innovations (FIRST-ESCSI 2024)*, Advances in Engineering Research 261,
https://doi.org/10.2991/978-94-6463-678-9_32

2. Design System

The architectural design of the IoT device in this research uses the NodemMCU ESP32 microcontroller and the DHT11 Temperature and Humidity Sensor, where the ESP32 WiFi feature is used as communication to the cloud using communication protocols such as MQTT and CoAP. The ESP32 microcontroller is programmed through the Arduino IDE software, then the device circuit is connected by the monitoring/IoT software to see the results of the simulation carried out.

Referring to previous research [1], based on the research they have done, the efficiency of several types of temperature sensors is very efficient, where the temperature difference between the IoT monitoring display of the design results and the direct measurement results is only 0.07oC. So in this study, only 1 type of temperature sensor was tried, namely DHT11 with the initial hypothesis that its efficiency is very good, but the main purpose of this study is not towards testing sensor efficiency but rather the integration of the monitoring system with the course learning system, and the ease of students in practicing learning.

On the software side, in addition to programming the system on the microcontroller using the Arduino IDE, a learning website design was also carried out that was integrated with this telemonitoring project. The practical design for students was made in a Job-Sheet, which is similar to what was done in this study. So students are expected to be able to design hardware and software from IoT-based networks, including integrating them with certain website pages other than the IoT cloud website used.

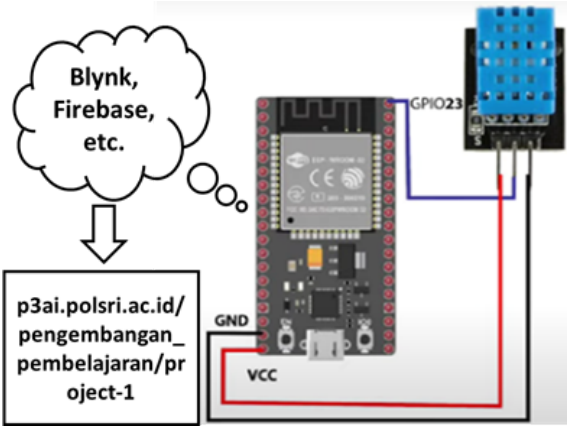

Fig. 1. System Design with Monitoring Object in the Form of Temperature

On the cloud side, the IoT Platform was chosen which is quite easy for students to work on. In previous research [2], it was stated that the Blynk application is highly recommended to a smart system in everyday life because of the practical and easy way to use it via a smartphone. In terms of the design of a learning website that is integrated with the telemonitoring system, the website is designed using html, and in the job-sheet students must also be able to design something similar.

3. Current Result

The result of the interim design is that the telemonitoring system is running as it should. Likewise with the results of the design and implementation of a learning website that is integrated with the telemonitoring system. The results of the learning system website design are temporarily placed at the URL address of the Sriwijaya State Polytechnic at the address:

https://p3ai.polsri.ac.id/pengembangan_pembelajaran/project-1/

Fig. 2. Integration of Telemonitoring System into Course Learning

4. Conclusion

The result of this research is an IoT-based telemonitoring system integrated with a learning website. The test results show that this system runs as it should.

Authors' Contributions

Contribution to the authors is desain and implementate integration of a telemonitoring system into course system.

Acknowledgments

Thank you to all parties who have contributed directly or indirectly to this research up to the writing of this proceedings article.

Thanks also to the Head of the Learning Development Center - Sriwijaya State Polytechnic who has allowed us to place this integrated system on the sub-section page of the p3ai.polsri.ac.id website. Thanks also to the Network Manager at Sriwijaya State Polytechnic who gave access rights to the Learning Development

Center in managing the p3ai.polsri.ac.id website.

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