

Wireless Aromatherapy Humidifier Robot for Interior Space to Promote Relaxation and Bliss

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ABSTRACT

A wireless aromatherapy humidifier robot is developed to promote relaxation and bliss for a solution to the problem of unpleasant odours in interior space. The robot consists of a control car and an aromatherapy humidifier that works together to move around the space and spray essential oils to create a relaxing and peaceful atmosphere. The robot is equipped with two motors and tires to ensure smooth movement. The function of the mist maker to disperse the fragrances evenly throughout the room. The use of ESP32 enable to connect smart devices to the internet and can pair with more components to quickly develop device prototypes. It can wirelessly control the robots using a smartphone. The ESP32 can act as a Wi-Fi signal receiver to access the internet with other networked devices because it has an embedded Wi-Fi module and feasible to connect with any wireless devices through the facility of Internet of Things (IoT). By providing a mobile and effective solution to unpleasant odors, the wireless aromatherapy humidifier robot can improve the quality of life for the elderly and enhance their well-being. In the future this prototype will be present in a larger size and able to move by itself using sensors.

Keywords: Humidifier robot, Wireless aromatherapy

1.0 Introduction

Humidifiers have played an important role in improving indoor air quality and increasing human comfort. Humidifiers trace back to ancient civilizations when various technologies were used to enhance moisture levels in the air. Ancient civilizations including Egypt, Greece, and Rome had a concept of humidification [1]. To raise humidity levels in homes and public areas, these societies used methodologies like placing water vessels next to heat sources or utilizing evaporative techniques. These early initiatives acknowledged the need for appropriate humidity for human comfort and health. Technology for humidification significantly advanced in the 18th century with the start of the Industrial Revolution. Steam-powered equipment became more common as industries grew. In order to reduce static electricity and enhance working conditions, large-scale humidification systems were created to raise the moisture levels in textile mills, printing presses, and other workplaces. With the development of electricity in the late 19th century, mechanical humidification equipment became more and more common. In the early days of mechanical humidifiers, water was only partially buried in rotating discs or drums [2]. As air moved over the damp surface, it absorbed moisture, raising the relative humidity in the area. The contemporary mechanical humidifiers that we use today are a direct result of these technologies. Significant developments in humidifier technology occurred during the 20th century as a result of the desire to enhance indoor air quality and treat certain health issues. It was a big advancement when ultrasonic humidifiers were created. High-frequency vibrations were used in ultrasonic

technology to break water into tiny mist particles, which were subsequently discharged into the atmosphere [3]. This made humidification more effective and precise. The introduction of evaporative humidifiers also transformed the sector. By employing a fan to blow air over a wet wick or filter, these humidifiers increased humidity levels by causing water to evaporate. Due to its low energy consumption, simplicity of operation, and capacity to add moisture to the air without running the risk of over-humidification, evaporative humidifiers have become very popular. The others type of humidifiers are steam humidifiers, spray nozzle and ultrasonic humidifiers [4].

The main problem that often appears in old houses is dry air. Dry air can cause various health problems such as dry skin, eye irritation, and breathing problems [5]. For the elderly who have sensitive skin, dry air can worsen their skin condition. However, by using a humidifier, the air humidity at home can be optimally maintained. Humidifiers help to increase the humidity of the air so that the skin remains soft, the eyes do not feel dry, and respiratory problems such as nasal congestion can be reduced [6]. The aims of this project to develop a wireless aromatherapy humidifier robot that can make an indoor living environment comfortable. The humidifier aromatherapy adds moisture to the air and can help to prevent the dryness that can cause irritations.

2.0 Literature Review

The process of humidifying involves introducing moisture to the air. Based on the Indoor Air Quality (IQA) standards, the need for effective humidification control of both industrial and commercial indoor space have increased. According to the ASHRAE standard 62-1989, relative

humidity in habitable spaces should be maintained between 30% and 60% [7]. Steam humidification system is also known as vaporizer, boil water and release the steam, which adds moisture to the air. The process is done with an electronic heating element and an evaporation space [8]. The cheapest and easiest way of humidification is this one. However, boiling water consumes a significant amount of energy, and the heating element is both dangerous and noisy. The wick in an evaporative humidification system is saturated with water from a reservoir to create a broad surface area for evaporation. To draw air into the wick and aid in water evaporation, a fan is required. The water evaporates based on relative humidity according to self-regulating principle, when the room humidity decrease, the water vapor increase [9]. Ultrasonic humidifier is very quiet, produces constant fine mist particles, and is able to achieve ideal humidity in a very short time [10].

However, it is advisable to use distilled water to prevent white dust. The advantage of steam humidifier is fast and efficient humidification. They use a heating element to boil and generate steam, which is then released into the air. This process allows for rapid moisture dispersion, quickly increasing the humidity levels in a room or space. But the steam humidifier also has its disadvantages, the economic effects of steam humidification cannot be disregarded. Steam humidifiers typically cost more than other types of humidifiers. Their intricate systems and parts raise the price of manufacturing and retailing. Professional installation might also be necessary, which would result in additional costs. Steam humidifiers are effective in controlling humidity, but they also use a lot of electricity. Electricity is needed to generate steam, which could result in higher utility costs. Long-term use or humidifying large

areas may increase energy usage considerably, needing careful evaluation of the expenses involved. Evaporative humidifiers are popular choices for adding moisture to the air and creating a comfortable indoor environment. One of the key advantages of these devices is their self-regulating system. Evaporative humidifiers are known for their self-regulating system, making them efficient and convenient devices for maintaining optimal indoor humidity levels. The evaporation process ensures balanced humidity, preventing both under-humidification and over-humidification. However, this humidifier system also has disadvantages, smaller to medium-sized rooms are better suited for evaporative humidifiers. They might not provide enough humidity for whole-house or larger-space applications. To reach the desired humidity level in a bigger region, you might need more than one device. The fan functioning of evaporative humidifiers can cause a light buzzing sound. Even while the noise is typically not too loud, it could still be audible, especially in calmer settings. Choose a model with a lower noise level or look into other types of humidifiers if noise is a problem.

The nozzle spray humidifier is also popular in market. It is made up of a fan, a water tank, and a nozzle or spray mechanism. Water is stored in the water tank before being pumped or delivered to the nozzle. The fan aids in spreading the mist into the surrounding air as the nozzle breaks the water into tiny droplets or mist. One benefit of nozzle spray humidifiers is the design's simplicity. They are simple to use and maintain thanks to their fundamental components. Furthermore, the uncomplicated form frequently translates into intuitive controls and operation. Although nozzle spray humidifiers may have a straight forward general design, there may be differences in

features and functionality between various types. Additional features like changeable mist settings, timers, or automatic shut-off capabilities could be available with some nozzle spray humidifiers. These modifications may offer more convenience and control but they may also somewhat raise the level of design complexity. Overall, nozzle spray humidifiers are well known for being simple, simple to use, and easy to operate. Humidifiers that use nozzle spray technology occasionally create vapor that varies in size and volume. There are a number of aspects of the construction and functioning of these humidifiers that might be blamed for this inconsistent behavior. Nozzle spray humidifiers are practical and simple to operate, but it's crucial to be aware of any potential drawbacks. Nozzle design, water pressure, and water quality can all affect the size and volume of vapor that nozzle spray humidifiers create. The size of the droplets or mist produced by the nozzle is greatly influenced by the water pressure. The droplets may be larger and heavier if the water pressure is too high, which will cause a higher concentration of moisture in some locations. On the other hand, if the water pressure is too low, the droplets can be lighter and smaller, which would result in a less efficient dispersion of moisture. The consistency of the vapor production can also be affected by the nozzle's design. The spray pattern and mist distribution can be affected by the size and shape of the nozzle orifices.

The effectiveness and silent operation of ultrasonic humidifiers are well recognized. They can also produce small mist particles. These characteristics have increased their appeal to those looking for a dependable and efficient humidification solution. The quiet operation of ultrasonic humidifiers is one of its distinguishing qualities. Ultrasonic

humidifiers operate quietly, in contrast to other varieties that use fans or motors. They accomplish this by producing and dispersing the mist into the air using ultrasonic vibrations. Ultrasonic humidifiers are a great option for bedrooms, offices, or any place where noise levels need to be kept to a minimum because the absence of loud components provides a quiet and undisturbed environment. Ultrasonic humidifiers excel in producing fine mist particles, according to mist production standards. In the water reservoir, a tiny metal plate or diaphragm generates ultrasonic vibrations that shatter the water into minuscule droplets. Then, these droplets are released into the atmosphere, resulting in a thin mist that swiftly dries up. A room may be humidified more quickly and effectively using ultrasonic humidifiers because the fine mist particles they create are easily absorbed by the air, enabling them to cover bigger regions and humidify the space more effectively. In conclusion, ultrasonic humidifiers provide a number of advantages that make them a popular option for people looking for a humidifier that is effective, quiet, and produces a fine mist. They are perfect for a variety of locations due to their capacity to run quietly, produce fine mist particles, and output moisture effectively. Users can utilize ultrasonic humidifiers to create a cozy and adequately humid environment by understanding their benefits and following the recommended maintenance procedures.

3.0 Methodology

There have two main parts of this project the first is the ultrasonic mist maker that makes the mist particles and the second part is the ESP32CAM that robot can be controlled by using smartphones. the main components of this project are ESP32CAM that allows users to take

photos that can be controlled using appropriate commands through a program running on the microcontroller and an ultrasonic mist maker to make fine mist by using ultrasonic vibrations. The ESP32 controls all of the systems and operations that enable the robot to function. this is due to the fact that the ESP32 module will act as an Internet of Things (IoT) module that will accept input from the Web browser before processing the ESP32 code and producing an output to the ESP32 pin. To move the robot, we use ESP32 code and the code will be processed to move the motor. The block diagram of the proposed project is shown in Figure 1.

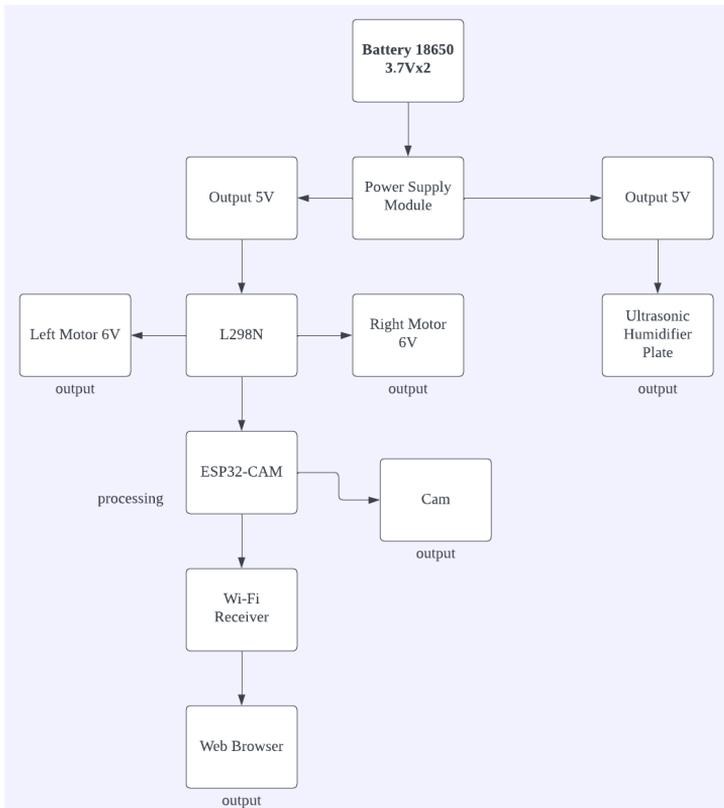


Figure 1: Block diagram of the proposed wireless aromatherapy humidifier robot

The creation of the body design will be the first step in the staged development of the wireless aromatherapy humidifier. The wireless aromatherapy humidifier body will act as both a housing for every microcontroller and a platform for the humidifier tank that could resemble both a car and container. An acrylic board is used to build the body and casing because it is easy to cut and join according to desire shape of the casing. It can also support the appropriate weight for a humidifier tank because of light and durable.

4.0 Result and Discussion

The prototype of robot humidifier with wireless aromatherapy has successfully developed as shown in Figure 2.



Figure 2: Side view of the robot that (a) has a casing; (b) without casing

The robot could disperse aromatherapy mist and walk around on its own. The utilization of an acrylic board presents a practical solution for constructing a casing and platform for a robot, alongside a designated space for a humidifier tank. The use of an acrylic material made the robot very lightweight when compared to alternatives like boards

or iron. Its characteristic facilitates ease of handling and maneuverability, making it an excellent choice for constructing the robot's casing. Moreover, acrylic possesses a remarkable strength and is impervious to water, rendering it both durable and waterproof. The robust nature of acrylic ensures the protection of internal components from external elements, particularly water pressure. Additionally, the acrylic board serves as a reliable platform for securely placing the humidifier tank, supporting its weight without compromising stability. The interface mobile app is illustrated in Figure 3.



Figure 3: User interface platform for controlling the robot

5.0 Conclusion

The project directly helps the health and well-being of elderly residents by maintaining ideal humidity levels, giving aromatherapy advantages, and managing respiratory concerns. It is consistent with the worldwide

goal of promoting health and well-being for people of all ages.

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Author Contributions

A.K. Shamsuddin: Original idea of study and conceptualization, Methodology, writing original draft preparation; **M.D. Darmin:** Data curation, Software, Validation, Supervision; **N.H. Ibrahim:** Software, Validation, Touch-up writing, reviewing and editing.

Conflicts of Interest

The manuscript has not been published elsewhere and is not under consideration by other journals. All authors have approved the review, agree with its submission, and declare no conflict of interest in the manuscript.

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