



# Implementation of Appropriate Technology for Bird Pest Removal to Replace Scarecrow with Solar Cell Based on Internet of Thing at Usaha Tani Mandiri Kertapati Palembang

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**Abstract.** There are several ways to increase rice production, in order to meet the ever-increasing food needs. Every effort is made to improve, however, there are always many disturbances in the form of abiotic and biotic stresses. Abiotic stresses such as drought, flood or poisoning. While biotic is the attack of pests and diseases, such as rats, leafhoppers, birds and so on. One of the causes of disturbance to rice plants is bird pests. The attack of the group of bondol birds has disturbed the farmers a lot. Control by farmers is usually mechanical by using tools that can be used to repel birds. However, the tools used are still manual which requires energy and is quite time-consuming. Usually given scarecrows and also sound repellent with makeshift materials, but still get results that are not effective. With these problems, this appropriate technology is expected to help solve problems that occur due to bird attacks just before the harvest season so that rice production is not disturbed. Control of this bird repellent will be displayed in the blynk application if our android is connected to the internet network. The initial process of this pest repellent is to activate the tool button next to the box panel, then the buzzer will sound 1 time, after that press the on button on 1 blynk, the wiper motor on the scarecrow will rotate, the speaker will make a loud sound and the device hardware will work properly.

**Keywords:** Blynk Application · Electronic Components · MIT App · Sensor and Transducer · Internet of Thing

## 1 Introduction

Indonesia is known as an agricultural country that is blessed with abundant natural wealth. One of Indonesia's abundant natural resources is in the agricultural sector. Data from the Central Statistics Agency in 2017 the area of rice fields in Indonesia is 8 million hectares. In terms of production, agriculture is the second most influential sector on economic growth, after the manufacturing industry.

Around 90% of the Indonesian population uses rice as a staple food because rice can contribute 40–80% of calories and 45–55% of protein. The contribution of rice in

fulfilling these nutritional needs is even greater in the low-income population [1, 2]. Thus the importance of the need for rice, from year to year it always increases in line with the increase in population. While rice production has not been able to meet the needs of the community, this is caused by several obstacles including an increase in the population of weeds that grow tightly, pests and diseases that are difficult to control and the use of fertilizers that have not been efficient which then has an impact on decreasing productivity [3].

Control by farmers is usually mechanical by using tools that can be used to repel birds. However, the tools used are still manual which requires energy and is quite time-consuming. Usually given scarecrows and also sound repellent with makeshift materials, but still get results that are not effective.

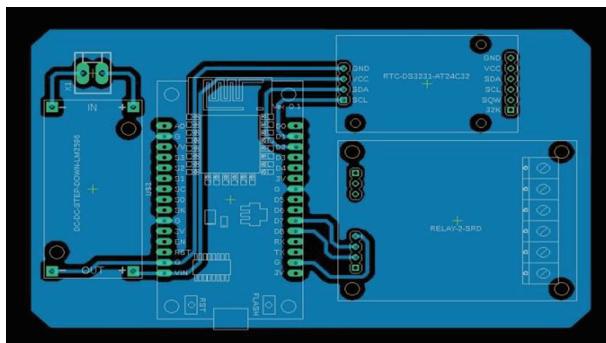
With these problems, this appropriate technology is expected to help solve problems that occur due to bird attacks just before the harvest season so that rice production is not disturbed. From these problems, technological assistance is needed called the Internet of things. Internet of things is a concept or program where an object has the ability to transmit or transmit data over a network without using the help of computers and humans. The development of IoT can be seen from the level of convergence of wireless technology, micro electro mechanical, internet, and QR (Quick Responses) Code. IoT is also often identified with RFID (Radio Frequency Identification) as a communication method, and is also assisted by solar cells as a power store to keep electronic circuits on. So with the Internet of Things technology, it can speed up the process of setting the length of drying salted fish, so as to increase production yields.

The virtue of this research is to assist and design and test Appropriate Technology for Bird Repellents to Replace Scarecrows with solar cells based on the Internet of Thing at Kertapati Palembang Mandiri Tani Enterprises, which will be determined by setting the Communication and Information Data model. So the system designed here is to detect, manage/control remotely with the IoT system, so that the automatic selection or setting system that is set in the IoT device can be properly selected, then calculations will also be used using binary logic 0 and 1 for the percentage. Input data output. With these problems, this appropriate technology is expected to help solve problems that occur due to bird attacks just before the harvest season so that rice production is not disturbed. Control of this bird repellent will be displayed in the blynk application if our android is connected to the internet network.

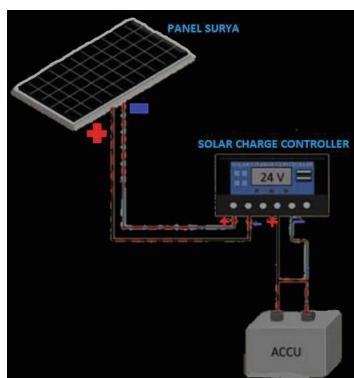
The initial process of this pest repellent is to activate the tool button next to the box panel, then the buzzer will sound 1 time, after that press the on button on 1 blynk, the wiper motor on the scarecrow will rotate, the speaker will make a loud sound and the device hardware will work properly. Based on the test results above, it can be concluded that the voltage distribution from the battery source and solar cell to supply each component is good and stable enough to meet the working system of the tool. This voltage measurement uses a digital multimeter and a digital oscilloscope, with a source voltage of 12 V.

## 2 Design System

This paper, for design is an important stage in the manufacture of an electronic device but before designing the workpiece, first prepare a good plan in order to obtain satisfactory



**Fig. 1.** Component layout



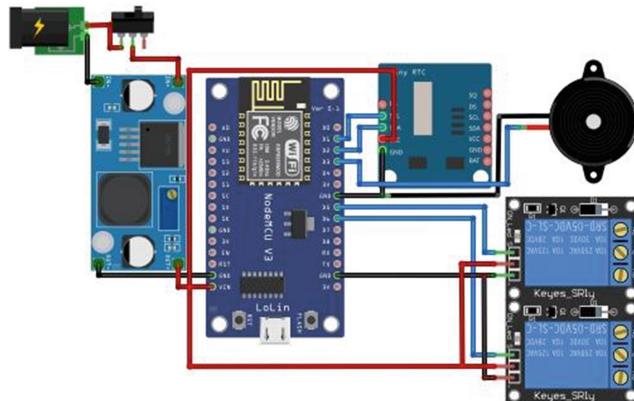
**Fig. 2.** Design from Schematic for solarcell

results. This is intended as an initial understanding of the tool or workpiece, both in terms of the circuit work system and the use of the tool and the required components.

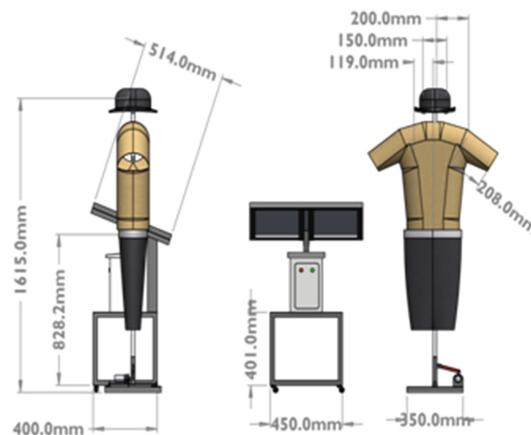
Furthermore, for the layout design stage, the thing that must be considered is the layout and sketch of the circuit that will be made in such a way and efficiently on the layout so that it does not take up too much space. The image below is a layout design, more details will be shown in the (Fig. 1).

A circuit schematic is a circuit that describes a circuit using electrical symbols. In the schematic diagram, the electrical symbols are connected by lines that describe the connections and relationships of the electrical components in the circuit. By using a schematic diagram, the workings of an electrical system can be observed from the input to the output. In this picture is a schematic design of a series of midges, more details will be shown in the figure below.

Design of this Internet of Things-Based Bird Repellent Tool has a working principle that can control rice fields or even in drying rice for automatic bird eviction (Fig. 2). Control of this bird repellent will be displayed in the blynk application if our android is connected to the internet network (Fig. 3). The source of this tool is the battery and solar cell as the power to drive the tool. The initial process for this midge is to activate



**Fig. 3.** Schematic circuit bird pest to replace scarecrows based on IoT



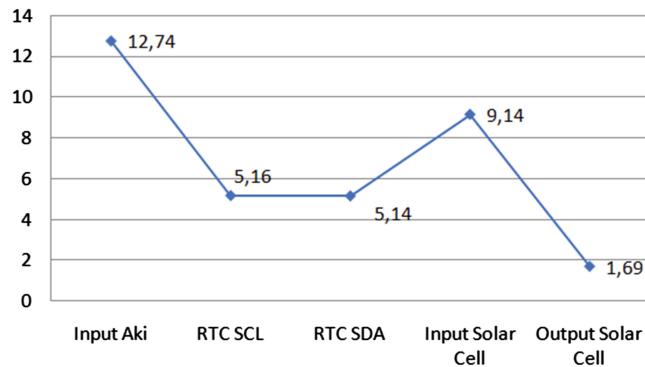
**Fig. 4.** Design bird repellent

the tool button next to the box panel, then the buzzer will sound 1 time, after that press the on button on the blynk, the wiper motor on the scarecrow will rotate, the speaker makes a loud sound, and hardware devices running as it should.

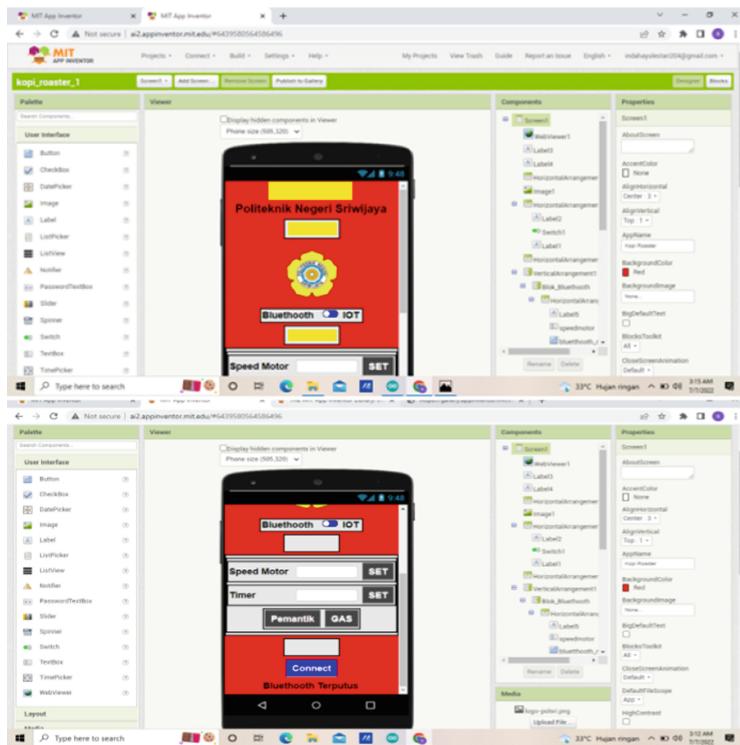
### 3 Current Result

For the function of the appearance of the MIT application that will be made, such as the results of software designs made by researchers, with the name “Politeknik Negeri Sriwijaya” (Fig. 4). If you have given a name then click “OK” and a screen like the one below will appear. Below is a view of the MIT App Inventor that is ready to use (Fig. 5) (Fig. 6).

The battery used is 12 V, by using this type of power supply the output voltage obtained will be more stable. The source of this tool is the battery and solar cell as the



**Fig. 5.** Result measuring point of component voltage on the battery



**Fig. 6.** View MIT Application is ready to use

power to drive the tool. The initial process of this pest repellent is to activate the tool button next to the box panel, then the buzzer will sound 1 time, after that press the on button on the blynk, turn on the tool via the blynk application that is already connected to the internet network, after that the wiper motor on the scarecrow the fields will rotate, the speakers make a loud sound, and the hardware devices work as they should.

## 4 Conclusion

The working principle of this pest repellent is that it can control the rice field area or even in the drying of rice for automatic bird expulsion. Control can be done via android using the “Blynk” application. The NodeMCU microcontroller is the main component in the design of this tool. The NodeMCU is supported by a WiFi connection which is used to connect the wiper motor and speaker module to the internet network. After that, the NodeMCU will command the blynk application to receive data.

## References

1. F.N. Aroeboesman, M.H.H. Ichsan, R. Primananda, “Analisis kinerja LoRa SX1278 menggunakan topologi star berdasarkan jarak dan besar data pada WSN”, Jurnal Pengembangan Teknologi Informasi dan Ilmu Komputer Vol. 3 No. 4 (JPTIIK), Jan. 2019.
2. Akbar, Muhammad Firly,”Pemanfaatan Sensor Mq-135 Sebagai Monitoring Kualitas Udara Pada Aula Gedung Fasilkom”.2021.
3. Sholihin, Eka Susanti, “Humanoid Robot Control System Balance Dance Indonesia and Reader Filters Using Complementary Angle Value”, E3S Web of Conferences 31, 2018.
4. Sholihin, Eka Susanti, A. A. Pramudita and M. M. Rose, “MIMO antenna with cross polarisation printed yagi elements for MIMO router”, Proc. 2017 3rd International Conference on Wireless and Telematics (ICWT) Palembang Indonesia, pp. 65–69, July 2017.
5. Eka susanti, Rosita febriani, Sholihin, Eka susanti, Emilia hesti, 2018, The design of hand gesture robot software based on wireless technology, IEEE conferences ICOIACT 2018, Indonesia, p.p 401 – 406.
6. Eka Susanti, \*, Ica Admirani, Romi Wilza, Irawan Hadi, Sholihin Sholihin,” Automation of The Palembang Semage Fabric Yarn Spinner”, Proceedings of the 5th FIRST T1 T2 2021 International Conference (FIRST-T1-T2 2021).
7. Suzanzefi, Eka Susanti \*, Sholihin Sholihin, M. Zakuan Agung, R.A Halimahtussa’diyah,” Innovation Technology of Lekor Dough Mixer Based Internet of Thing”, Proceedings of the 5th FIRST T1 T2 2021 International Conference (FIRST-T1-T2 2021).
8. Emilia Hesti Sholihin, Sarjana,” Coffee Groping Control System using tcs 3200 Sensor Based on xbee”, Journal of Physics: Conference Series, Volume 1167,2019.
9. Amira fakhirah Emilia Hesti, Sholihin, Adewasti, Sarjana,” Internet of thing for the commando Robot Command System”, Journal of Physics, IOP publishing ltd, Volume 1500,2020.
10. Emilia Hesti, Adewasti, Rosita Febriani, Sholihin, Eka Susanti,” Xbee pro module application in to organize and monitoring earthquake disaster location with the robot control system”, International Conference on Information and Communication Technology (ICOIACT) 2018, page 651 – 655, 2018.

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