M.KUMARASAMY COLLEGE OF ENGINEERING , DEPT OF AIDS – B.TECH

(AGC1361) AGILE METHODOLOGY – MODEL REVIEW

Class   :   III AI&DS- B

Batch no :   7

Date   :   05-12-2025

A unified Dashboard approach for smart home automation and monitoring

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Literature Review

Sl. No.	Title of the Paper	Authors	Name of the Journal	Year, Volume, Issue	Problem Identified	Solution
1	Agile Methodologies Applied to the Development of IoT-Based Systems: A Review	G. Guerrero-Ulloa, C. Rodríguez-Domínguez, M. J. Hornos	Sensors (MDPI)	2023, Vol. 23, No. 2	Traditional Agile doesn't suit HW–SW dependencies of IoT.	Proposes IoT-tailored Agile: shorter sprints, device simulators, cross-functional teams.
2	Towards Securing Smart Homes: A Systematic Literature Review	O. Alshamsi, K. Shaalan, U. Butt	Information (MDPI)	2024, Vol. 15, No. 10	Security vulnerabilities at device, network, cloud layers.	Layered security: authentication, encryption, local/edge processing.
3	Security & Privacy in Smart Home Systems: Survey	C. Cera, S. Mascio, C. Perin	ScienceDirect	2023, Vol. 14, No. 12	Privacy leakage and poor authorization in smart-home devices.	Recommends authorization frameworks and privacy-preserving architectures.
4	Usability Evaluation of Dashboards: Systematic Review	Lixia Zhang	PubMed / ResearchGate	2022, Vol. 18, No.11	Dashboards lack standard usability metrics.	Dashboards lack standard usability metrics.
5	Exploring Usability of Privacy Data-Flow Visualizations	C. Tagliaro, F. Hahn, R. Sepe, M. Lindorfer	Conference Paper	2023, Vol. 5, No.8	Users struggle to interpret privacy exposure info.	Introduces data-flow visuals to clarify privacy risks.
6	Survey on Smart Homes: Vulnerabilities, Risks, Countermeasures	Damien Bouchabou	ScienceDirect	2022, Vol. 28, N0.6	Fragmented ecosystem increases attack surface.	Catalogs threats and proposes secure defaults, segmentation.
7	Improving Usability of Security/Privacy Dashboards	Philipp Moll,	USENIX Security	2022, Volo. 23, No.10	Security dashboards are hard for non-experts to use.	Offers design guidelines to improve comprehension and actionability.

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8	Smart Energy Management & Analytics: A Review	A. K. Sharma et al.	Energy Reports	2024, Vol. 10	Energy dashboards lack clear, actionable insights.	Integrates IoT telemetry with ML forecasting and KPI-focused dashboards.
9	A Review on Energy Consumption Optimization Techniques in IoT Smart Buildings	A. S. Shah, H. Nasir, M. Fayaz, A. Lajis, A. Shah	*arXiv*, academia	2019, Vol 25, No.12	Lack of optimized energy usage techniques balancing comfort and efficiency.	Reviews optimization algorithms and fog/edge computing strategies
10	The Ifs and Buts of IoT Application Development Approaches	D. Agudelo-Sanabria, A. Jindal	arXiv	2021, Vol 20, No.7	IoT dev is challenged by HW/SW diversity and lifecycle complexity.	Analyzes mashup, model-based, FaaS approaches; proposes a hybrid method.
11	Towards a General Software Engineering Methodology for IoT	F. Zambonelli	arXiv	2016, Vol 18, N0.2	Lack of principled, systematic approaches for IoT system development.	Proposes a generalized software engineering framework for IoT.
12	Agile & IoT Methodologies in Managing IoT Projects	S. Merzouk, A. Marzak, N. Sael	IGI Global book chapter	2023, Vol 13, No.9	Agile frameworks not flexible enough for IoT project challenges.	Compares Agile, DevOps, IoT methodologies; proposes an improved IoT management approach.
13	Smart Energy Management: A Computational Approach	K. Ramamritham, G. Karmakar, P. Shenoy	Big Data Analytics Conference (Springer)	2017, Vol 21, No.5	Energy systems lack real-time, state-aware responsiveness.	Uses IoT-enabled sensors with data-driven actuation and optimization.
14	Approach of Agile Methodologies in Web-Based Software Development	J. Molina Ríos, N. Pedreira-Souto	Information (MDPI)	2019, Vol. 10, No. 10	Agile application to web dev lacks systematic coverage.	Presents Agile approaches adapted to web-based software projects.

Abstract

The project aims to design a Smart Home Automation and Monitoring System that allows users to control and observe multiple home appliances from a single unified dashboard using the Blynk IoT platform. The system integrates temperature and humidity sensors (DHT22), a relay module for appliance control, and an ESP8266 microcontroller for Wi-Fi communication.

Users can monitor real-time data, control devices remotely through a mobile dashboard receive notifications for online/offline status.

Existing System

- **Google Home App** – Centralized device control via Google Assistant.

- **Amazon Alexa** – Voice and app-based smart home management.

- **Apple HomeKit** – Secure Apple-based smart control ecosystem.

- **Samsung SmartThings** – Multi-device automation platform.

Drawbacks of Existing System

•High cost for setup and devices.

•Internet dependency for operation.

•Compatibility issues among brands.

•Security risks if not configured properly.

Proposed System

☐ The proposed system provides a unified IoT dashboard built on Blynk Cloud that integrates both hardware and software control.

Using ESP8266, DHT22, and relay modules, the system allows users to:

☐ Monitor temperature and humidity in real-time.

☐ Turn home appliances ON/OFF remotely.

☐ Get device notifications when the system is online or offline.

Proposed System Advantage

Advantages:

- Low-cost and customizable.

- Easy mobile access through Blynk app.

- Real-time cloud-based updates.

- Energy-efficient and scalable.

Software & Hardware Requirements Specification

Software Requirements

Component	Technology
Programming	C/C++ (Arduino)
Platform	Blynk IoT Cloud
IDE	Arduino IDE
Communication Protocol	MQTT / HTTP
OS	Windows / Android

Software & Hardware Requirements Specification

Hardware Requirements

ESP8266 (NodeMCU)	IOT microcontroller with WI-FI
DHT22 Sensor	Temperature and humidity measurement
Relay Module	Controls electrical appliances
AC Bulb	Load device for demonstration
Power Adapter	5V regulated power supply
Breadboard/PCB	Hardware connections base

List of modules

1. User Authentication & Profile Management

2. Appliance Control Module

3. Environment Monitoring Module

4. Dashboard & Visualization Module

5. Report And Optimization Module

Summary of Module -1

User Authentication & Profile Management

Secure Blynk token–based authentication ensures only verified users can access devices.User profiles are safely managed with encrypted credentials and role-based permissions.

Summary of Module -2

Appliance Control Module

The appliance control module operates relay switches to turn household devices ON or OFF. Commands sent from the Blynk dashboard are processed instantly through Real time Monitoring. This enables seamless remote control of appliances like lights, fans, and other smart home loads

Summary of Module - 3

Environment Monitoring Module

This module collects data from sensors to measure each appliance's energy consumption. It provides real-time tracking and stores usage data for further analysis.

# Summary of Modules -4

Dashboard & Visualization Module

This module acts as the central interface where users can view appliance status and energy data. It presents information in the form of graphs, charts, and interactive controls.

Summary of Modules -5

Reports & Optimization Module

This module generates detailed energy reports on daily, weekly, or monthly bases. It analyzes usage patterns and suggests ways to save energy and reduce costs.

Data Flow
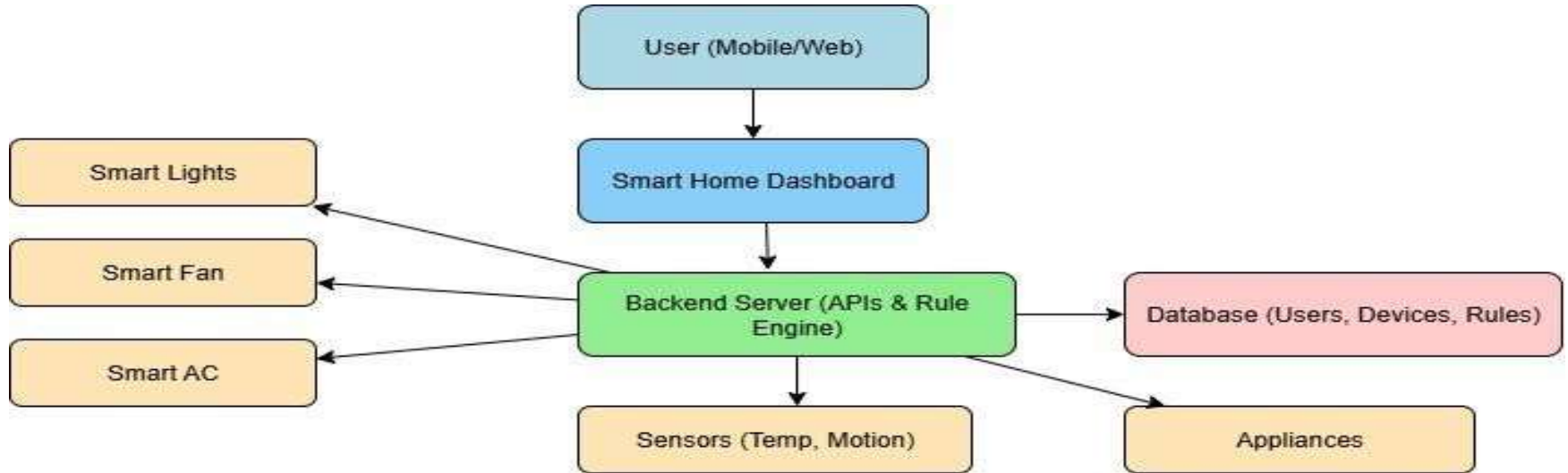
DataBase Table

Virtual Pin	Parameter	Data Type	Description / Function	Source / Destination
V0	Temperature	Float	Stores real-time temperature readings from the DHT11 sensor.	DHT11 → ESP8266 → Blynk Cloud
V1	Humidity	Float	Stores real-time humidity data from DHT11 sensor.	DHT11 → ESP8266 → Blynk Cloud
V2	Relay Control	Boolean	Controls appliance ON/OFF status through relay module.	User Dashboard → ESP8266 → Appliance
V3	Data Usage	Integer	Tracks total data usage or number of transactions.	ESP8266 → Blynk Cloud
V4	Notification Status	String	Indicates online/offline status of the device.	ESP8266 ↔ Blynk Cloud
V5	Energy Log	Float	Logs future energy consumption data for analysis.	Sensor/Software Computed → Blynk Cloud

MODULE IMPLEMENTATION
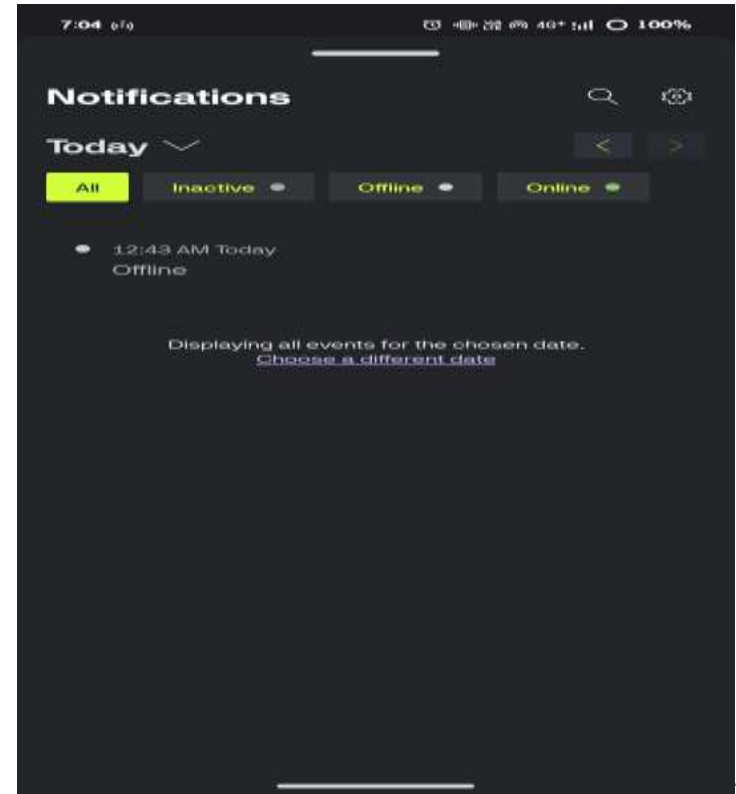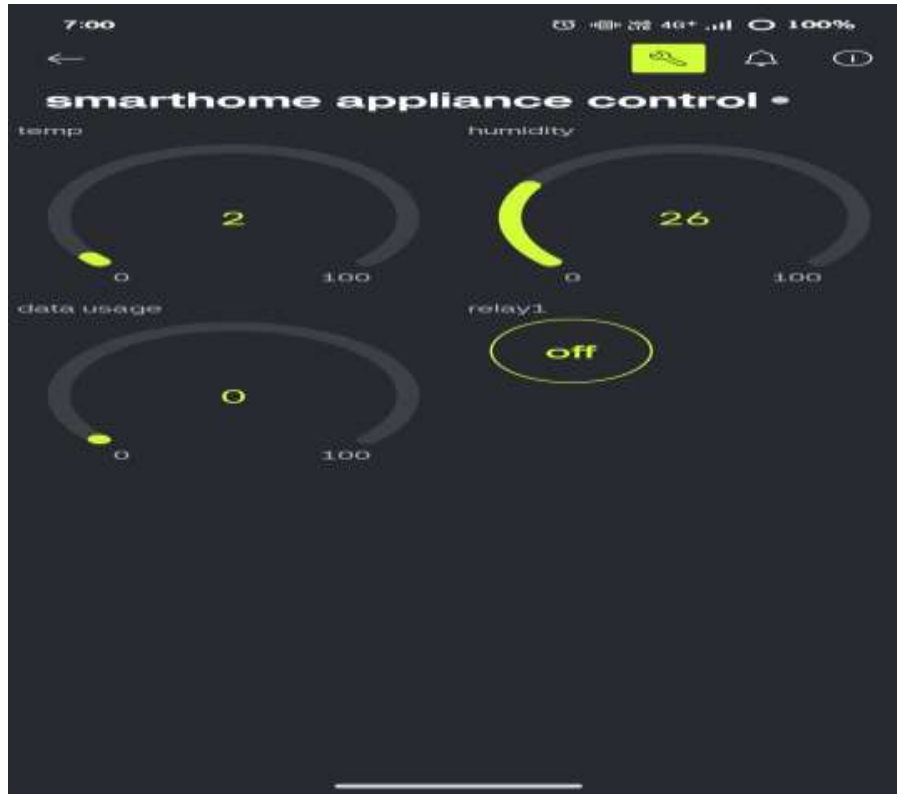
MODULE IMPLEMENTATION

Conclusion

The Unified Smart Home Dashboard successfully demonstrates a low-cost IoT-based automation system integrating hardware and cloud technology.
The system enables users to control appliances, monitor environmental conditions, and receive instant alerts via a single Blynk dashboard.
It enhances comfort, safety, and energy management within the home..