# Internet of Things (IoT) Training at PU Nurul Jadid Islamic Boarding School

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**Abstract—** IoT is the next evolution of the Internet and has the potential to drastically transform both life and industries. A new era is about to begin, where everyday objects will soon be equipped with connectivity to the Internet, allowing these objects to transmit and receive data without human interaction. Some factors hindering students in implementing IoT include high costs, security issues, incompatibility with old systems, complex systems, and a lack of human resources understanding IoT. In general, it can be said that the IoT ecosystem has not yet been fully established, both in the educational world to prepare human resources and in the industry, which is still hesitant to enter IoT while considering many factors mentioned above.

In the context of this Community Service Program (KKN), efforts are made to bridge the knowledge needs in the field of IoT, especially at the student level in Pondok Pesantren Nurul Jadid, by providing training through an IoT Trainer Kit. This is expected to lay the foundations of IoT technology needed to initiate IoT development. The training covers IoT solutions, including basics for hardware (sensors) at the student level in Pondok Pesantren Nurul Jadid to create new IoT solutions. The results of this community service show that students at Pondok Pesantren Nurul Jadid can effectively use the IoT trainer, from assembling hardware, understanding sensors to producing targeted training module outputs.

**Keywords—** *Training; Islamic Boarding School*

## 1   Introduction

Pondok Pesantren Nurul Jadid (PPNJ) is a partner in this service program. PPNJ is an Islamic educational institution located in a rural area that caters to students

from various social and economic backgrounds. PPNJ has a vision to provide quality education to students so that they become a skilled and competitive generation in facing future challenges.

One of the problems faced by PPNJ is lagging behind in the understanding and application of the Internet of Things (IoT) among their students. PPNJ realizes that the development of IoT technology is very important in this digital era, but their students do not have enough understanding and skills in this regard. Here is a more detailed overview of the problems faced by PPNJ:

1. Limited Knowledge: Students at PPNJ have limited access to advanced technologies such as IoT. They have a minimal understanding of IoT concepts, the devices involved, and their benefits in everyday life.
2. Limited Practical Skills: PPNJ students lack practical experience in designing, assembling, and operating IoT devices. They do not have the opportunity to develop the necessary technical skills.
3. Relevance of Education: The development of IoT technology is an integral part of today's technological developments. However, the PPNJ curriculum has not fully integrated lessons about IoT, so students have not been well exposed to these issues
4. Untapped Creative Potential: Students have untapped creative potential in developing IoT solutions that are beneficial to their environment. Limited knowledge and resources have hindered the development of their innovative ideas

This dedication program aims to address these issues by providing comprehensive IoT training and accessibility to the necessary hardware and educational support. Through this effort, PPNJ hopes to prepare their students better to face the ever-evolving world of technology.

## 2    Method

The following is the implementation matrix for the Community Service (PKM) program which aims to strengthen Internet of Things (IoT) skills at Nurul Jadid Islamic Boarding School: PKM Program Implementation Matrix - Strengthening IoT Skills at PPNJ

**Table 1.**    . Example table

| Stages of Activities | Who Is Involved | Achievement Indicators | Implementation Time |
|---|---|---|---|
| | . | . Survey of student needs related to IoT | . |
| | | - Available device documentation | |

| | | | |
|---|---|---|---|
| Identify Needs | PKM Team, PPNJ Staff | - Interview with PPNJ teaching staff<br><br>- IoT needs plan and training<br><br>- Define training goals | August 2023 |
| Program Design | PKM Team, PPNJ Staff | IoT training curriculum design<br><br>- Creation of training materials<br><br>- Preparation of training devices<br><br>- Training scheduling | September 2023 |
| Training Implementation | PKM Team, PPNJ Staff, Santr | - Trainee attendance<br><br>- Evaluation of participation and understanding<br><br>Students on training materials<br><br>- Practical skill level of students | Oct-Sept 2023 |
| Evaluation and Monitoring | PKM Team, PPNJ Staff | Evaluation of program implementation<br><br>- Feedback from PPNJ students and staff<br><br>- Program improvements if needed | November 2023 |

| Preparation of Final Report | PKM Team | - Final report on program implementation | December 2023 |
|---|---|---|---|
| | | -Documentation of training results | |
| | | - Evaluation results and recommendations | |

The implementation matrix above provides an overview of the stages of PKM program activities, who is involved in each stage, achievement indicators that will be used to measure the success of the program, and the estimated implementation time of each stage. With this matrix, you can monitor and manage PKM programs more structured and efficient.

## 3 RESULTS AND DISCUSSION

### 3.1 Result

In this research, IoT training was conducted for students at Nurul Jadid Islamic Boarding School. This training uses IoT Trainer Kit which consists of hardware and software. The hardware used is like Arduino UNO, DHT11 sensor, and PIR sensor. The software used is Arduino IDE. This training is divided into several modules, namely:
1.  Module 1: Introduction to IoT
    Trainees are given an introduction to IoT, starting from its history, concepts, technology, and benefits. Trainees are also given an understanding of the role of IoT in everyday life and industry.
2.  Module 2: Hardware Assembly
    Trainees were given material on IoT hardware assembly. Trainees are taught to assemble IoT hardware, ranging from Arduino UNO, sensors, and other electronic components.
3.  Module 3: Sensor Recognition
    Trainees were given material on IoT sensor recognition. Trainees are taught about the types of IoT sensors, how IoT sensors work, and the use of IoT sensors.
4.  Module 4: IoT Programming
    The training was given material on IoT programming. Trainees are taught about IoT programming languages, how to write IoT programs, and how to debug IoT programs

The results of this training show that trainees can use IoT Trainer Kit well. Trainees can assemble IoT hardware, get familiar with IoT sensors, and write IoT programs

## 3.2 Discussion

This training uses IoT Trainer Kit which is an affordable and easy to use device. This IoT Trainer Kit can be used to learn the basics of IoT, from hardware assembly, sensor recognition, to IoT programming.

The results of this training show that trainees can use IoT Trainer Kit well. Trainees can assemble IoT hardware, get familiar with IoT sensors, and write IoT programs. This shows that this training successfully achieved its goal. There are several factors that contribute to the success of this training, namely:

1. Affordable and easy-to-use use IoT Trainer Kit
2. Training materials that are arranged systematically and relevant to the needs of trainees
3. Training methods that are interactive and actively involve trainees

IoT training for students at Nurul Jadid Islamic Boarding School is one of the efforts to increase student's interest and skills in the IoT field. With this training, it is hoped that students can become human resources who are ready to face the IoT era.

Based on the results of this study, several recommendations can be given, namely the need for continuous IoT training for students at various levels of education. It is also necessary to develop IoT training modules that are more specific and by the needs of trainees.

## 4 Closing

Based on the results of research that has been conducted, it can be concluded that IoT training for students at Nurul Jadid Islamic Boarding School has succeeded in achieving its goals. Trainees can use IoT Trainer Kit well, from hardware assembly, sensor recognition, to IoT programming. IoT training for students at Nurul Jadid Islamic Boarding School has positive implications for several parties, namely:

1. **Student**
   This training can improve learners' knowledge and skills in the IoT field. By having knowledge and skills in the field of IoT, students can become human resources who are ready to face the IoT era.
2. **Islamic Boarding School**
   This training can improve the quality of education at Nurul Jadid Islamic Boarding School. With this training, Islamic boarding schools can produce graduates who have knowledge and skills in the IoT field.
3. **Community**
   This training can increase public awareness about the importance of IoT technology. With this training, people can take advantage of IoT technology to improve their quality of life

This study has some limitations, namely that this study was only conducted for two months, so the time available for training was limited. And the number of

samples used in this study is limited, so the results of this study cannot be generalized.

Based on these limitations, several recommendations can be given, namely:

1. It is necessary to conduct continuous IoT training for students at various levels of education.
2. It is necessary to develop IoT training modules that are more specific and by the needs of trainees.
3. Further research needs to be done to assess the effectiveness of IoT training for students.

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