VIT-AP UNIVERSITY

IOT BASED WEB CONTROLLED HOME AUTOMATION

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ABSTRACT:

In an era of technological innovation, the convergence of the Internet of Things (IoT) and home automation has catalyzed changes in the way we interact with our living spaces. This project, entitled "IoT-Based Web-Controlled Home Automation", embodies this revolution by seamlessly combining IoT technologies and web-based interfaces to form a dynamic user-centric home automation system.

Traditional home automation systems, limited by local controls, have long faced limitations in remote access and adaptability. This project aims to fill these gaps by exploiting the potential of state-of-the-art components: ESP32 microcontroller, DHT11 sensor to capture temperature and humidity nuances, LDR resistor to light brightness, PIR sensor to detect motion signals, and LM23D motor controller. fan function. These components are intricately woven into a robust network that governs seamless communication with a locally hosted website. This digital hub offers real-time data visualization, allows users to explore their surroundings and device management at their fingertips.

The project introduces a two-mode framework that adds functionality. In automatic mode, the system cleverly interprets the motion signals from the PIR sensor, which triggers the activation of smart lighting and fan. This intelligent response promotes energy efficiency and meets the ideals of modern sustainable living. In manual mode, the user perfectly takes control and operates the devices with intuitive switches integrated in the online user interface. The implications of the project had a profound impact. Remote access overcomes space limitations and gives homeowners unparalleled power to control their environment. Real-time data becomes ambassadors for informed decision-making that encourages energy-conscious practices and increases cost savings. A motion-based control mechanism transcends comfort and predicts energy efficiency.

The project's achievement reflects interdisciplinary sophistication. The symbiosis of hardware configuration and software architecture is orchestrated with utmost precision, resulting in a harmonious user experience. The user-friendly web interface, characterized by intuitive navigation and responsive design, reflects the atmosphere of modernity, where technology blends seamlessly into everyday life.

In conclusion, the "IoT-Based Online Home Automation" project realizes the visionary fusion of IoT innovation and home automation. Its realization is not an end point, but a prologue that evokes several future perspectives. From diversifying sensors to incorporating advanced control algorithms and adapting renewable energy sources, this project offers an exciting development trajectory. It strikes us as a clarion call to reimagine our relationship with our living spaces, on the threshold of an era where our homes are smart, adaptable and sustainable.

1.INTRODUCTION:

"IoT-based network-controlled home automation" project covers the transformative possibilities of modern technology to revolutionize the interaction with our living spaces. In the era of rapid development of the Internet of Things (IoT), this project aims to perfectly combine automation and connectivity to create an innovative solution for modern homes.

Traditionally, home automation has been limited to local control mechanisms, limiting convenience and accessibility. However, the convergence of IoT and home automation has opened the doors to a new paradigm. This project takes advantage of this synergy by allowing homeowners to remotely monitor and control their living environment through a web-based user interface. The impact is profound and offers a transition from mere convenience to better energy efficiency, security and ease of use.

The focus of this project is the use of state-of-the-art hardware components, including an ESP32 microcontroller, a DHT11 sensor for temperature and humidity readings, an LDR resistor for brightness detection, a PIR sensor for motion detection, and an LM23D. engine control Together, these components form an intelligent network that communicates seamlessly with a locally hosted website. The site provides real-time environmental information and offers control options for lighting and fan systems.

This project also introduces two different modes: automatic and manual. In automatic mode, the system intelligently responds to motion signals and improves energy efficiency by activating lighting systems and fans only when needed. Manual mode, on the other hand, puts control in the user's hands, allowing them to customize their environment to their preferences using web interface switches.

As technology becomes more and more intertwined with our daily lives, this project is an example of a significant step towards a smarter and better connected living space. Harnessing the potential of the Internet of Things, it not only addresses the limitations of traditional home automation, but also lays the groundwork for a future where homes are intuitive, adaptive and energy conscious.

2. BACKGROUND:

The background of the "IoT-based online home automation" project is the development of home automation systems and the changing impact of the Internet of Things (IoT) on modern living spaces. Home automation, a concept that dates back to the mid-20th century, has gradually evolved from rudimentary control mechanisms to complex, interconnected systems that increase convenience, efficiency and security.

In recent years, the spread of the Internet of Things has ushered in an era of new possibilities for home automation. The seamless integration of devices, sensors and systems via the Internet has enabled a level of connectivity and control previously unimaginable. This project uses this technological revolution to create a complete solution that not only automates important functions in the home, but also allows remote access and customization. While traditional home automation systems often required complex installations and were limited, the Internet of Things approach offers a user-friendly and flexible

alternative. The ability to monitor and control temperature, humidity, brightness, lighting and fans via a locally hosted website provides convenience and accessibility previously reserved for futuristic shoots.

This project draws inspiration from existing smart home technologies and platforms and is based on the Internet of Things and sensor technologies. The integration of components such as an ESP32 microcontroller, DHT11 sensor, LDR resistor, PIR sensor and LM23D motor controller highlights the interdisciplinary nature of this endeavor, combining electronics, programming and network development.

Understanding the historical development of home automation and realizing the potential of the Internet of Things, this project not only addresses the limits of traditional systems, but also contributes to the continuous transformation of modern living spaces. As the world moves towards greater connectivity and automation, this project is a testament to technology's ability to shape and redefine how we interact with our homes.

3.PROBLEM DEFINITION:

"IoT-Based Web-Controlled Home Automation" project identifies and addresses the challenges and limitations of traditional home automation systems, paving the way for the innovative IoT-based solution presented in this project.

Traditional home automation systems often suffer from a lack of accessibility and convenience. These systems typically use local control mechanisms, such as physical switches or remote controls, which limit the user's ability to remotely monitor and control their environment. This limitation is particularly evident when homeowners are away from their residences and want to adjust settings such as temperature, lighting or fan speed.

In addition, the lack of dynamic responsiveness of traditional systems can lead to wasted energy. For example, lights and fans can remain active even when the room is empty, which wastes energy unnecessarily and increases the electricity bill. Such inefficiencies not only burden household budgets, but also worsen the ecological footprint, a concern of growing environmental awareness.

Security and adaptability also present challenges in traditional home automation. A lack of real-time monitoring and communication limits the ability of homeowners to quickly respond to unexpected events, such as unauthorized entry or changes in environmental conditions. Fixed automation routines fail to adapt to changing preferences and needs, stifling customization and user-centric experience. In addition, the complexity and cost of implementing traditional home automation systems hinders widespread adoption and leaves the benefits of automation to a select few. This important difference calls for an accessible, user-friendly and cost-effective solution that democratizes the benefits of home automation.

The section summarizes these challenges and highlights the need for a modern and interconnected approach to home automation. Recognizing the shortcomings of traditional systems, this project aims to bridge the gap between remote control, energy efficiency, customization and affordability through the innovative use of IoT technologies and web-based user interfaces.

4.OBJECTIVES OF THE PROPOSED WORK:

The specific objectives and results that the "IoT-based network-controlled home automation" project aims to achieve. These goals include an overall mission to create an advanced, user-friendly and energy-efficient home automation system that uses Internet of Things technologies and web-based user interfaces.

1. Controller and management: The main goal is to develop a home automation system that allows homeowners to remotely operate and control various aspects of their living environment. This includes the ability to monitor temperature, humidity and brightness, as well as the ability to adjust lighting and fan settings regardless of their physical location. 2. IoT Integration: The project aims to seamlessly integrate IoT technologies to create a networked ecosystem for the home. Using an ESP32 microcontroller and sensors such as a DHT11 for environmental data collection, an LDR resistor for brightness measurement, and a PIR sensor for motion detection, the system enables real-time data collection and responsiveness.

3. Two operating modes: The project aims to implement two different operating modes: automatic and manual. In automatic mode, the system intelligently reacts to motion signals detected by the PIR sensor and optimizes energy efficiency by activating lights and fans only when needed. In manual mode, users can directly control these devices through a web-based user interface and customize their environment according to their preferences.

4. Web-based user interface: Another important goal is to develop a user-friendly and intuitive web user interface. Users access the home automation system through a locally hosted website, where they can view real-time sensor readings, turn devices on/off, and seamlessly switch between operating systems. 5. Energy efficiency and sustainability: The main goal is to improve the energy efficiency of the home. The project aims to reduce unnecessary energy consumption by introducing motion-based control and providing users with real-time data. This promotes savings for homeowners and reduces the ecological footprint.

6. Future Scalability and Adaptability: The project creates a system that is not only functional but also adaptable for future expansions and improvements. The codebase and architecture are designed with scalability in mind, allowing easy integration of additional sensors and devices for further automation and customization.

7. Condition and Accessibility: The project aims to create a cost-effective solution that democratizes the benefits of home automation. Using readily available components and open source tools, the proposed system aims to provide an accessible option to a wider range of homeowners. Together, the objectives of the proposed work reflect a commitment to modernize home automation through IoT-based innovations. The project aims to redefine the way people interact and manage living spaces by addressing remote control, energy efficiency, user-friendliness and adaptability.

5.METHODOLOGY/PROCEDURE:

This section provides a step-by-step explanation of project implementation, including hardware installation, software, integration, and testing.

1. Integration of hardware components: The project begins with the construction and integration of hardware components. The ESP32 microcontroller is connected to a DHT11 sensor for temperature and humidity, an LDR resistor for brightness detection, a PIR sensor for motion detection, and an LM23D motor controller for fan control. The LED lights are integrated into the lighting remote control. 2. Software development: The next step involves software development. The Arduino IDE is used to program the ESP32, allowing it to collect data from sensors, control the motor and LEDs, and manage communication with the web-based user interface. Code is written to interpret sensor data and implement logic in automatic and manual control modes.

3. Building a Local Website: Developing a locally hosted website uses PHP and HTML as the user interface. The website displays real-time temperature, humidity and brightness data obtained by the ESP32. Lever switches are implemented to control lights, fans and rooms (auto/manual).

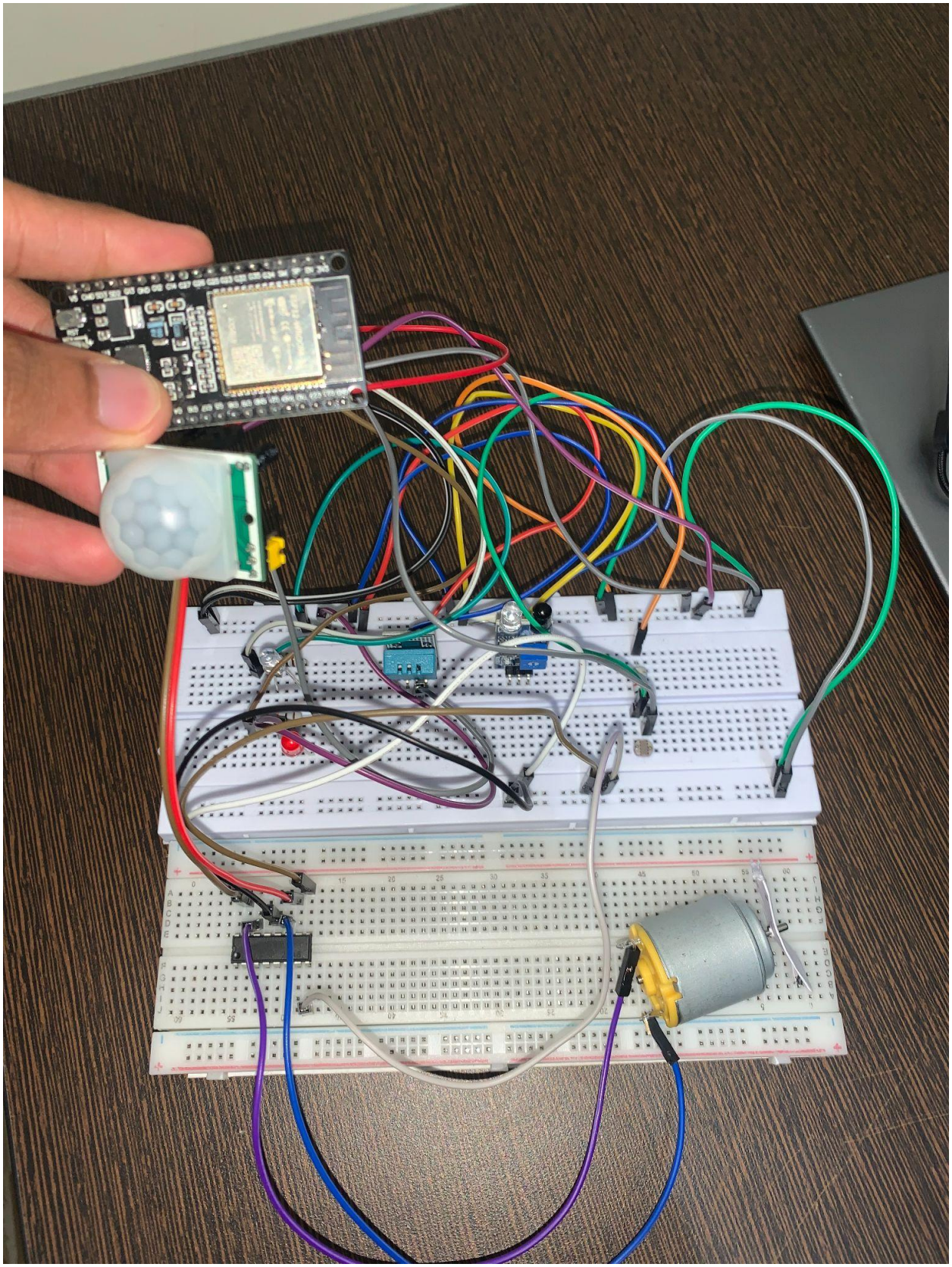
4. Database Integration: Sensor data is sent to a MySQL database via HTTP requests and PHP scripts. This allows data to be stored for future analysis and facilitates seamless communication between the hardware and the web interface.

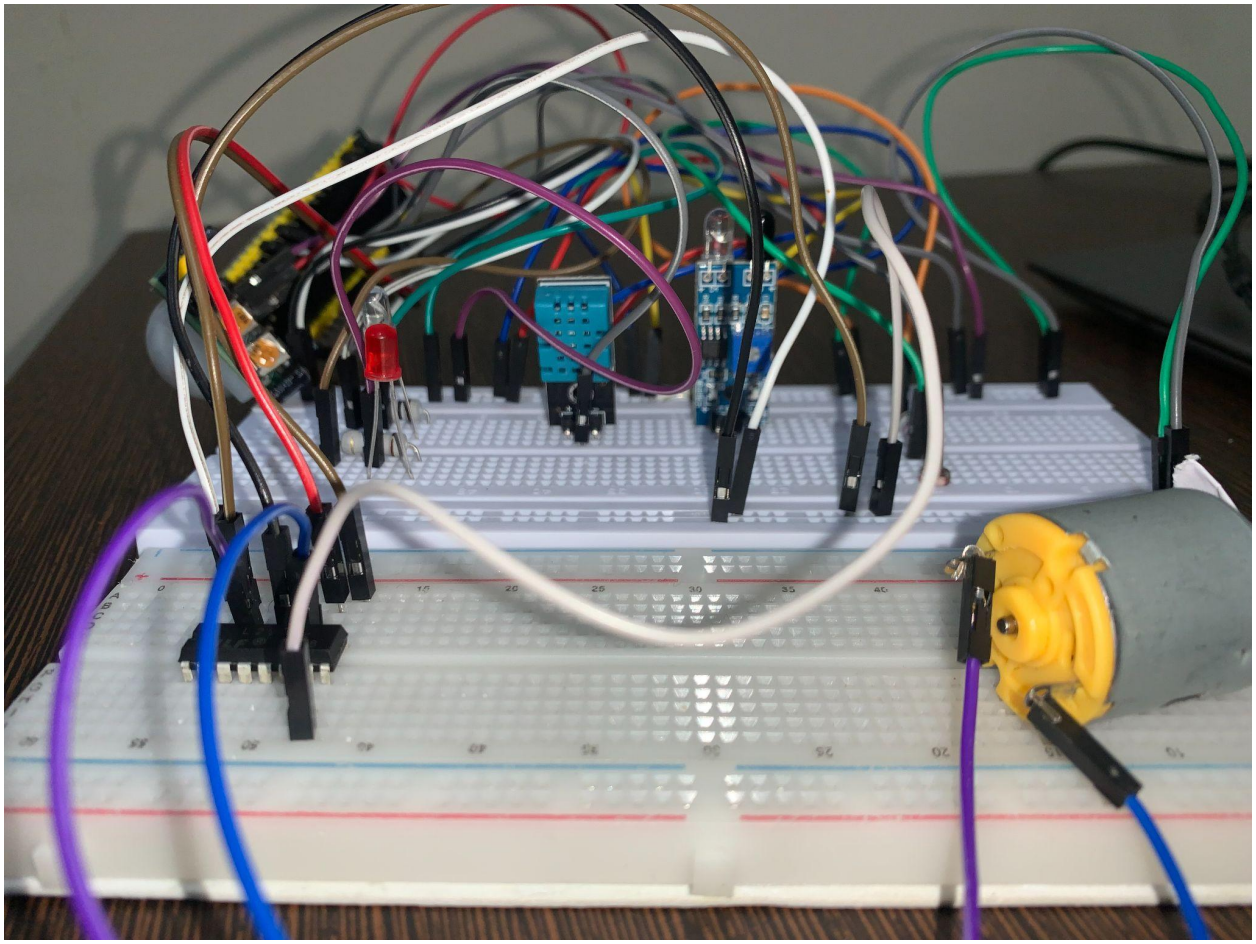
5. Automatic and Manual: The project implements two different modes. In automatic mode, a PIR sensor detects motion and activates lights and fans, promoting energy efficiency. In manual mode, users can control the devices directly through the web interface switches. 6. Integration and Testing: Hardware components, software code, local website and database are integrated. Rigorous testing is performed to ensure correct operation, data accuracy and reliable communication between components. The system is tested in various scenarios, including motion detection, remote control and mode switching.

7. Fine tuning and optimization: The system is optimized for optimal performance and user experience. The code has been improved and the web interface has been improved for intuitive navigation and responsiveness. Energy consumption is monitored and analyzed to improve energy efficiency.

8. Documentation: Extensive documentation is prepared, including user manuals and technical manuals. The project report you are working on is designed to present the objectives, methodology, results and impacts of the project.

By strictly following this methodology, the project successfully realizes the vision of an IoT-based web-based home automation system. It combines hardware expertise, software and integrated testing to create a unified and functional solution that bridges the gap between traditional home automation and modern IoT-based connectivity.





6.RESULTS AND DISCUSSION:

"IoT-based Web-based Controlled Home Automation" project and engages in an in-depth analysis of the impact and significance of these results.

Results:

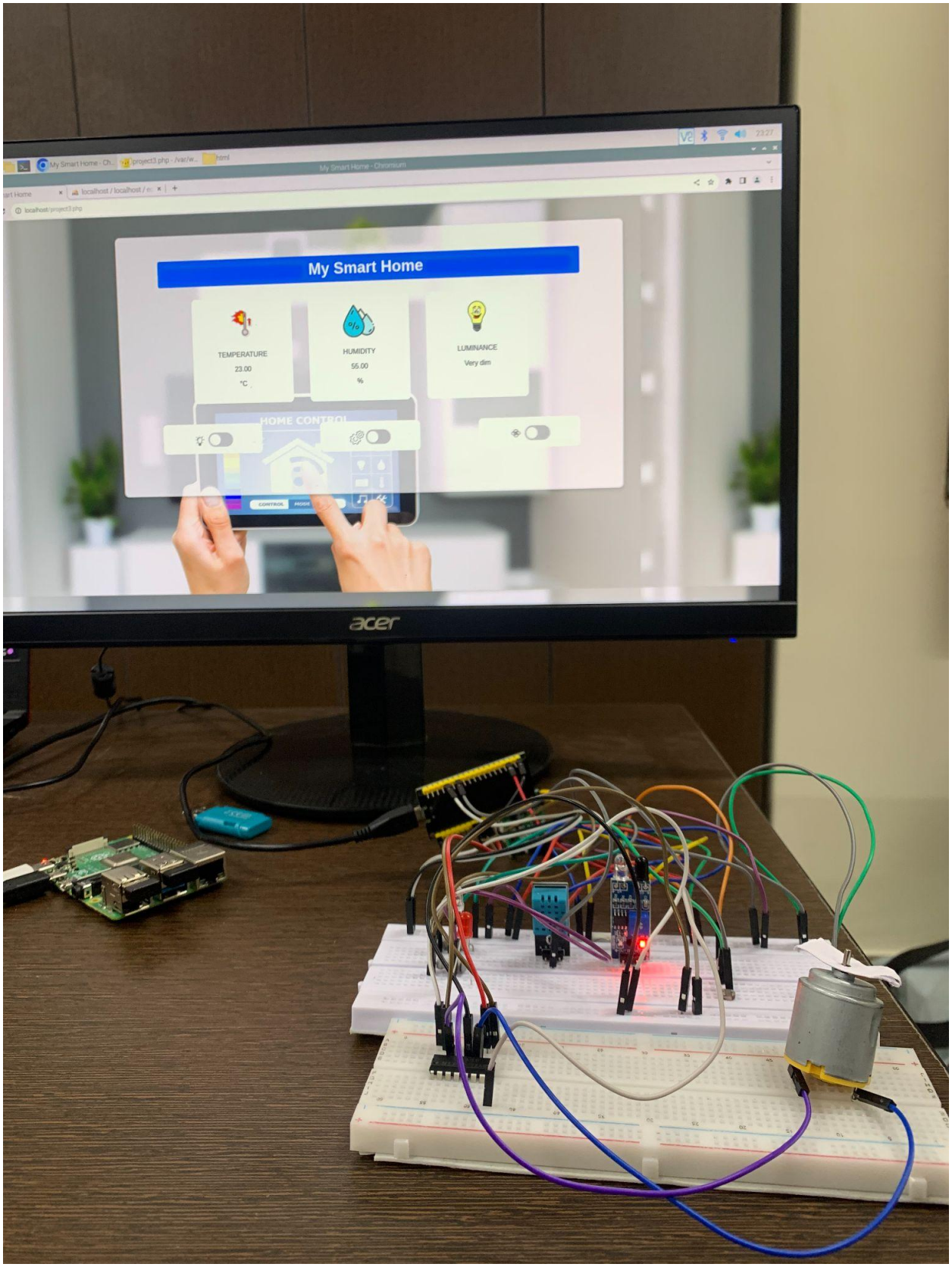
The project successfully presents a fully functional IoT-based home automation system with a web-driven user interface. The locally hosted website effectively displays real-time temperature, humidity and brightness data obtained from the DHT11 sensor and LDR resistor. Users can seamlessly control the LED lights and fan with intuitive toggles. The integration of a PIR sensor enables motion-based activation of lights and fans in automatic mode, which increases energy efficiency. The system's performance in automatic mode is commendable, as the PIR sensor detects motion accurately and triggers quick activation of the device. In manual mode, users experience seamless device control that reflects the successful integration of hardware and software components.

Discussion:

The results of the project will affect modern home automation and IoT applications in several ways. A web-based user interface provides remote control and management, allowing users to monitor their living environment from anywhere. Real-time data monitoring encourages informed decision-making that drives energy-efficient practices and savings. The integration of business-based management meets the modern trends of sustainable living and strengthens the project's commitment to energy saving.

In addition, the successful integration of various hardware components, including sensors and microcontrollers, demonstrates the multidisciplinary nature of the project and demonstrates the potential for cross-domain innovation. The user-friendly design of the web interface improves the overall user experience, making home automation easier and more intuitive.

The results also highlight the scalability and adaptability of the system. More sensors and devices can be seamlessly integrated to expand automation capabilities, responding to changing user needs and technological advances. In summary, the project results confirm the feasibility and effectiveness of an IoT-based network-based home automation system. The successful integration of hardware, software and network components and the achievement of energy efficiency and user-friendliness position this project as an important contribution to the field of home automation and IoT technology.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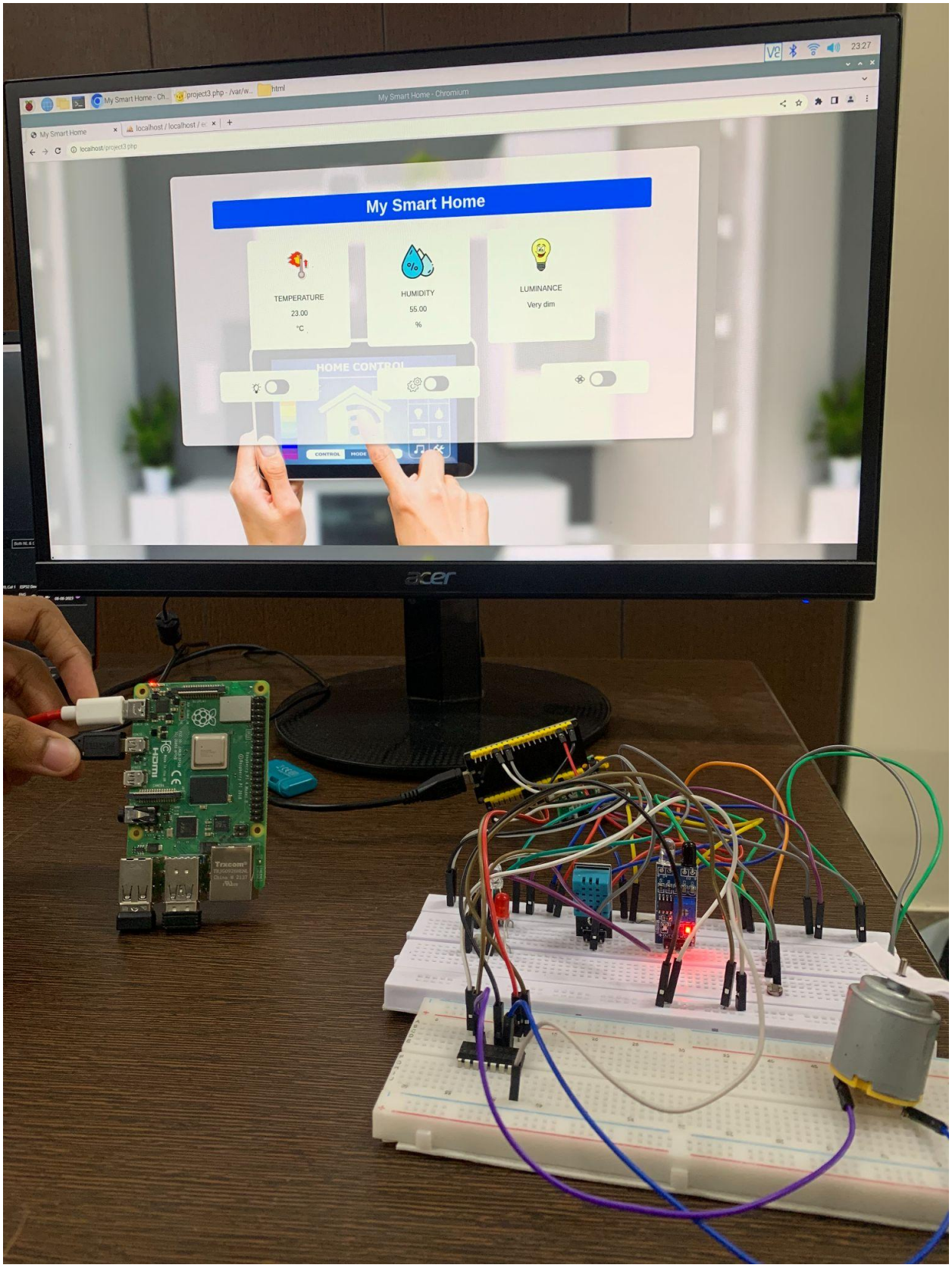
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7.CONCLUSION AND FUTURE SCOPE:

Conclusion:

In conclusion, the "IoT-based Web-based Home Automation" project has successfully implemented a complex and user-centric home automation system by exploiting the capabilities of the Internet of Things (IoT) and web-based user interfaces. This effort highlights the transformative potential of technology, redefining the way we interact with our environment. Through the seamless integration of hardware components, software programming and intuitive user interfaces, the project presented a compelling solution that addresses the limitations of traditional home automation systems.

Key project achievements include enabling remote control and monitoring of temperature, humidity, light, lighting and fan systems through a locally hosted website. The integration of automatic and manual modes with motion-based control not only increases user comfort, but also promotes energy efficiency and sustainable lifestyles. The successful implementation of these functions confirms the objectives of the project and highlights its contribution to the modernization of home automation.

Future Scope:

The achievements of this project set the stage for several exciting opportunities for further advancements and expansions:

1. Sensor Diversification: Integrating additional sensors such as air quality monitors and presence sensors can improve system intelligence and responsiveness.

2. Integration: Further integration with existing smart home platforms and devices can lead to a complete smart home ecosystem. 3. Machine Learning Integration: The inclusion of machine learning algorithms allows the system to adapt to user behavior and preferences, optimizing automation routines.

4. Advanced User Interfaces: The development of mobile applications or cloud-based user interfaces can extend control and monitoring capabilities beyond the local network.

5. Energy Optimization: Applying energy prediction and optimization algorithms can configure device activation and promote energy savings.

6. Security Enhancements: Integration with security systems and remote monitoring can improve home security and surveillance.

7. User Customization: When users can customize automation scenarios and schedules, they can respond to individual preferences and needs. 8. Integration with renewable energy: System integration with renewable energy sources such as solar panels can be compatible with sustainable energy practices.

The achievements and further development opportunities of the project underline its importance in shaping the future of home automation. As technology advances, this project will lead the way to smarter, more efficient and better connected living spaces that benefit both homeowners and the planet.

8.REFERENCES:

- https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjP49jtoNWAAxXEe94KHWgcCXYQFnoECBAQAQ&url=https%3A%2F%2Fcircuitdigest.com%2Fmicrocontroller-projects%2Fiot-raspberry-pi-home-automation&usg=AOvVaw11cSIsMOwzR3sxRA9sShAu&opi=89978449
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- CHAT GPT

9.CODES IN APPENDIX:

WEBSITE CODE:

```php
<?php
// Your PHP code to fetch data from the database
// ...

// Database connection
$host = 'localhost';
$username = 'webuser';
$password = 'vortex';
$database = 'ecs';

$conn = mysqli_connect($host, $username, $password, $database);
// ...

// Query to fetch data
$query = "SELECT  temperature, humidity, lum, reading_time FROM dht_sensor ORDER BY reading_time DESC LIMIT 1";
// ...
```

```
// Fetch the data into an associative array
$data = mysqli_fetch_assoc($result);
// ...

function controlLED($action) {
    // ...
}

if ($_SERVER['REQUEST_METHOD'] === 'POST') {
    if (isset($_POST['action'])) {
        // ...
    }
}
?>
```

```
<!DOCTYPE html>
<html>
<head>
    <!-- ... -->
</head>
<body>
    <div class="container">
        <!-- ... -->
    </div>
    <script>
        function handleSlideButton() {
            // ...
        }

        function controlMotor(action) {
            // ...
        }

        function toggleLoop() {
            // ...
        }
    </script>
</body>
</html>
```

To post data from esp to php:

** PHP Code for Data Insertion**

```php
<?php


$servername = "localhost";

// REPLACE with your Database name
$dbname = "ecs";
// REPLACE with Database user
$username = "webuser";
// REPLACE with Database user password
$password = "vortex";

// Keep this API Key value to be compatible with the ESP32 code provided in the project page.
// If you change this value, the ESP32 sketch needs to match
$api_key_value = "tPmAT5Ab3j7F9";

$api_key= $sensor = $location = $temperature = $humidity = $lum = "";

if ($_SERVER["REQUEST_METHOD"] == "POST") {
    $api_key = test_input($_POST["api_key"]);
    if($api_key == $api_key_value) {
        $sensor = test_input($_POST["sensor"]);
        $location = test_input($_POST["location"]);
        $temperature = test_input($_POST["temperature"]);
        $humidity = test_input($_POST["humidity"]);
        $lum = test_input($_POST["lum"]);


        // Create connection
        $conn = new mysqli($servername, $username, $password, $dbname);
        // Check connection
        if ($conn->connect_error) {
            die("Connection failed: " . $conn->connect_error);
        }

        $sql = "INSERT INTO dht_sensor (sensor, location, temperature, humidity,lum)
        VALUES ('" . $sensor . "', '" . $location . "', '" . $temperature . "', '" . $humidity . "', '" . $lum .
"')";
```

```
        if ($conn->query($sql) === TRUE) {
            echo "New record created successfully";
        }
        else {
            echo "Error: " . $sql . "<br>" . $conn->error;
        }

        $conn->close();
    }
    else {
        echo "Wrong API Key provided.";
    }

}
else {
    echo "No data posted with HTTP POST.";
}

function test_input($data) {
    $data = trim($data);
    $data = stripslashes($data);
    $data = htmlspecialchars($data);
    return $data;
}
```