

*Research Article*

## Arduino Based Automatic Ornamental Fish Feeding Intelligent System

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### Abstract

Fish feeding is one of the most important things for the fish farming business in ponds and aquariums. Currently, feeding generally still depends on manual human resources. Therefore, a tool is designed to provide fish feed that can work automatically based on time and schedule. Ornamental Fish Feeder. In Automatic Aquarium is an intelligent system that aims to facilitate feeding so that when fish keepers have a fairly dense activity and find it difficult when going to leave the house for a long time, the fish will remain awake in the process of feeding. The system designed has 5 hardware parts, namely microcontrollers using RTC (Real Time Clock) time parameters, Arduino as a process, DC motor (Direct Current) as output condition and LCD (Liquid Crystal Display) as user interface and monitoring, Desktop 9v as a voltage source. By using the components of the tool above and some software that supports the running of the tool, the automatic feeding of fish can work according to a schedule that can be set automatically. Scheduling fish feed is given at 13.30-13.35; the Servo Motor will dispense fish feed 2 times using 3 grams of pellets.

**Keywords:** Fish Feed Tool, Arduino Uno, RTC DS3231, Servo Motor

### Abstrak

Pemberian pakan ikan merupakan salah hal yang sangat penting untuk usaha budidaya ikan di kolam dan aquarium. Saat ini pemberian pakan umumnya masih tergantung pada sumber daya manusia yang bersifat manual, oleh karena itu dirancang alat untuk memberikan pakan ikan yang dapat bekerja secara otomatis berdasarkan waktu dan jadwal. Pemberi Pakan Ikan Hias Di Aquarium Secara Otomatis merupakan sistem cerdas yang bertujuan untuk mempermudah dalam pemberian pakannya, sehingga ketika pemelihara ikan memiliki kesibukan yang cukup padat dan merasa kesulitan ketika akan pergi meninggalkan rumah dalam waktu yang cukup lama, maka ikan akan tetap terjaga dalam proses pemberian pakannya. Sistem yang dirancang ada 5 bagian hardware yaitu mikrokontroler menggunakan parameter waktu RTC (Real Time Clock), arduino sebagai proses, motor DC (Direct Current) sebagai kondisi output dan LCD (Liquid Crystal Display) sebagai user interface dan monitoring, Desktop 9v sebagai sumber tegangan. Dengan menggunakan komponen-komponen alat diatas serta beberapa software yang mendukung berjalannya alat, maka pemberian pakan ikan secara otomatis dapat bekerja sesuai dengan penjadwalan yang bisa diatur dengan secara otomatis. Penjadwalan pakan ikan di berikan waktu jam 13.30-13.35, Motor Servo akan mengeluarkan 2 kali pakan ikan dengan menggunakan 3 gram pellet.

**Kata Kunci:** Alat Pakan Ikan, Arduino Uno , RTC DS3231, Motor Servo

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## 1. Introduction

The development of technology today is increasingly rapid, one of which is in the field of electronics. The existence of these developments is very influential on the manufacture of sophisticated tools (Rahmanto et al., 2020). One of them is being able to create tools that can work automatically and have advantages in speed, accuracy, and high accuracy so that work that is usually routinely done by humans becomes easier and more practical (Hayatunnufus & Alita, 2020). These technological developments encourage changes in people's lives to create a tool that can work automatically (Stmik & Riau, 2018). So that the existence of automatic tools will facilitate work, and this brought about a change in the system from manual to automatic (Wiryanawan et al., 2020).

During the pandemic outbreak, some Indonesian people complained that their finances had declined drastically, and some Indonesian residents chose to open businesses with little capital, for example, raising ornamental fish for trading. Fish feeding is one of the important things in fish farming. But at this time, the fish feeding system is still very dependent on human resources, and feeding is done manually. So, if a farmer has a lot of pond land, this will increase the duration of feeding fish (Ibrahim et al., 2022). Not feeding fish is also the most worrying thing and a problem for aquarium and pond owners when they have many activities that cannot be left. Thus, there is a risk that the fish will die, and the level of fish sales will decrease if not fed regularly (Harel et al., 2018).

The maintenance or breeding of fish in an aquarium or a pond can not be kept carelessly. Many things must be considered and taken into account. Seen from the cleanliness of the aquarium, pond, and water content to the time of feeding fish so that the fish do not die and do not harm the business owner himself. With this problem, of course, aquarium and pond owners need a schedule to take care of and care for fish. Because busy work schedules or other activities sometimes create obstacles and make us not have time to take care of and feed these pet fish regularly and on time.

## 2. Literature Review

An Internet port is a mechanism that allows a computer to maintain multiple connection sessions to connect to other computers and programs on the network. Ports can use connections on TCP/IP networks to identify applications and services. The port can be identified by a 16-bit (two-byte) number (Vomitance et al., 2018). Bandwidth is the capacity that operates a large amount of data to be connected to a network. The term relates to electrical engineering, where bandwidth is the total distance or range of the highest and lowest signals of a communication channel (band) (Susianto, 2016).

Layer 7 Protocol is the application layer used to connect application programs from network functions, regulate how application programs connect to the network, and generate error messages. The protocols in this section include NFS, SMTP, HTTP, and FTP (Martini et al., 2019). Bridge is a method that can combine a separate segment into two network segments. From the local address, the packet will be forwarded, unlike the IP Address (as on the router). This is because the forwarded packet will be used at layer 2 so that the bridge can be passed on many ethernet (Supendar & Handrianto, 2017).

A web server is software that can produce data services used to obtain requests on HTTP or HTTPS from clients, commonly called web browsers, and the results can be sent back from web pages, which are usually in the form of HTML (Nasution & Hasan, 2018).

Simple Queue is a simple method used to limit bandwidth adjusted to data rates. Simple Queue is a feature that operates bandwidth management for use on networks from small to medium scale and can manage the use of download and upload bandwidth for each user (Qirom, 2017). Mikrotik router board has many features, such as a hotspot for plug-and-play access bandwidth management, remote inbox GUI admin, routing, and a stateful firewall. Mikrotik router-board administration can be connected to a Windows application (WinBox). Currently, Winbox has been made with a graphical display, so it can easily configure and access the router effectively and efficiently according to what is needed. When setup configuration can minimize errors, it can be understood easily and customizable as needed (Yayan Sopyan, 2020).

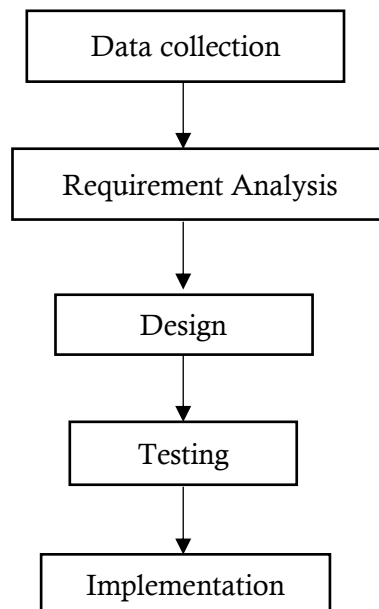
A firewall is a system of devices that allows network traffic to run when it is secure and prevents it from

running when it is not safe. Generally, a firewall is used on a dedicated machine that passes from the gateway on the internet network to the local network (Muzawi, 2016).

IP Address is a numerical identity labeled on devices such as routers, printers, and computers as communication, and there is an internet protocol in a network (Witriyono & Fernandez, 2021).

### 3. Methods

This research goes through stages, as shown in Figure 1.



#### 3.1. Data collection

As support for collecting this research data, the researcher used observation, interviews, and a literature review.

#### 3.2. Requirement Analysis

For this step, a requirement analysis, analysis of problems experienced, analysis of institutional needs, and analysis of arrangements on the network that is currently running. In the analysis and design of this research, it is needed, namely:

1. Hardware hardware is needed in managing website blocking with address list name and bandwidth management, namely:

The administrator uses a laptop as a control tool to configure routers, switches, and access points, Mobile or Laptop as connected to wifi, Mikrotik RB941-2nD Router, Tp-Link Switch T2600G-28TS.

2. Software: The software needed is OS (Operating System) Windows 7 or newer, Winbox application, Omada as a network controller tool, and browsers such as Mozilla Firefox, Google Chrome, Safari, and so on.

#### 3.3. Design

Perform network design using the required tree topology based on the results of the analysis. Design a proposed network system by making new network settings based on reference books of computer network management theory and practice.

#### 3.4. Testing

In this stage, the author, together with Mr. Lukinanto th, the staff in charge of the IT Crew division at CV Berkah Sumber Mas, conducted several tests to determine the success rate of this research, including:

1. To test blocking websites with address list names is done by opening sites through the Google browser and is said to be successful if the user cannot open certain websites based on the configuration of the Mikrotik router

2. To test bandwidth management, speed test upload and download techniques are used via the browser and the [www.speedtest.cbn.net.id](http://www.speedtest.cbn.net.id) website.

### 3.5. Implementation

In this stage, the author applies the proxy management system. The incoming user will be limited in bandwidth using the simple queue feature and automatically blocked by the website with a firewall feature during working hours. This is where the network will be tested successfully or not the network will be implemented.

## 4. Results

### 4.1. Network Topology

For network topology, we are still using a tree network topology, such as the network that is already running on CV Berkah Sumber Mas.

### 4.2. Network Scheme

Based on the results of the research, the author did not change much about the network scheme on CV Berkah Sumber Mas, but there were changes for the TP-Link TL-WR841HP Router replaced with the Mikrotik RB941-2nD Router. So that security related to data on each user's PC is safer and bandwidth distribution is easier and more even. Similarly, the IP address that was originally class B IP was changed to class A IP because it involved an increasing number of clients every year.

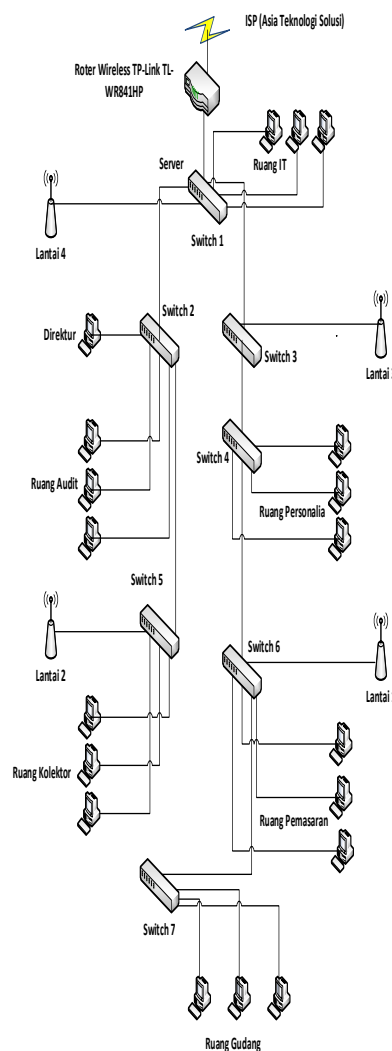


Figure 2. Initial Network Scheme

Figure 2 shows the initial network scheme on CV Berkah Sumber Mas, which already exists, and bandwidth settings have not been changed.

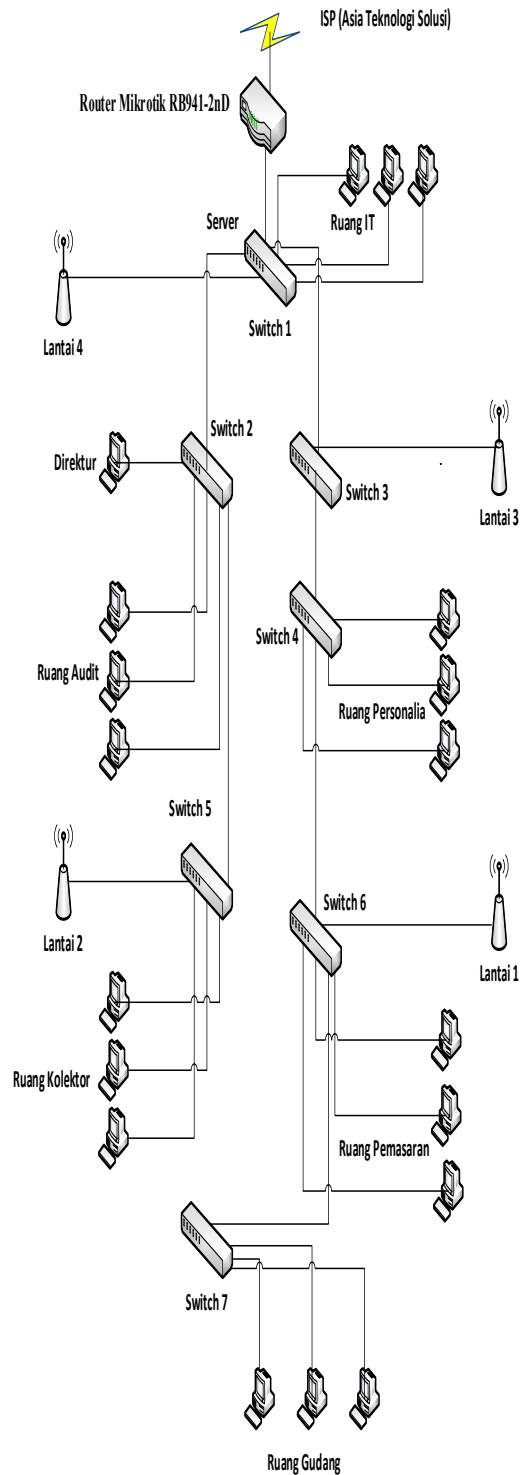


Figure 3. Proposed Network Scheme

Figure 3 shows a proposed network scheme whose bandwidth settings have been changed, with the TP-Link TL-WR841HP Router replaced with a Mikrotik RB941-2nD Router.

#### 4.3. Network Security

This network security includes:

1. Memblokir port virus melalui mikrotik.
2. Securing the proxy from UDP flood attacks where the attack aims to flood the router with data packets (spamming) continuously, causing the Mikrotik router to go down.

3. Securing the proxy from Brute Force attacks, which involve breaking passwords through SSH and telnet ports, is crucial.
4. Secure the Mikrotik admin user by changing the initial proxy password with a new password or adding a new administrator so that it can secure the configuration that cannot be changed carelessly.

## 5. Discussion

### 5.1. Application Design

To overcome the problems that have been obtained before, the author makes a proposal analysis to provide solutions to overcome problems on CV Berkah Sumber Mas. Among them are configuring using Winbox software, configuring bandwidth management, and configuring website access blocks.

### 5.2. Network Management

With network management between the same client or groups of clients with different usernames, bandwidth management uses the Rate Limit (rx / tx) feature and simple Queue, and this can make it easier for network administrators to provide bandwidth as needed.

By using the Rate Limit (rx / tx) feature for the queue type, it aims to recognize the direction of the flow so that it can divide bandwidth fairly, evenly, and fixedly and more easily monitor the network so that it can run well on the running network.

### 5.3. Network Testing

At this stage, it discusses the ongoing network testing process and the proposed network that has been implemented. The initial test of network entry to ensure all users get an IP automatically by clicking the SSID and then entering the password for the final test of network entry to get an automatic IP from DHCP is done by logging into the hotspot or typing the DNS name through the browser then will be directed to enter the username and password. For initial bandwidth testing, including speed tests on the [www.speedtest.cbn.net.id](http://www.speedtest.cbn.net.id) website, final testing is also carried out by doing speed tests on the website [www.speedtest.cbn.net.id](http://www.speedtest.cbn.net.id), for initial testing of website access blocks is carried out by opening a social media website and final testing by logging in to the internet network using users, directors and employees and then opening social media websites during working hours.

#### 5.3.1. Initial Network Testing

In the initial testing stage of entering the computer network to connect to the internet, test by clicking the SSID access point at the bottom right of the laptop and then entering the appropriate password.

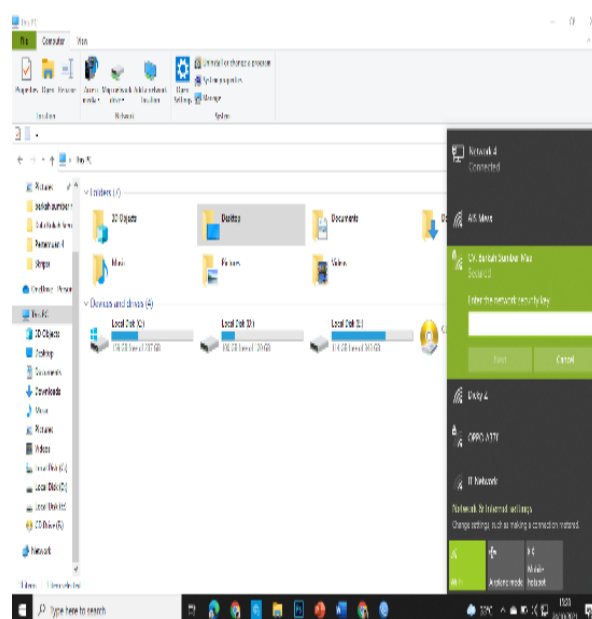


Figure 4. Initial testing of network sign-in

### 5.3.2. Initial Testing of Bandwidth

The initial condition of the computer on the website [www.speedtest.cbn.net.id](http://www.speedtest.cbn.net.id) has yet to be in the speed bandwidth.

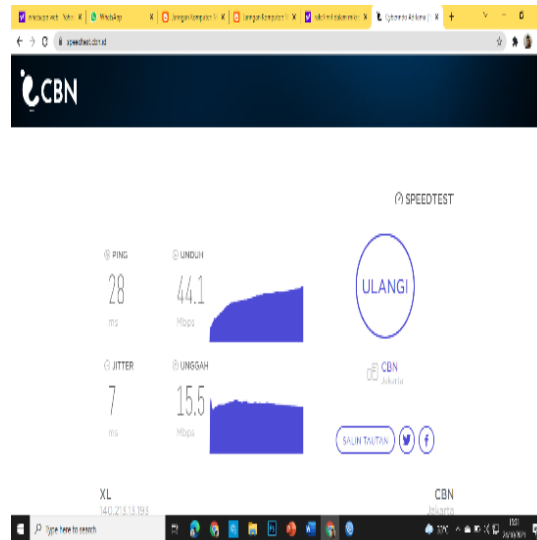


Figure 5. Initial bandwidth test

### 5.3.3. Initial testing of block access websites

The initial condition of computers and laptops on [www.facebook.com](http://www.facebook.com) websites that have not been blocked during working hours.

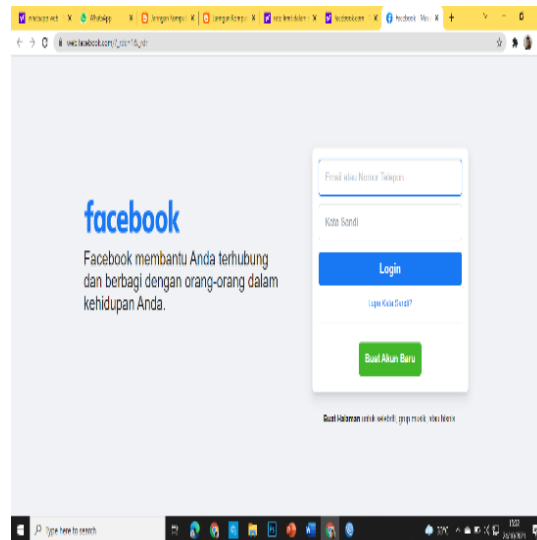


Figure 6. Social Media Websites

### 5.3.4. Network Login Testing

At the initial test stage, enter the computer network to connect to the internet, test by clicking the SSID access point at the bottom right of the laptop, and then enter the appropriate password.

In Figures 7 and 8, it has successfully entered the network. Then, it will be redirected to the company's website with the warehouse name and get an automatic IP from the DHCP server.

### 5.3.5. Final testing of Website Block

For this test, enter the internet network using PC devices used by warehouse users, IT, and personnel by opening social media websites on Google.com browsers.



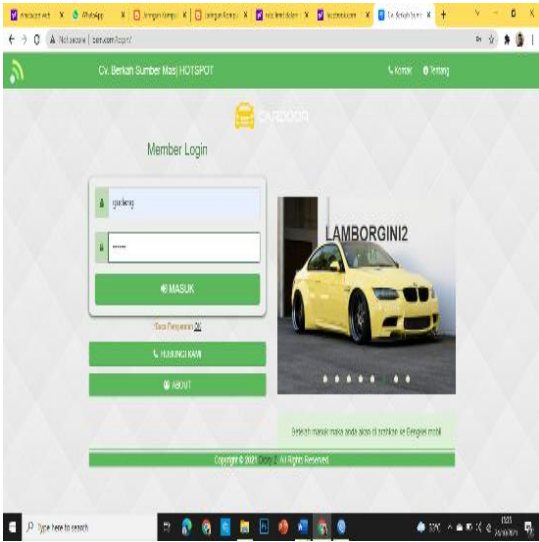


Figure 7. Login



Figure 8. Successfully logged in to the network

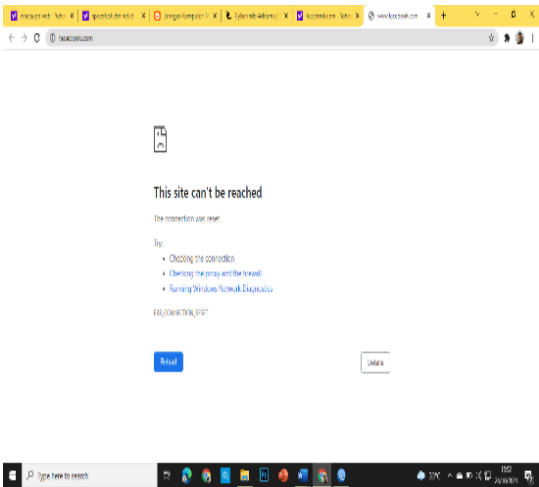


Figure 9. Website blocking results

In Figure 9, blocking this user has been successful because the website cannot be opened every day.



## 6. Conclusion

After conducting network research on CV Berkah Sumber Mas. The author came to the conclusion that the RB941-2nD mikrotik router as a proposed router on the network running in CV Berkah Sumber Mas can overcome the shortcomings of the previous tp-link router. The simple queue method is able to solve the problem of bandwidth management settings from the network running in CV Berkah Sumber Mas, because network administrators can operate bandwidth according to user needs. Block Website with address list name is able to provide a solution for network administrators in blocking websites on predetermined users.

## References

- Harel, D. A., Pratiwi, H., & Hermawan, H. (2018). *Pengembangan Prototipe Sistem Otomasi Alat Pemberi Makan Ikan Terjadwal Pada Aquarium Berbasis Arduino UNO R3*. 5(2).
- Hayatunnufus & Debby Alita (2020). Sistem Cerdas Pemberi Pakan Ikan Secara Otomatis. *Jurnal Teknologi dan Sistem Tertanam* (Vol 1 No 1). <https://ejurnal.teknokrat.ac.id/index.php/jtst/article/view/799/0>
- Ibrahim, S. M., Bangun, R., Ibrahim Matondang, S., & Yanie, A. (2022). Rancang Bangun Alat Pemberi Makan Ikan Otomatis Berbasis Arduino. In *Cetak) Journal of Electrical Technology* (Vol. 7, Issue 2).
- Martini, Mufida, E., & Krisnadi, D. A. (2019). Implementasi Manajemen Bandwidth Menggunakan Metode Queue Tree (Studi Kasus Pada Universitas Pancasila). *Jurnal Teknologi Informatika Dan Komputer*, 5 No. 1, 19–23.
- Muntahanah, Darnita, Y., & Toyib, R. (2018). Paper Block Akses Browsing Menggunakan Mikrotik Rb 751U-2Hnd Dengan Schedule Time (Studi Kasus : Disnakerpora Kota Bengkulu). *Sistemasi, Volume 7 N*, 64–77.
- Muzawi, R. (2016). Aplikasi Pengendalian Port dengan Utilitas Port Knocking untuk Optimalisasi Sistem Keamanan Jaringan Komputer. *SATIN - Sains Dan Teknologi Informasi*, 2(1), 52–58.
- Nasution, N., & Hasan, Mhd. A. (2018). Uji Web Server Universitas Lancang Kuning. *SATIN - Sains Dan Teknologi Informasi*, 4(1), 66. <https://doi.org/10.33372/stn.v4i1.298>
- Putu Adi Wiryawan, I Gede Suardika, & Suniantara, I. K. P. (2020). Penerapan Metode Simple Additive Weighting pada Sistem Pendukung Keputusan Penerimaan Debitur Anggota Koperasi. *SATIN - Sains Dan Teknologi Informasi*, 6(2), 12–23. <https://doi.org/10.33372/stn.v6i2.655>
- Qirom, S. M. S. (2017). Rancang Bangun Jaringan Hotspot, Bandwidth Dan Blokir Website Berisi Konten Negatif Untuk Meningkatkan Layanan Pembelajaran Di Sd Negeri Bangun Galih 1. *Jurnal Power Elektronik : Jurnal Orang Elektro*, 6, 5.
- Rahmanto, Y., Rifaini, A., Samsugi, S., & Dadi Riskiono, S. (2020). Sistem Monitoring Ph Air Pada Aquaponik Menggunakan Mikrokontroler Arduino Uno. In *JTST* (Vol. 01, Issue 1).
- Stmik, Z. E., & Riau, A. (2018). *SATIN-Sains dan Teknologi Informasi Sistem Keamanan Pintu Ruangan Berbasis Mikrokontroler Atmega328 dan Pattern Unlock Smartphone Android* (Vol. 4, Issue 2). <http://jurnal.stmik-amik-riau.ac.id>
- Supendar, H., & Handrianto, Y. (2017). Simple Queue dalam Menyelesaikan Masalah Manajemen Bandwidth pada Mikrotik Bridge. *Bina Insani ICT Journal*, 4(1), 21–30.
- Susianto, D. (2016). Implementasi Queue Tree Untuk Manajemen Bandwidth Menggunakan Router Board Mikrotik. *Jurnal Cendikia*, 12, 1–7.
- Witriyono, H., & Fernandez, S. (2021). Enkripsi Base 64, Hashing SHA1 dan MD5 pada QR Code Presensi Kuliah. *JSAI (Journal Scientific and Applied Informatics)*, 4(2), 263–272. <https://doi.org/10.36085/jsai.v4i2.1680>
- Yayan Sopyan, S. K. (2020). *Mikrotik Default Password Setelah Reset mikrotik.labcom.co.id*.