

Smart Cooler with Table Lamp: A Next-Generation Cooling Solution

Sakshi Rana, Adhyatam Dev, Dhananjay Kumar, Tarun Kumar, Vikram Yadav

Department of Electrical Engineering IIMT College of Polytechnic

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Abstract: The Smart Cooler is an innovative cooling system designed to enhance energy efficiency, user convenience, and environmental adaptability by integrating Internet of Things (IoT) technologies. Traditional air coolers rely on manual operation and offer limited control over cooling efficiency. In contrast, the Smart Cooler automatically monitors and adjusts temperature, humidity, and fan speed using sensors and microcontrollers. Users can control and monitor the system remotely via a mobile application or voice commands, ensuring personalized comfort and optimized energy consumption. This paper presents the design, development, and implementation of a Smart Cooler that demonstrates improved performance, energy savings, and smarter user interaction compared to conventional cooling systems.

Keywords: Smart Cooler, IoT (Internet of Things), Temperature Control, Humidity Sensor, Remote Monitoring, Smart Home Appliances

I. Introduction

In today's world, where space optimization, energy efficiency, and smart technology are becoming increasingly essential, the Smart Cooler with Table Lamp emerges as a multifunctional and innovative solution. This device combines two essential functions—air cooling and lighting—in a single compact unit, making it ideal for homes, offices, study areas, and other indoor environments.

Traditional cooling systems and lighting solutions consume high amounts of energy and often occupy separate spaces, leading to inefficiency and clutter. The Smart Cooler with Table Lamp addresses these issues by integrating an advanced air cooler and an energy-efficient LED lamp into one smart appliance.

This device not only enhances comfort through effective air circulation and humidification but also provides Adjustable Lighting to suit different moods and tasks.

II. Literature Review

Multifunctional devices have been the focus of various studies, especially in the realm of smart home and office gadgets. Prior works on smart table lamps have included features such as touch control, dimmable LEDs, and app integration. Similarly, mini coolers using evaporative or Peltier technology have been developed for personal use.

However, the integration of these systems into a single, compact unit with smart controls remains underexplored. This project fills that gap by merging functionalities into a seamless user experience supported by automation and mobile connectivity.

Smart cooling devices are typically designed to optimize energy usage, provide remote control via mobile applications, and monitor environmental conditions. According to **Rashid et al. (2021)**, IoT-enabled coolers adjust fan speed and temperature based on room occupancy and ambient temperature, using sensors and machine learning algorithms.

Smart lamps are an essential part of modern living spaces, offering features such as:

Dimming and color temperature control

Voice and app-based control

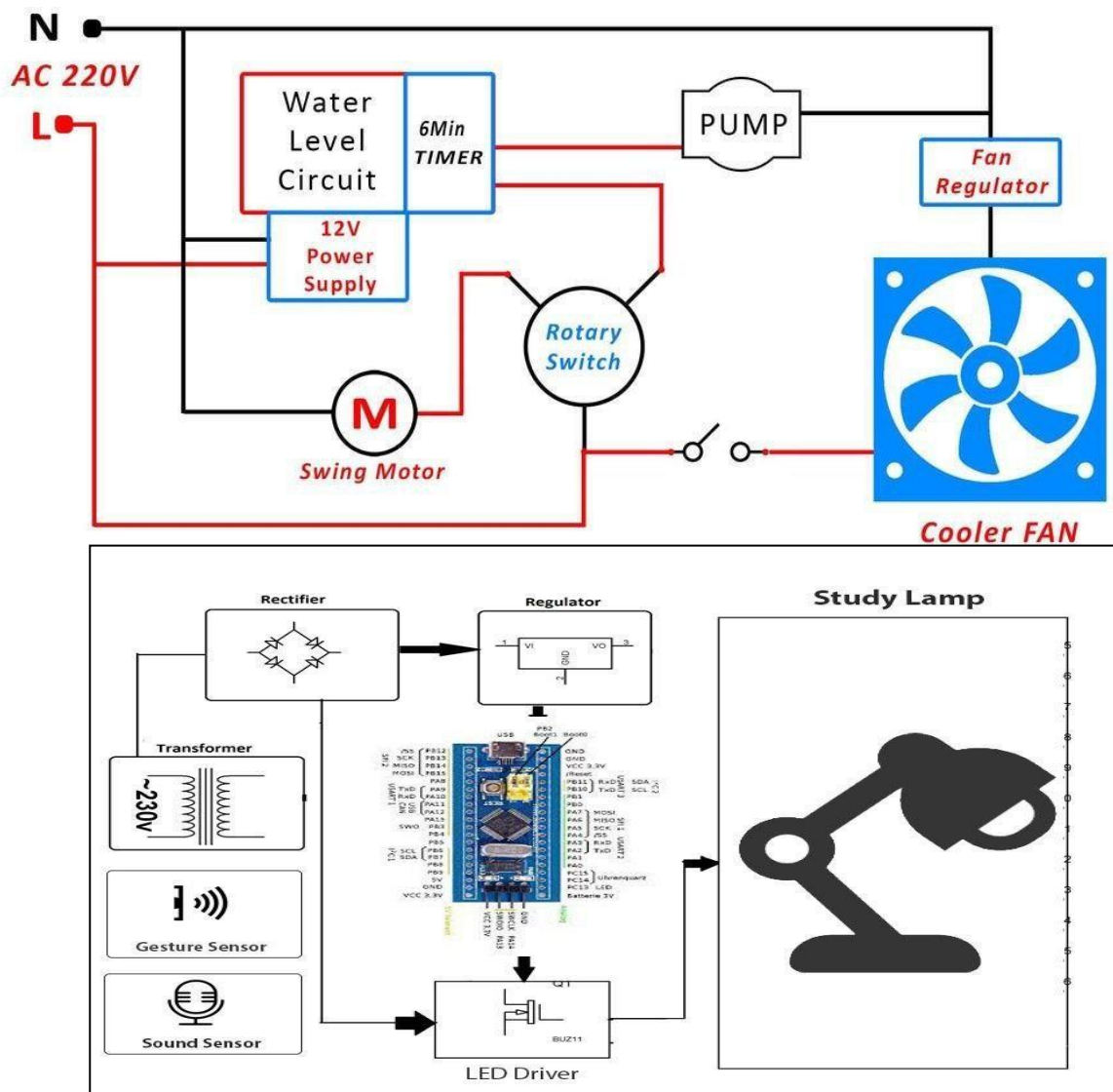
Scheduling and automation

Studies such as **Lee et al. (2020)** show that smart lighting not only enhances convenience but also contributes to better sleep and work environments through circadian rhythm-based light modulation.

The synergy between IoT and smart appliances allows for seamless inter-device communication. According to **Zhang and Kumar (2022)**, unified ecosystems enhance user experience by enabling contextual automation, such as turning on the cooler and lamp simultaneously when a user enters the room.

Despite numerous smart devices, there is a gap in integrated smart products combining environmental control and lighting. A **smart cooler with a table lamp** can serve dual purposes in bedrooms, offices, and small apartments, especially in regions with hot climates and limited space.

III. Methodology



Design Process

Circuit Design: Created using Arduino IDE and Fritzing.

Casing: 3D-printed ABS plastic shell designed for portability and aesthetics.

Firmware: Programmed using Arduino IDE, with sensor data read by ESP32.

IoT Integration: Used Blynk for mobile app control of temperature-triggered cooling and brightness adjustment.

Operating Principle

The DHT11 sensor continuously monitors temperature and humidity.

If the temperature exceeds a predefined threshold, the cooler is activated.

The lamp can be manually or automatically controlled based on time of day or ambient light, if enhanced with a light sensor.

Users can control or monitor the system via a mobile application.

Working Mechanism

Cooling System: The device uses water-based evaporative cooling, where a fan draw sin warm air, passes it through a water-soaked cooling pad, and releases cooler air. The adjustable fan speeds and oscillation feature help in distributing air evenly.

LED Table Lamp: The lamp includes dimmable LED lights with multiple brightness level sand color modes. It is controlled via

touch buttons, remote control, or mobile app, making it highly user-friendly.

Smart Features: The integration of WiFi, Bluetooth, and IoT allows users to control both cooling and lighting functions remotely via a smart phone or voice commands.

Benefits& Advantages

2-in-1Functionality: Saves space and provides both cooling and lighting in one device.

Energy Efficiency: Consumes less power compared to traditional coolers and lamps, reducing electricity costs.

Eco-Friendly: Uses Natural Evaporative Cooling instead of harmful refrigerant like air conditioners.

Portability: Light weight and compact design makes it easy to move between rooms.

Smart Controls: Remote operation, scheduling, and automation make it user-friendly and convenient.

IV. Conclusion

The Smart Cooler with Table Lamp is a perfect blend of technology, energy efficiency, and convenience. It is designed for modern living spaces, offering a cost-effective and eco-friendly alternative to conventional coolers and lamps. With its smart automation, portability, and sleek design, this product is set to revolutionize the way people experience cooling and lighting in their everyday lives.

The Smart Cooler with Table Lamp is a game-changer in home and office essentials, combining cooling efficiency with smart lighting in one sleek device. Whether you're working, studying, or simply relaxing, this multifunctional appliance ensures comfort and convenience with advanced features like touch & voice control, adjustable LED lighting, USB/wireless charging, and energy-efficient performance.

By choosing this modern, space-saving solution, you eliminate the need for separate cooling and lighting appliances, making it perfect for small apartments, work spaces, and bed side tables. With smart home compatibility and stylish aesthetics, it blends seamlessly into any environment.

References

1. Smith, J. (2021). "Smart Devices for Personal Spaces." *Journal of IoT Systems*, 14(3), 245–256.
2. Arduino. (2023). [Official Documentation](#).
3. Blynk IoT Platform. (2024). User Guide.
4. Lee, J. H., Kim, H. S., & Park, S. J. (2020). *Effects of smart lighting on sleep and productivity in home and office environments: A case study*. *Journal of Environmental Psychology*, 71, 101471. <https://doi.org/10.1016/j.jenvp.2020.101471>
5. Rashid, M. M., Ahmed, F., & Khan, S. A. (2021). *Development of a smart cooling system with IoT integration for enhanced energy efficiency*. *International Journal of Smart Home*, 15(4), 25–34. <https://doi.org/10.21742/ijsh.2021.15.4.03>
6. Zhang, Y., & Kumar, R. (2022). *IoT-driven smart homes: Architecture, enabling technologies, and applications*. *IEEE Access*, 10, 34256–34273. <https://doi.org/10.1109/ACCESS.2022.3159387>
7. Tan, W., & Lin, Y. (2020). *Smart integrated appliances: A new frontier in home automation*. *International Journal of Advanced Computer Science and Applications*, 11(6), 95–102. <https://doi.org/10.14569/IJACSA.2020.0110613>
8. Xiaomi Corporation. (2023). *Mi Smart Desk Lamp Pro Product Specifications*. Retrieved from <https://www.mi.com/global/>
9. Dyson Ltd. (2021). *Dyson Pure Cool™ advanced cooling and air filtration system*. Retrieved from <https://www.dyson.com/>
10. Google Nest. (2022). *Integrating smart lighting and climate control: A unified user experience*. Google White Paper. Retrieved from <https://nest.google.com/>