International Journal of Psychological Rehabilitation, Vol.24, Issue 2, 2020
ISSN: 1475-7192

Home Security System 4.0 Addition Uses Radio Frequency Waves

Parlindungan[1], Ucu Nugraha2,

Abstract: *In this study the authors will only limit the problems in assembly, communication devices using RF modules, MQTT connections, web sockets and database analysis. The simulation is carried out with a model of a house with tools that will be controlled by a "Full" system. "(Radio frequency (RF) based home automation system IoT) has been successfully carried out, but for applications in the field certainly requires further research by adding parameters outside the scope of our research. Security systems are able to improve systems and can be controlled remotely, while the number of users and use of electrical devices can be monitored directly through the server in the form of cloud computing.*

Keywords: *security system, radio frequency, server*

I. INTRODUCTION

Home automation system (home automation / domotic) or commonly called smarthome is a system integration to control and automate home devices such as lighting, heating, ventilation, air conditioning (HVAC), and security, as well as household appliances such as washing machines, ovens or cabinets ice, CCTV, alarms, door locks, sensors and much more. The purpose of the home automation system is to provide convenience, energy efficiency, security, and comfort to the occupants of the house wherever and whenever they want. At present, the popularity of home automation systems is a rapidly developing technological trend. This is marked by the number of companies engaged in this field such as Google home, Control4, Crestron, AMX, knx, dynalite, etc. [1]

Although there are many competing vendors, there are only a few industry standards that are accepted throughout the world, most researchers conduct simple home automation systems with components available. This is due to the reliability and performance of the system as well as the high cost of home automation system products from vendors. The task of the Interfacing I and Network Security I courses this time is to create a simple home automation system that we call "Control". "Controls" can turn on or turn off different electrical equipment. There are many ways to implement this control system, including ZigBee, Bluetooth, Wi-Fi, Radio Frequency (RF Module), GSM etc. In this task, "Full" integrates Radio Frequency (RF Module), Arduino and ESP based on cloud computing (Internet of Things / IoT). [2] [3]

II. PROCESS

The scope of this task is to simulate an IoT radio frequency (RF) based home automation system. In this simulation, we include a model house and a set of devices can be controlled with a "Full" system. "Control" consists of relay switches and sensors connected to a central hub (gateway) where the system is controlled with a web-based interface that interacts with devices via cloud computing. "Full" will make it easy for homeowners to access their homes via smart phones and tablets connected to the internet [4].

With extensive use of smartphones and tablets, IoT is perhaps the best choice for implementing home automation. In addition, the use of RF Modules in "Control" is an innovation to facilitate the performance of automation systems in homes with electrical network installations or devices that are already installed without having to overhaul or change existing networks. [5]

1 [1)2)] Information System , Faculty of Engineering
Widyatama University, Bandung
[1)]parlindungan.mt@widyatama.ac.id, [2)] ucu.nugraha@widyatama.ac.id

The purpose of this assignment is to apply knowledge from Interfacing I and Network Security I in daily life. Especially related to the problems that surround the author, especially in the IoT trend and the concept of home automation. The benefit of this research is that it is an innovation in the application of IoT radio frequency-based home automation which is still relatively little done in Indonesia. The target of this research is a house with electrical installations and devices that are already installed but want to be controlled remotely without changing existing installations or devices [6]

III. DESIGN INTERFACE

Component requirements in this study consist of several components, namely: ESP 8266 - 12 MCU Nodes V.3 ESP 8266 is a development module derived from the IoT (Internet of Things) platform module ESP 8266 type ESP-12 family. The function of this module is almost similar to the Arduino module platform, but what distinguishes ESP is its superiority to internet connections that do not require additional modules.

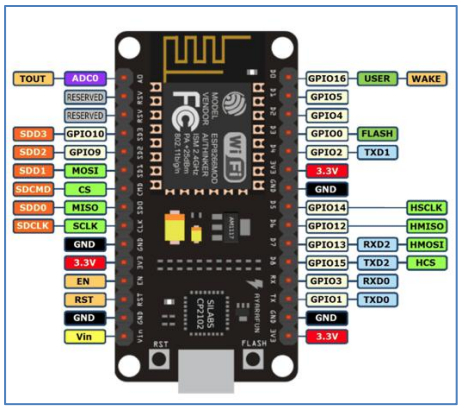


Figure 1. ESP 8266 with Pin Descriptions.

- **nRF24L01**

The nRF24L01 Wireless Module is a remote communication module that utilizes the 2.4GHz ISM (Industrial, Scientific and Medical) RF band. This module uses the SPI interface to communicate. The working voltage of this module is 5V DC. nRF24L01 has baseband logic Enhanced ShockBurst ™ hardware protocol accelerator that supports "high-speed SPI interface for the application controller". nRF24L01 has a true ULP solution, which allows battery life for months to years. This module can be used for the manufacture of PC peripherals, game devices, fitness and sports devices, children's toys and other tools.

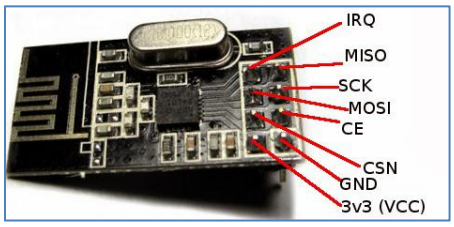


Figure 2. nRF24L01 with Pin Description.

- Arduino Nano

Arduino Nano is a variant of Arduino microcontroller board products. Arduino Nano is the smallest Arduino board, using the Atmega 328 microcontroller for Arduino Nano 3.x and Atmega168 for Arduino Nano 2.x. This variant has the same set as the Arduino Duemilanove type, but with different PCB sizes and designs. Arduino Nano is not equipped with a power socket, but

there are pins for external power supply or can use a power supply from a mini USB port. Arduino Nano is designed and manufactured by Gravitech.

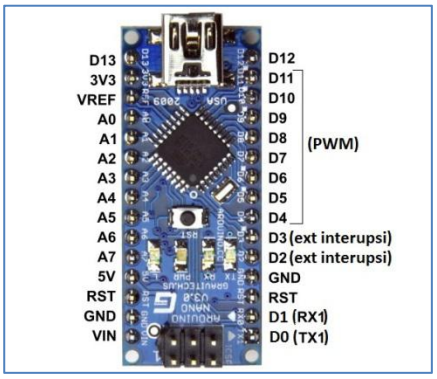


Figure 3. Arduino Nano with Pin Descriptions

- ***Relay Switch***

Relay switch is a type of switch that works based on electromagnetism to move a number of arranged contactors which are controlled from other electronic circuits by utilizing electric power as its energy source. The contactor will be closed or open due to the effect of the magnetic induction generated by the inductor coil which is powered by an electric current

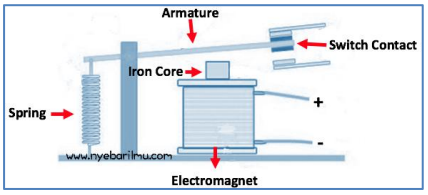


Figure 4. Relay Switch Component Illustration

In the picture above it can be seen that an iron core is wrapped around a coil of coil. If the coil has an electric current, an electromagnetic force will arise. From the electromagnetic force can pull the armature to change position with a spring holder, so that contact occurs where the initial conditions are closed (Normally Close / NC) will be open (Normally Open / NO). The difference with the switch is the contactor movement on the switch for on or off conditions is done manually without the need for electric current while the relay requires electric current. In this task, the author uses 8 channel relay modules.

figure 5. Relay Switch Module 8 Channel

- Breadboard

Project Board or often referred to as Bread Board is the basis of the construction of an electronic circuit and is a prototype of an electronic circuit. This aliasless solder board does not require soldering so it can be reused, and as such can be used for temporary prototypes and helps in experimenting the design of electronic circuits. Various electronic systems can be prototyped using breadboards, ranging from small analog and digital circuits to making centralized processing units (CPUs).

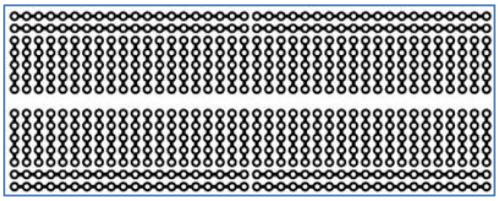


Figure 6. Illustration of Bread Board Pathway

Two pairs of upper and lower lanes are connected horizontally to the middle of the breadboard. Usually this path is used as a power path or signal path that is commonly used such as a clock or communication line. Five component holes in the middle is a place for component assembly. The middle border of the breadboard is usually used as a place to plug the IC components

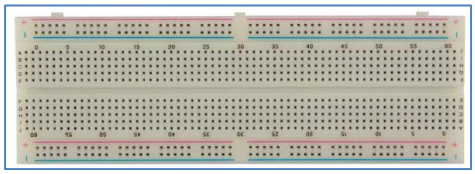


Figure 7. Bread Board Components

DHT11 Temperature + Humidity Sensor

The temperature and humidity sensor DHT11 is a sensor module with calibrated digital signal output. The advantages of the DHT11 sensor compared to others include having a very good data reading quality, being responsive (fast in reading room conditions), and not easily intervened. Each DHT11 sensor has a feature for calibration that is quite accurate. The calibration coefficient is stored in the OTP program memory, an internal sensor detects a signal in a process that can be called a calibration coefficient. This sensor has four legs, namely VCC, Data, NC, and GND pins.

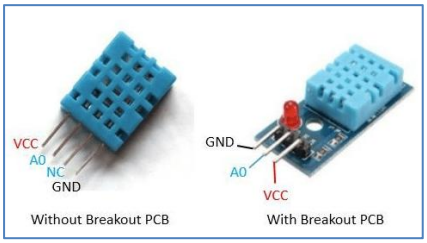


Figure 8. DHT Module 11 With Description of Pi

- **Adapters**

The adapter is one of the DC voltage sources that we often encounter in household devices. The use of these adapters is as a source of laptop voltage and other electronic devices. The adapter is a device that serves to reduce the AC AC voltage from 220 volts then convert it to a DC voltage. Therefore the adapter is often referred to or named by the term AC DC Adapter

Figure 9. Adapter Components

- Resistor

Resistors are electronic components that are designed to regulate electrical voltage and electric current, with certain resistance (resistors) Resistors are used as part of electronic circuits and electronic circuits and are one of the most frequently used components. The size and location of the foot depends on the circuit design, the resistor's power requirements must be sufficient and adjusted to the current needs of the circuit so it does not burn. In this task 2 pieces of 10 ohm resistor and 1 330 ohm resistor are needed.

Figure 10. Resistor Components

- Buzzer

Buzzer is an electronic component that functions to convert electrical vibrations into sound vibrations. Basically the working principle of the buzzer is almost the same as the loud speaker, so the buzzer also consists of a coil mounted on the diaphragm and then the coil is flowed so that it becomes an electromagnet, the coil will be attracted in or out, depending on the direction of the current and the magnetic polarity, because the coil mounted on the diaphragm then each movement of the coil will move the diaphragm back and forth so that it makes air vibrate which will produce sound. Buzzer is usually used as an indicator that the process has been completed or an error has occurred in a device (alarm).

Figure 10. buzzer Components

- LED lights

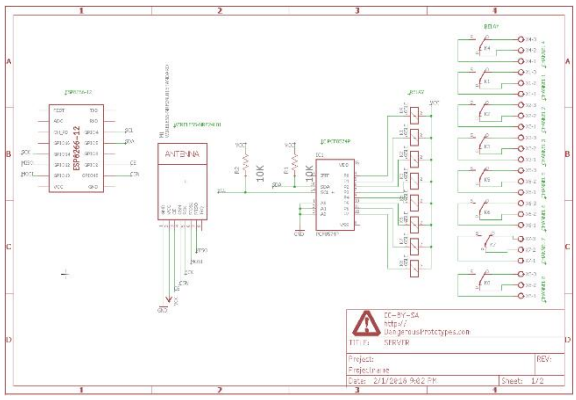
LED (Light Emitting Diode) is an electronic component that can emit monochromatic light when given a forward voltage. LEDs are a family of diodes made of semiconductor materials. The colors of the light emitted by the LED depend on the type of semiconductor material used. LEDs can also emit infrared rays that are not visible to the eyes as we often see on remote controls.

LEDlights

LED (Light Emitting Diode) lights are electronic components that can emit monochromatic light when applied forward voltage. LED is a family of diodes made of semiconductor materials. The colors of the light emitted by the LED depend on the type of semiconductor material used. LEDs can also emit infrared rays that are not visible to the eye as we often encounter on the remote control. The shape of an LED is similar to a bulb (light bulb) that is small and can be easily attached to various

electronic devices. Unlike incandescent lamps, LEDs do not require burning of filaments so they do not cause heat to produce light.

I. DESIGN METHOD



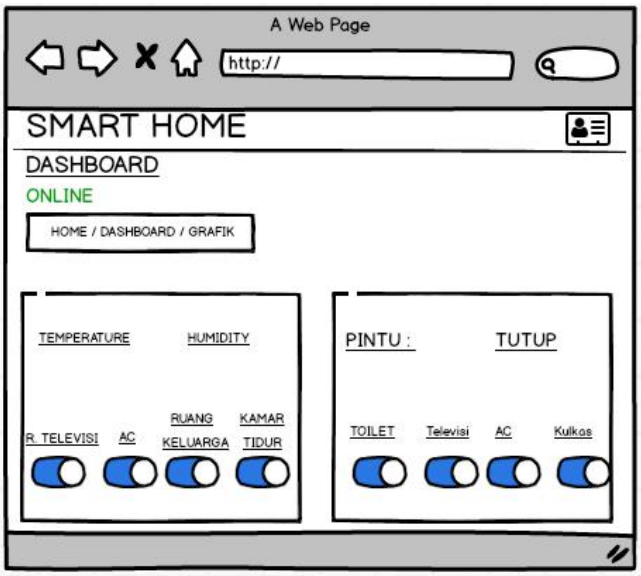


Figure 11. design interface

IV. IMPLEMENTATION SYSTEM

- Header: consists of a label (title) and a picturebox containing a user profile picture).
- Dashboard Frame: consists of a text (dashboard), a listbox that contains the status of a web connection with the device and a combobox that contains a selection of pages (home / dashboard / graphics)
- Node 1 Frame: 4 labels (equipment list), 2 listboxes (which contain temperature and humidity value sensors) and 4 switch boxes.
- Node 2 Frame: 4 labels (equipment list), 2 listboxes (which contain temperature and humidity value sensors) and 4 switch boxes.

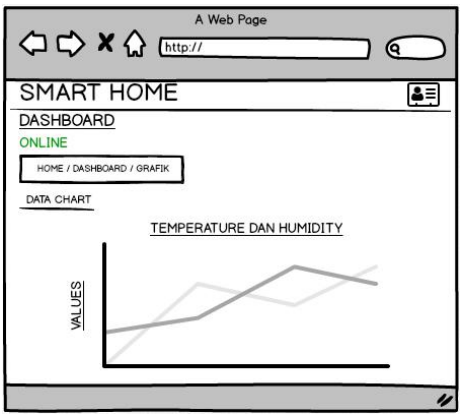


Figure 12. design Adapter Components

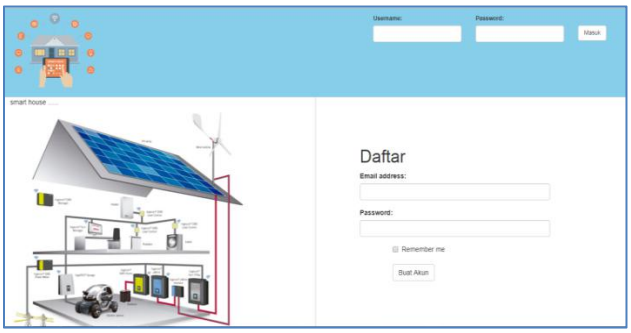


Figure 13. Mock Up User Interface Page 3

Header: consists of a label (title) and a picturebox containing a user profile picture). Dashboard Frame: consists of a text (dashboard), a listbox that contains the status of a web connection with the device and a combobox that contains a selection of pages (home / dashboard / graphics). Data Frame: 3 labels (data chart, values, temperature & humidity) as well as a graphic (which contains data fluctuations from temperature and humidity values).

V. CONCLUSION

The assembly process is carried out from the hardware preparation stage according to the scheme and uploading the software into Arduino and ESP. Load components are connected by relay to the node and then connected to Arduino and RF Module using jumper cables. The ESP, Buzzer and RF Module components are also connected using jumper cables. The power of these components is connected through the adapter module and 9 volt adapter. The components are assembled and then arranged into a model that has been made before.

Distance control system provides an extension to the user to check and provide safety with no senses of the human rights and its privacy and its private relationship with the mud and human resources and through the private relationship and there is a restaurant in the private and own prosperous, and there is a restaurant and there is a religion to the authority of the private vocational school and the accuracy of the organization in the private vocational school and the private relationship and family members. Further suggestions for research are the features of this package can not be installed only at home but can be integrated for vehicles.

VI. REFERENCE:

[1] ASHRAE Handbook, "HVAC Systems and Equipment," in *American Society of Heating, Refrigerating, and Air nditioning Engineers*, Atlanta, 1996, pp. 1-10.

[2] Sherin C Abraham, "Internet of Things (IoT) with Cloud Computing and Machine-to-Machine(M2M) Communication," *ernational Journal of Emerging Trends in Science and Technology,* 2017.

[3] A. N. Shewale; J. P. Bari, "Renewable Energy Based Home Automation System Using ZigBee," 2015.

[4] Prakash, G., Darbandi, M., Gafar, N., Jabarullah, N.H., & Jalali, M.R. (2019) A New Design of 2-Bit Universal Shift gister Using Rotated Majority Gate Based on Quantum-Dot Cellular Automata Technology, *International Journal of oretical Physics,* https://doi.org/10.1007/s10773-019-04181-w.

[5] Ahmed ElShafee; Karim Alaa Hamed, "Design and Implementation of a WiFi Based Home Automation System," in *rld Academy of Science, Engineering and Technology* , 2012.

[6] Satish Palaniappan;Naveen Hariharan;Naren T Kesh;Vidhyalakshimi S;Angel Deborah S, "Home Automation Systems - Study," *International Journal of Computer Applications (0975 – 8887),* vol. 116, no. 11, 2015.