



HVAC-AHU System Evaluation using WPM method

Vidhya Prasanth, M. Ramachandran, PrabaKaran Nanjundan

REST LABS, Kaveripattinam, Krishnagiri, Tamil Nadu, India.

*Corresponding author Email: prasanthvidhya69@gmail.com

Abstract. In this paper, we are going to analyze the smart sensor networks based on the four parameters using WPM (Weighted Product Model) methodology. Real-time profession of HVAC zones to keep energy without compromising occupier comfort / Various strategies to comprehend the vacancy had been explored. The air coping with unit or AHU is the air conditioning A self-assembly of components (fanatics, cooling coils, filters, humidifiers and dampers) Integrated inside the construction package deal and established as a separate unit, with metallic pipe work device Connected. Distributes conditional air. Weighted Product Model (WPM) is a popular number Criterion choice evaluation (MCDA) / Multi Scale decision making (MCDM) method. This is much like the weighted sum version (WSM). The main distinction is, in the main mathematical function there is now multiplication rather than addition. MCDM is multi, contradictory, preferred and/or a technique for integrating alternative overall performance into quantitative standards and developing an answer that calls for consensus. In this paper we used WPM for ranking the WPM method is the most ideal solution Short-distance and Alternative The solution with the longest distance from the solution Determines, but the comparison of these distances Does not consider importance. Bluetooth low energy, Wifi, Long Range radio. Evaluation Parameters in Depression Loneliness Life Satisfaction Sensor networks, Packet length (kb), TX/RX bandwidth (kbps), RS (sample/s), NS (pkt/sample). Use Attention deficit from the result it is seen that genetic engineering (A2) is got the first rank whereas is the Biotechnology (A5) is having the lowest rank.

1. Introduction

An air dealing with unit (AHU) heating, ventilation and is used to recirculate and flow into air as part of the air conditioning device. There are two major forms of air handling devices - 'blow-via' and 'draw-thru'. A fan at Blow-Through AHU Is, which blows air before going into the mixer field, cooling coil and filter out community. Draw-thru AHU may be vertical or horizontal. This system is an actual air handling unit, heat sensors, Consisted of records acquisition forums and a laptop with an acquisition plan. Substantial experiments were carried out to seize the operational traits of the actual air on plant. With the assist of the purchase device, A neural network-based totally version became built that would as it should be predict plant behaviors. A sensible top of the line manipulate is for this reason possible. The set of rules on this examine is proposed with the neurological network below online education the acquisition system may be utilized in different regions for higher manage performance. As ANN's technology has been discussed in previous research, our endeavor will focus on the automatic acquisition system in the actual cooling plant. In this paper, a fully automated data acquisition system Developed and installed in a laboratory level air handling unit (AHU) to recover heat online. Data for ANN. It has analog-to-digital (A / D) acquisition boards, multiple sensors, a unique Contains a computer and a computer program to capture real-time data. An ANN to identify AHU using one-step response data is trained and operated with the same operating conditions that feed AHU is called offline ANN. The output of ANN is compared to the actual output of AHU. The weighted product method uses multiplication to relate the attribute rating is a method of decision making in which the evaluation of each attribute must first be elevated with the attribute weight. This process is similar to the normalization process. For Weighted Product (WP) approach The normalization process is needed due to the fact this technique multiplies the outcomes of the assessment of each attribute Multiplication outcomes do no longer make feel if they're not (not shared) compared to traditional values. Weight multiplication for benefit attributes Acts as a superb rating inside the method, even as the value weight operates as a negative rating similar research results use WP as a method in analysis. Issuing in rural banks; in Bali Initial draft of the WP-primarily based CSEUCLA evaluation version for enhancing virtual library offerings on the pc college in; Weighing within the fine timber putting for guitar substances Implementing the Gross Product Assessment (VASP) gadget; Implementation of WP system for recruitment of body of workers in PT. Krakatau Argo Logistics; And the great of the rambutan fruit the use of the WP method Decision assist device for determining quality. Whereas, WP method is to decide the nice of brown sugar this observe makes a specialty of designing stop support systems the use of.

2. HVAC-AHU System

Full HVAC, in both residential or commercial homes More than one sensor is wanted to cowl the region as well. This front-give up sensors create a wi-fi community that periodically sends pattern records to the again-stop HVAC controller. In designing this kind of community, the maximum range of nodes, the most variety of the community, the common sensor Energy / electricity and machine fame detection overall performance are primary worries . Network fame that complements front-give up sensor intelligence and target design metrics within the proposed system is complemented by using an

interconnected awakening mechanism. In this work, we use Lo Ra as a conversation protocol. However, other protocols which include Wi-Fi depend on availability Can be used. To clear up these troubles the proposed system has sensor information processing capability and low bandwidth / low power Reports backlight controller (located underneath HVAC manage) when an area is occupied through a protracted distance radio (Lo Ra) containing. The standard "Sense-Transmit (BLE, Wi-Fi)" strategy with the proposed intelligence Lo Ra wireless software we evaluate the wi-fi the front-end numerically. In our modern test gadget, the Raspberry PI has an included Wi-Fi radio. We also run the Aduino primarily based Lo Ra radio which has an interface with the Raspberry PI. An added benefit of the use of Lo Ra within the current device the capability to permit higher grain power management (turning the radio on and off) through the Arduino board - thereby reducing energy. Including ASICs Advanced designs can similarly improve power control on the radio by means of permitting faster waking and sleep; But it's this Is beyond the scope of the article. To better compare sensor performance with various HVAC structures, the office HVAC environment and residential HVAC Two units of aggression strategies are approximated to simulate the surroundings as properly. A unique HVAC We takes into account the arrival and live time of the resident in the place and follows the normal shipping. Bluetooth Low Energy is an energy-saving variant of Bluetooth Personal Area Network (PAN) technology designed to be used by machines and equipment connected to the Internet. Also marketed as Bluetooth Smart, the Bluetooth LED was introduced in the Bluetooth 4.0 specification as an alternative to the Bluetooth Classic. Wi-Fi is a wireless technology used to connect computers, tablets, Smartphone and other devices to the Internet. WiFi is a radio signal that is transmitted from a wireless router to a nearby device, which translates the signal into data that you can view and use. Motorola T470 2-Way Radios. The T470 is Motorola's powerful option; It has a 35-mile range, and it has 22 channels and 121 privacy codes, a group of sensors that make it easy to stay in one sensor network, where each sensor monitors data at a different location and sends that data to the hub. Storage, view and analysis. The pocket size is 1.5 KB for Ethernet and 64 KB for IP payloads. A pocket is a unit of data that is transmitted between an origin and a destination on the Internet or other pocket-switched network - or networks that transmit data in small pockets. Tx / Rx Ratio - Displays sending / receiving data ratios (in Mbps). Tx / Rx CCQ, % - Displays the wireless client connection quality (CCQ). Value (in percent) shows how effectively the bandwidth is used with respect to the maximum possible bandwidth. RS (sample / s), NS (pkt / sample).

3. Weights Product Method

Weights Product Method is an instantaneous approach, especially used in single dimensional issues. The weighted manufacturing technique is similar to the weighted sum approach. The major difference is, in this model there is multiplication instead of addition. Each opportunity is accelerated with the aid of numerous ratios with the other Comparable, one for every criterion. Each ratio is raised to a force equal to the relative weight of the corresponding criterion. Weighted product (WP) and Ideal Solution (TOPSIS) technique for order prioritization in selection making there are strategies that are broadly used to help. Since studies on the assessment of the two techniques does no longer look like complete, this have a look at targets to compare the 2 methods by way of searching at their complexity and accuracy. To combine score houses, weighed with the idea of multiplication Processing of studies records the use of production methods that need to be extended to progress with relevant weights. Education, GPA, paintings revel in, interview and trying out can add fundamental skills or vice versa Criteria used in new worker recruitment research which are normally taken to be changeable. The outcomes of the research are the net-based totally recruitment of recent worker decision aid gadget utility, For new employees who are inside the top scores in attention for making the proper decision for them They are predicted to offer records and facilitate the selection-making process within the excellent viable way. Two varieties of multi-man or woman auction models based totally on scoring regulations and auction goal features have been brought. Equilibrium bidding strategies, buyer earnings comparisons and best bid layout are characterized by those two fashions. Finally, this newsletter discusses a few improvements inside the energy of our fashions in phrases of assumptions.

4. Analysis and Discussion

Table 1 show up the determination of best and worst value for investment prioritizing. And it shows the Economic factors, Technological factors, Suppliers, Ecological factors, Social (personnel) factors, Political and legislative factors, Total costs of investment. A6 shows the highest value for economic factors and A4 shows the lowest value for economic factor. In technological factors A1 shows the highest value and A2 shows the lowest value A6 shows the highest value for suppliers and A2 shows the lowest value for suppliers. A4 shows the highest value for ecological factors and A1 shows the lowest value for ecological factors. A5 shows the highest value for social factors and A1 shows the lowest value. A5 shows the highest value for political and legislative factors and A2 shows the lowest value. A4 shows the highest value for total costs of investment and A1 shows the lowest value for total costs of investment.

TABLE 1. HVAC-AHU System in Various.

Sensor networks	Packet length (kb)	TX/RX bandwidth (kbps)	RS (sample/s)	NS (pkt/sample)
Bluetooth low energy	700.00	2000.00	0.05	1.00
Wifi	700.00	20000.00	0.05	1.00
Long Range radio	0.08	2.50	0.05	0.02

Table 1. Shows the tabulation of data set for three smart sensor networks based on the values of four evolution parameters (packet length, TX/RX bandwidth, RS and NS)

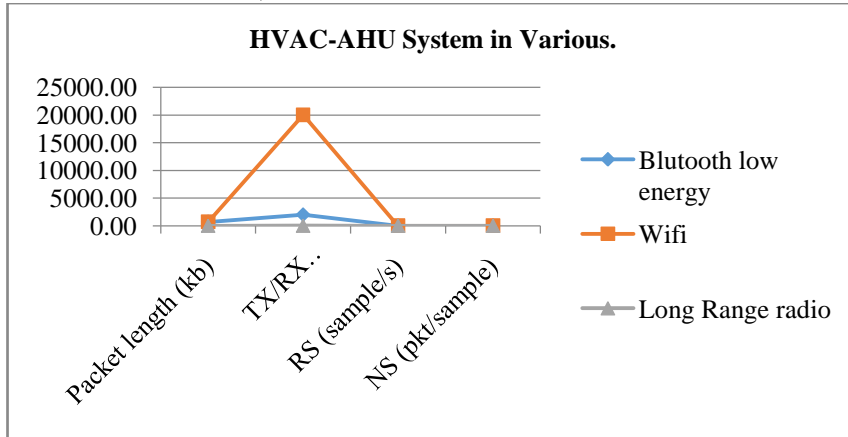


FIGURE 2. HVAC-AHU System in Various.

Figure 2 Shows the plot of the data set in which wifi has the maximum values over other two and long Range radio(Lo Ra) has the least value. Bluetooth (BLE) is in moderate range.

TABLE 2. Normalized decision matrix

Sensor networks	Packet length (kb)	TX/RX bandwidth (kbps)	RS (sample/s)	NS (pkt/sample)
Bluetooth low energy	1	0.1	1	0.021
Wifi	1	1	1	0.021
Long Range radio	0.000114286	0.000125	1	1

Table 2 shows the tabulation of Normalized decision matrix and it is calculated by using normalization formula, from the table above three networks are in same value (1) in RS

TABLE 3. Weighted normalized decision matrix.

Sensor networks	Packet length (kb)	TX/RX bandwidth (kbps)	RS (sample/s)	NS (pkt/sample)
Bluetooth low energy	1	0.562341325	1	0.38067541
Wifi	1	1	1	0.38067541
Long Range radio	0.103394631	0.105737126	1	1

Table 3 Shows the tabulation of Weighted normalized matrix which is calculated by multiplying the normalized value into weight, wifi has three maximum values in its row.

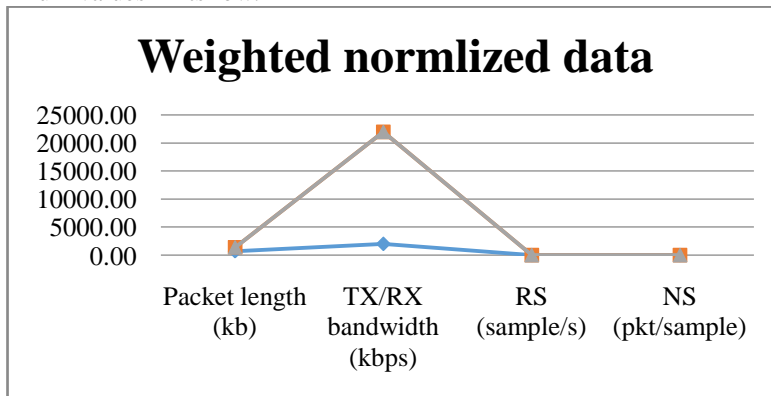


FIGURE 3. Weighted normalized data

Figure 3 shows the plot of weighted normalized data, we can use some changes in graph the red and green line are in same range ie., Bluetooth low energy and Long range radio has the highest value.

TABLE 4. Rank

Sensor networks	Rank
Bluetooth low energy	2
Wifi	1
Long Range radio	3

Table 4 shows the tabulation final ranking for the three smart sensor networks based on the values of preference scores, according to that wifi has the better advantages over other networks.

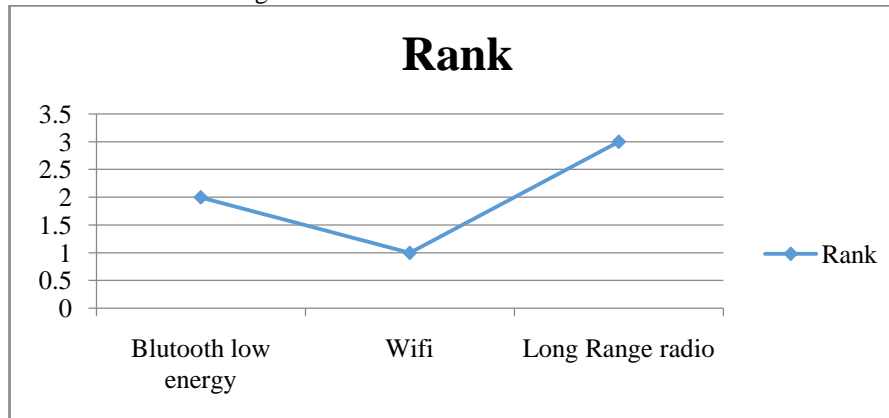


FIGURE 4. Rank

Figure 4 shows the plot of ranking system, in which wifi is ranked as no.1 followed by Bluetooth and long range radio.

5. Conclusion

Using the WPM method, the other two smart sensors analyze the given data we have come to the conclusion that WiFi has better advantages than networks. HVAC systems, But AHUs in particular use up most of the energy supplied to commercial buildings. In the traditional supplier selection approach, cost is very important was the criterion. However, environmental aspects have recently become central in supplier selection decisions. Therefore, selecting the most suitable HVAC-AHU machine and its supplier is refrigerated Green certificates for improving the electricity performance of business buildings and evaluating the mission in question It is also crucial to get a good score from the gadget. Of the price of the estimate on this technique basically the weight allocation for every criterion depends on the software. Different weights are pre-defined for every estimate. Pre-described Weight allocation depends absolutely at the person. Many standards consist of residual energy, pocket transfer frequency and hop quantity. The major motive of this algorithm is, Is to offer balanced strength intake with minimal delay in any respect sensor nodes. Ranking system, in which wifi is ranked as no.1 followed by Bluetooth and Long range radio.

6. Reference

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