



Smart Home

Jirapat Jampa, Natthakorn Duangnil, Sibthit Thaiteang and Sasivimon Sukhapat
Bachelor of Science Program in Computer Science

Abstract

This research purposes the notification systems in a smart home, which consists of a fire detection system, electricity consumption detection system, and water consumption detection system. The fire detection system will get the data from the flame sensor, the temperature sensor, the gas sensor to analyzed by fuzzy logic. The data collected from those sensors will be analyzed in our system using NodeMCU microcontroller. If the values obtained from each sensor is higher than the set threshold, the system will notify the user via Line Notify. The water consumption detection system and electricity consumption detection system will get the data from a water detection sensor and an electricity detection sensor respectively. Both systems will send those data to NETPIE2020. If usage exceeds the monthly average, it will send a notification to the user via Line Notify. The users can choose to enable or disable a NodeMCU Microcontroller while they are at home.

From the experimental results of this research, all three systems can send the notification to the user via line notify to prevent the occurrence of fire, and able to monitor the consumption of water and electricity if the values received from the sensors in each system exceeds the set threshold.

02 Related Literature



The smart home is an introduction technology for living or automation to be used outside and inside the house by connecting to various devices. Residents can control these devices via smartphones or mobile devices cause convenience, energy-saving, and security.

The Internet of Things (IoT) describes the network of physical objects—"things"—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. These devices range from ordinary household objects to sophisticated industrial tools.

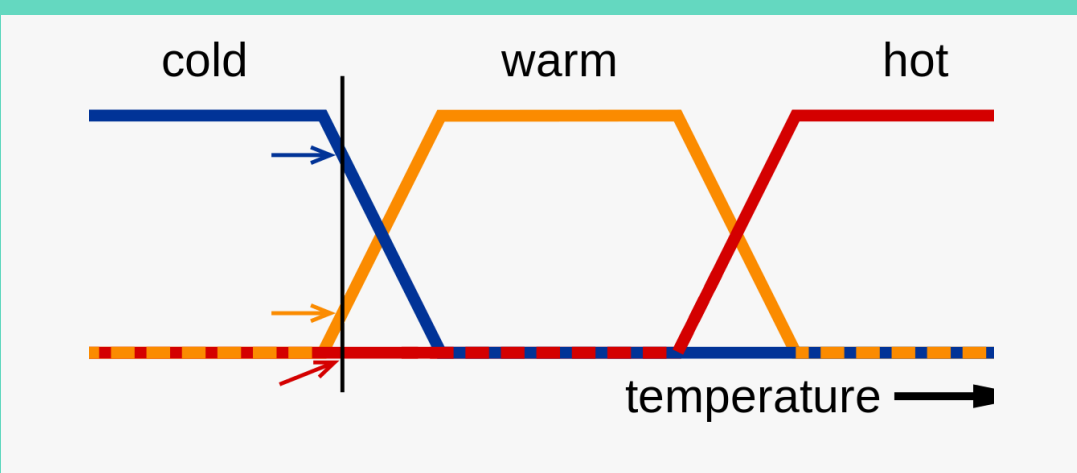


LINE Notify is a notification service that allows users to link to a web service and receive notifications from the official account "LINE Notify" that is provided by LINE. Users can receive notifications from multiple services in groups or 1-on-1 chats and Primary services available GitHub, IFTTT, or Mackerel, etc.

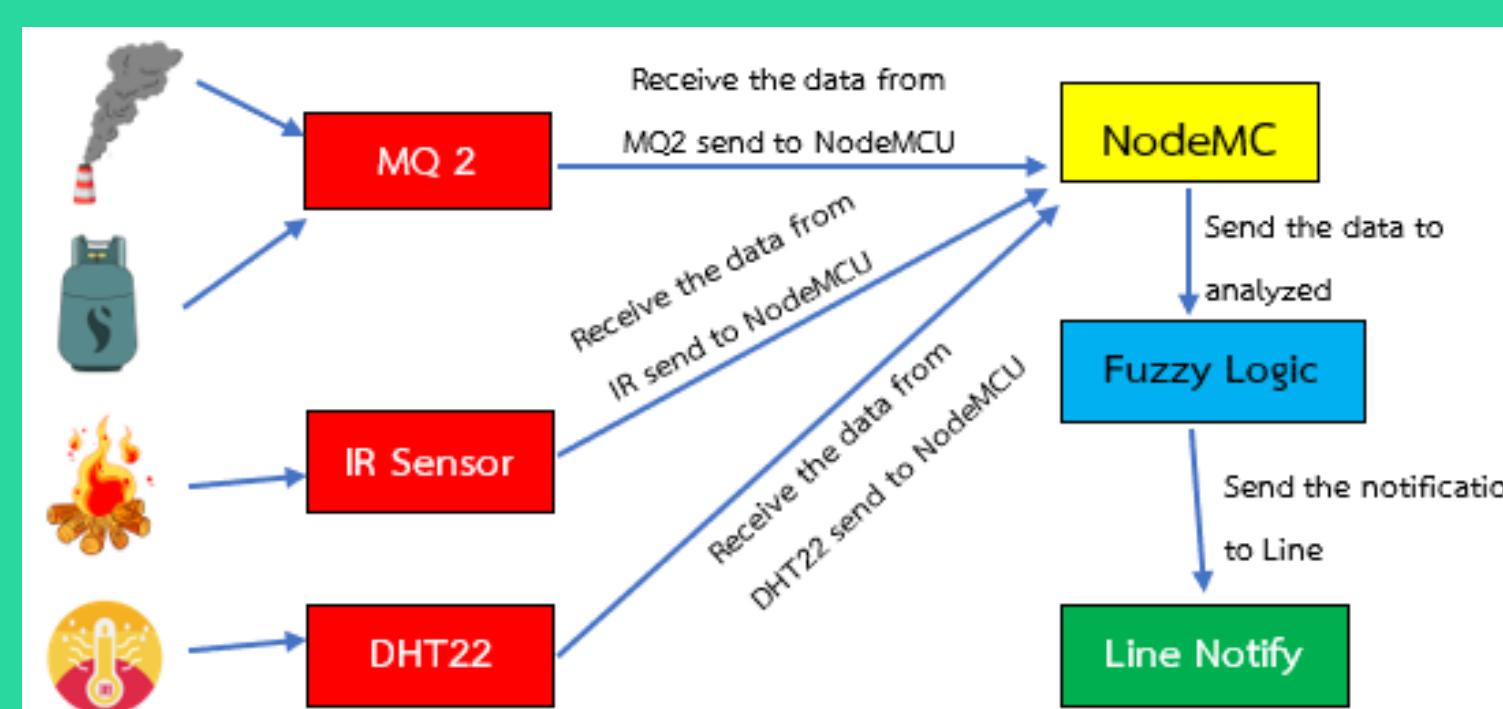


NETPIE is an IoT cloud-based platform-as-a-service that helps connect your IoT devices seamlessly by pushing the complexity from the hands of application developers or device manufacturers to the cloud.

Fuzzy Logic Theory is approximate reasoning. Unlike the use of reason in a decisive manner, true/false, yes/no of classical-logic. Fuzzy logic can be considered a simulation application, expert decision-making on more complex problems.

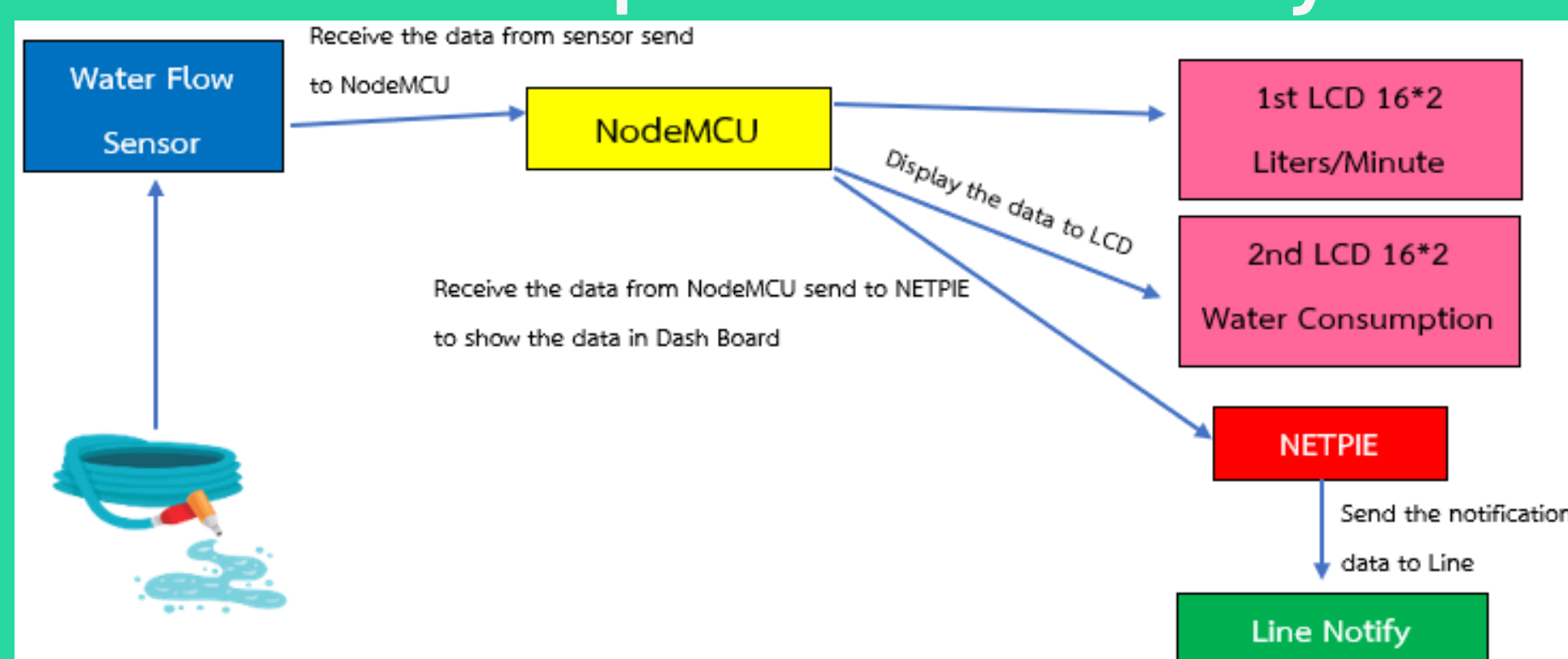


Fire detection system

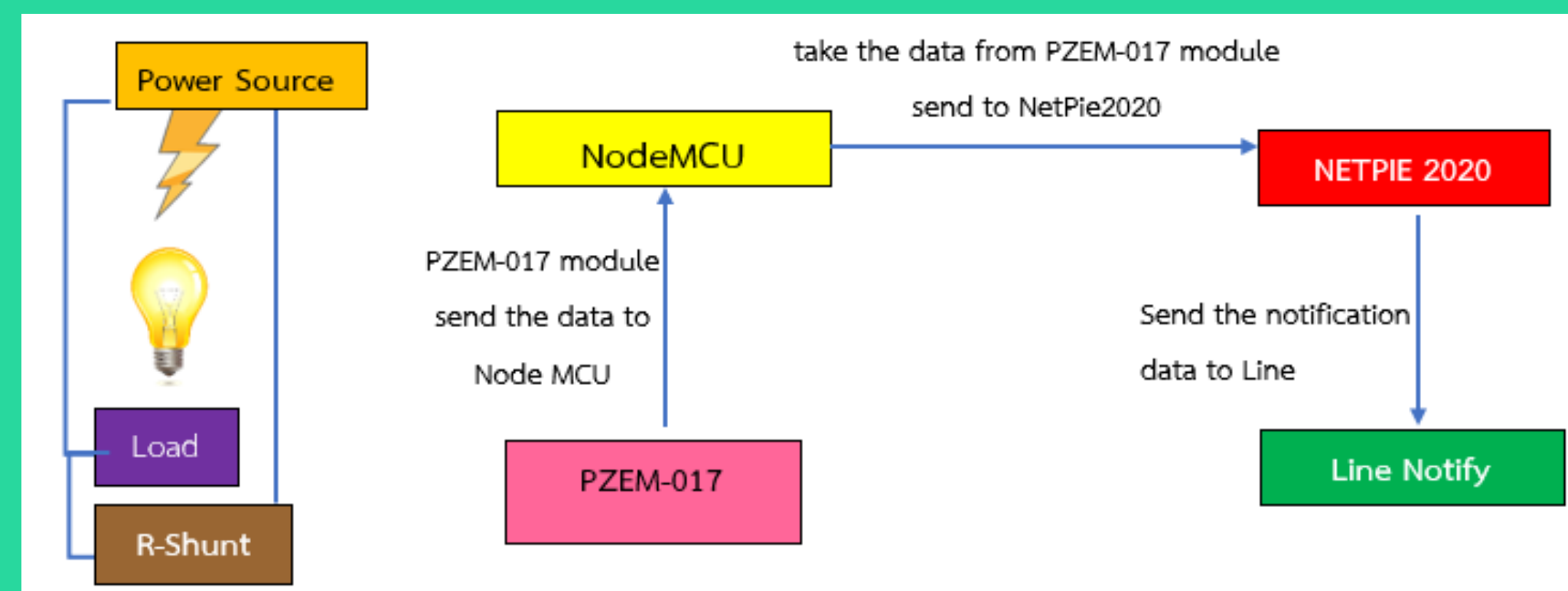


03 Procedure

Water consumption detection system



Electricity consumption detection system



Conclusions

1. The proposed system can detect gas, smoke, and fires in-door by using the MQ2 sensor, DHT22, and Infrared IR Flame Detector sensor Module, providing accurate notification to the user.

2. Electricity and water consumption in the house can be detected by PZEM-017 and water flow sensor, respectively. The system can report the fire and water usage statistics daily and weekly. The system will send notifications to the user If electricity and water usage exceed the monthly average consumptions.

06 Bibliography

- [1] geng. (2017).Line notify . Retrieved June 10, 2020, from <https://notify-bot.line.me/th/>
- [2] @KITCHEN TEAM (2017). Smart Home & Smart Living Smart technology for your dream home.Retrieved June 10, 2020, from <https://atkitchenmag.com/smart-home-smart-living/>
- [3] gitbook (2020). Introduce NETPIE. Retrieved June, 29 2020, from <https://netpie.gitbooks.io/doc/content/chapter1.html>
- [4] Robert A. Sowah.; et al. (2017). Hardware Design and Web-Based Communication Modules of a Real-Time Multisensor Fire Detection and Notification System Using Fuzzy Logic. Retrieved January, 18 2021, from <https://ieeexplore.ieee.org/document/7575685>
- [5] Oracle (2021). What Is IoT? Retrieved March, 24 2021, from <https://www.oracle.com/th/internet-of-things/what-is-iot/>

04 Results

Fire detection system

The Experimental Results Table of Gas, Smoke, and Flame Detection						
Length (Meter)	Experimental (time)	Flame	DHT 22	MQ 2	Fire Status	Notification
0.8 Meter	1st	968	31.5	4.95	0.46	Potential
	2nd	952	31.7	4.84	0.46	Potential
	3rd	855	33	4.21	0.61	Fire
	4th	657	36.9	3.57	0.78	Fire
	5th	356	40.5	3.39	0.84	Fire
1.6 Meter	1st	1024	31.2	5.24	0.42	No
	2nd	1024	31.5	4.98	0.45	Potential
	3rd	986	33.2	4.36	0.48	Potential
	4th	863	35.1	4.12	0.62	Fire
	5th	647	35.2	3.95	0.67	Fire
2.4 Meter	1st	1024	31	5.71	0.39	No
	2nd	1024	31.1	5.23	0.42	No
	3rd	1024	34	4.75	0.49	Potential
	4th	925	34	4.58	0.51	Potential
	5th	864	35.2	4.33	0.62	Fire

** The environment in the room have Flame 1024 Analog, DHT 30 Celsius, MQ2 7 Ratio **

The notifications of the fire detection system



Fire Detection: Potential Fire Alert!!!



Fire Detection: Fire Alert!!!

Water consumption detection system

The Experimental Results Table of Water Consumption Notification		
Date	Accumulated water consumption (Total/L)	Notification
11/2/2563	0.41	No
12/2/2563	0.41	No
13/2/2563	0.41	No
14/2/2563	8.38	No
...	...	...
8/3/2563	1179.85	Yes
9/3/2563	1192.4	Yes
10/3/2563	1237.81	Yes
11/3/2563	1239.52	Yes
Average per a month	898.62	

** Start collecting the notification data on the 11th, The total value reset at 03.00 pm. on the 11th of every month and if the water consumption exceeds 25% of average month or 1123.28 Liters, it will notify user immediately **

The notification of the water consumption detection system



Water System: The amount of water consumption exceeded the monthly average.

Electricity consumption detection system

The Result Table of Electricity Consumption		
Date	Electric unit (Wh)	Notification
12/3/2021	47.37	NO
13/3/2021	105.57	NO
14/3/2021	157.58	YES
15/3/2021	161	YES
...	...	...
26/3/2021	222.88	YES
27/3/2021	238.71	YES
28/3/2021	252.5	YES
29/3/2021	261.29	YES

** If the electricity consumption exceeds 25% of average month or 157.5 Wh, it will notify user immediately **

The notification of the electricity consumption detection system



Electricity System: The amount of electricity consumption exceeded the monthly average.