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# Predictive Analysis of Aged and Faulty Electronic Appliances in Smart Home

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**Abstract- The use of smart homes and Internet of Things (IOT) devices has become increasingly common in recent years. As a result, there is growing interest in using predictive analytics to detect failures in electronic devices and managing medications in smart homes, especially smart homes used by sensors. The purpose of this study is to explore the use of predictive analytics in smart homes to detect errors in electronic devices and improve medication management. To do this, it uses data from a variety of sensors and devices to identify patterns and anomalies that indicate possible errors or problems in devices and medicines. The research focuses on using machine learning algorithms to analyze data from sensors such as temperature, humidity, motion and light to identify patterns of device use and medication administration. Algorithms then use this data to predict the likelihood of failure or problems with devices and medicines. The study also explores how natural language processing (NLP) techniques can be used to analyze text-based data such as drug labels and instructions for use. This allows us to better understand how medicines are used and administered correctly. Overall, this research contributes to the development of predictive analytics techniques that can improve the management of smart homes, especially electronics and medicines used by the elderly.**

**Keywords- RF ID Reader, Predictive Analysis, Electronic Appliances, Smart Home, Energy Aware.**

## I. INTRODUCTION

Predictive analysis of aged and faulty electronic appliances in smart homes has become a crucial component of ensuring the safety and efficiency of the home. With the increased adoption of smart home technology, the ability to monitor and analyze appliances performance has become more accessible, allowing homeowners to proactively address issues before they become more significant problems.

One of the primary benefits of predictive analysis in smart homes is the ability to detect and prevent appliance failure. By using machine learning algorithms, Smart home systems can identify patterns in appliance usage and performance, predicting when an appliance is likely to fail. This proactive approach allows homeowners to take corrective measures before an appliance failure occurs, avoiding potential safety hazards and costly repairs.

Additionally, Predictable analysis can help homeowners optimize energy usage by identifying appliances that consume excessive energy. With the ability to track energy usage patterns. Smart home systems can suggest ways to reduce energy consumption, such as replacing old appliances with newer, energy-efficient models. This not only saves homeowners money on their energy bills, but also benefits the environment by reducing energy waste. Another significant benefit of predictive analysis is its ability to improve the lifespan of appliances. By identifying potential issues before they escalate, homeowners can perform maintenance and repairs, increasing the longevity of appliances. This reduces the need for costly appliance replacements and ensures that appliances are operating at their optimal capacity, reducing energy consumption, and saving money. Moreover, Predictable Analysis can be used to identify usage patterns and provide recommendations on how to better use appliances. By analyzing data on how frequently appliances are used, how long they are used, and the time of day they are used, smart home systems can suggest more efficient ways to use appliances. For example, if an appliance is not used often, the system may recommend unplugging it to save energy.

Finally, Predictive analysis can enhance the overall experience of living in a smart home. By providing personalized recommendations on how to improve appliances usage and performance, homeowners can optimize their daily routines and enjoy the benefits of smart home technology. Overall, predictive analysis is Critical component of smart homes: providing homeowners with information. They need to maintain safe, efficient, and comfortable living environments.

## II. RELATED WORK

**Mohammad Shorfuzzaman, M. Shamim Hossain, 2021** proposed a research predictive analysis of energy consumption by IOT-based smart devices for green city development. Whether it's making IOT devices more efficient in terms of power requirements or saving energy in those devices, predictive analytics is the foundation for unlocking value and insight from big IOT data.

**Wafa Shafqat, Kyu-Tae Lee 2022** proposed a research on a comprehensive predictive learning framework for optimal scheduling and control of smart home devices, based on purchased ideas for user and device classification. Machine learning has achieved great results in the field of energy management systems. This white paper presents a comprehensive framework for a smart home energy management system based on predictive learning.

**Debajyoti Pal and Tuul Triyason 2018** proposed a study on smart home and quality of life for the elderly. Competing Models and Perspectives on Ideas In this paper, he aims to fill this gap with a missing theoretical approach by testing three models in the context of smart home adoption by sensors increase. To do this, we conducted a survey and analyzed the results using structural equation modeling and confirmatory factor analysis techniques.

**Shalini Chopra, Nasar Al Siyabi 2022,** proposes an investigation into the factors that have led consumers to accept smart home IOT devices for recreational and home use, arguing that smart home devices are becoming more prevalent.pointing out that there is a difference in the assumptions they mean IOT device. This study examines differences in consumer acceptance of various smart home device categories. Smart home devices are categorized.

**Mohammad Mizanur Rahman proposed a study on medical records management using RFID technology in 2018** and proposed the concept of Radio Frequency Identification (RFID) technology. RFID technology uses radio frequencies to identify inventory items, track cars in parking lots, and is used for vehicle identification and books used in the library. RFID technology can also be used in hospital medical records for patient record keeping. RFID is a very popular technology for identifying items and objects at close range.

## III. PROBLEM IDENTIFICATION

Developing a predictive analysis model of energy consumption by IOT-based smart devices to promote the development of green cities. The goal is to increase the efficiency of IOT devices and save energy for these devices. This can be achieved by using predictive analytics to analyze the massive amount of IOT data generated by these devices and derive knowledge from it. This research aims to address energy consumption challenges and promote sustainability in smart cities by developing predictive models that can optimize energy consumption and reduce waste.[1]

Development of a comprehensive predictive learning-based framework for optimal planning and control of smart home devices based on user and device classification. The aim is to improve energy efficiency and reduce energy consumption in smart homes. The proposed framework consider various factors such as user preferences, device characteristics, energy prices, and weather conditions to optimize smart home device scheduling and control. The aim is to provide a more personalized and efficient energy management system for smart homes.[2]

Lack of theoretical approach related to smart home adoption by sensors. This paper aims to fill this gap by testing three competing his models and analyzing the results using structural equation models and confirmatory factor analysis techniques. Specifically, this study examines the relationship between the smartness of his home and the quality of sensors life. [3]

There research aims to examine the factors that significantly influence consumer acceptance of smart home IOT devices for recreational home and personal use. The purpose of this study is to examine the differences in consumer acceptance of different categories of smart home devices. The authors suggest that smart home devices are more prevalent, although there may be differences in adoption across categories. Therefore, the purpose of this study is to identify the factors that influence consumer adoption of smart home devices and to understand how these factors differ across various device categories.[4]

Traditional methods of managing patient records in hospitals can be time-consuming and error-prone, leading to potential medical errors, treatment delays and poor quality of care. With RFID technology, patient records can be managed more efficiently and accurately, giving healthcare providers quick access to patient information to improve the overall quality of care.[5]

## IV. PROPOSED SYSTEM

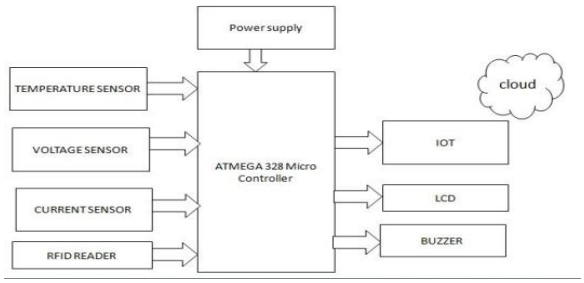



Fig 1. Hardware Block diagram.

Here various hardware and software are introduced and used to design the proposed system in a complete module. There are many formats for achieving the goal. Predictive analytics for ageing or broken electronics in smart homes.

**1. Hardware Block Description:**

In it implemented temperature, current and voltage sensors. They all act as transducers and RFID readers are used in medical applications. A temperature sensor is available. Convert non power to power and measure temperature. In general, temperatures can be expressed in degrees Celsius or Kelvin. Temperature sensors can be atmospheric in nature. Current sensors can be used to convert non-power sources to power sources and measure current. In general, current can be expressed in amperes, and current sensors essentially work as a system.

A voltage sensor can be used to convert a non-power source to a power source and measure the voltage. In general, voltage can be expressed in volts, and voltage is sometimes called potential difference. All these sensors are implemented in our project and we can see the temperature, current and voltage values on the LCD display screen. A power supply was used to power the project by applying a voltage of 230V and a frequency of 50Hz. Power is a combination of voltage and current. Generally, power can be expressed in watts. An Atmega 328p microcontroller is used to determine if the product is aging.

The Atmega328p is built into an Arduino with Proteus software. The Atmega328p will serve as his Arduino for simulation for a while. Here Arduino Uno Kit is mainly for IOT. All this data is collected by sensors, stored in tests and sent over IOT and the cloud to check if the device is out of date. A buzzer sounds a sound regardless of aging deterioration. It can be monitored via the LCD display to measure temperature, current and voltage. LCD displays are primarily used in projects with microphones and microcontrollers to write code and verify code. The LCD display will show Good as the output if it is degraded and Poor as the output if it is not degraded. This is an RF ID reader used to scan QR code codes on medicines old and new. Some medicines do not have expiry dates and are therefore counterfeit or uninterrupted medicines.

**2. Hardware Requirements & Specification:**

| S.No | Description | Specification |
|---|---|---|
| 1 | Arduino | Uno R3 |
| 2 | Microcontroller | Atmega328p |
| 3 | Temperature Sensor | Dh11 |
| 4 | Current Sensor | Acs712 |
| 5 | Voltage Sensor | Zmpt101b |
| 6 | Rf Id Reader | Em-18 |
| 7 | Lcd Display | 16 * 2(Dimension) |
| 8 | Buzzer | ----- |
| 9 | Node Mcu | Esp8266 |

**3. Software Block Representation:**

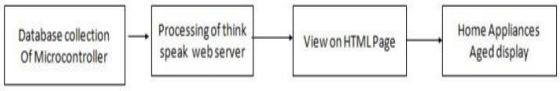



Fig 2. Software Block Diagram.

**3.1 Software Block Description:**

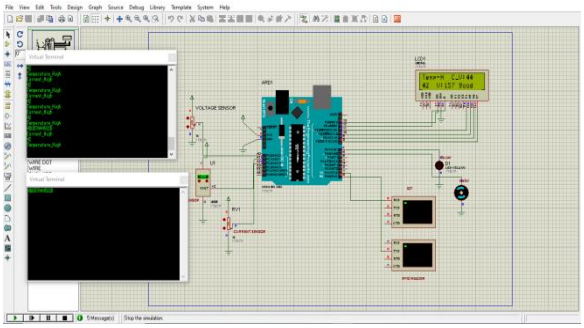
The Arduino Integrated Development Environment - or Arduino Software (IDE) - includes a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them. The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuits boards. For the development of software blocks we need an arduino IDE and a Proteus, two software needed. Mainly, the Arduino IDE is used for code writing and debugging.

The written code, we have written the code in the embedded C language. Proteus is mainly for collections of components that are used to assemble the components to design the circuit and execute the simulation. The program we have implemented using thing speak, the code which is dumped into the arduino kit. The data's can be collected from the hardware through a microcontroller sent to thing speak server and can be viewed on the HTML Page and, finally, we can view at home. Old view of the device.

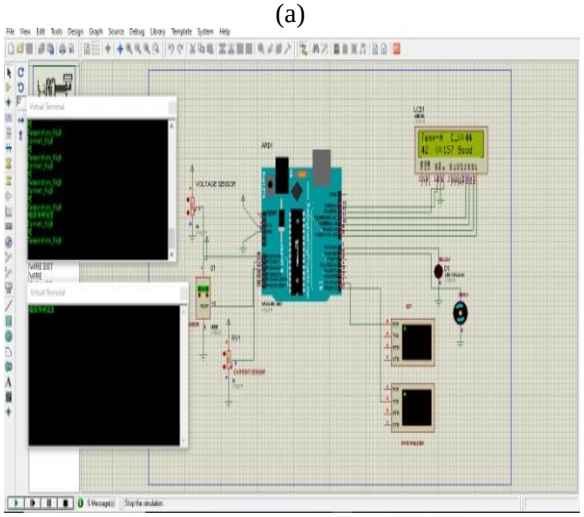
**3.2 Software Requirements & Specification:**

| S.No | Description | Specification |
|---|---|---|
| 1 | MC Programming Language | Embedded In C |
| 2 | Arduino IDE | Version 1.8.3 |
| 3 | Proteus | Iso 8.5 |

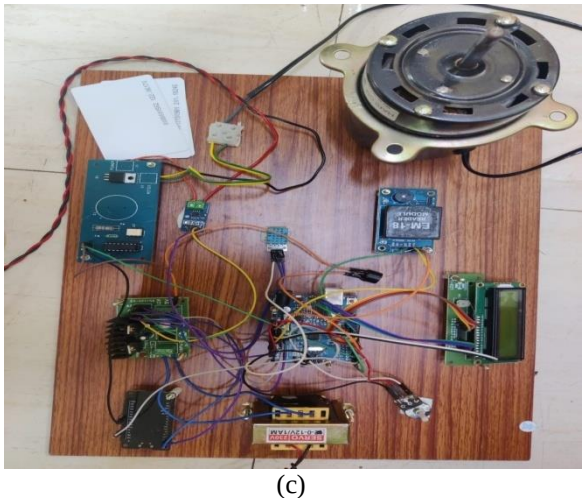
## V. RESULT AND DISCUSSION



(a)



(b)



(c)

Fig 3. Result Analysis.

From the analysis of simulation we can find the age of the old product as well as new product. Here arduino will act as microcontroller the data collection is stored from the sensors and send through microcontroller. It can able to monitor the movement of DC motor. All sensors are connected to the ground. Here Transformer is mainly used for getting power supply; it will act as a power supply module. Here sensors can be act as smart home and RF ID Reader will act as both transceiver and it is used for medical applications. If we scan the data which is available in Tablet the RF ID Reader will collect the data from the tablet description it will check the Identify the reading which is valid or not.

Then it will send through Arduino Microcontroller board and finally we can able to obtain the results on the LCD Display whether it is aged or not. This Simulation result analysis is applicable in medical shops, General Stores etc. In future aspects also it is applicable through this analysis we can develop one new ID Readers, QR Codes. This result analysis is applicable for elderly and new generation of people.

## VI. CONCLUSION

Based on the available information provided in the question, it is difficult to draw specific conclusions about the predictive analysis of aged and faulty electronic appliances and medicine in smart homes. However, I can provide some general insights and considerations related to these topics. Regarding aged and faulty electronic appliances, predictive analysis techniques can be used to monitor the performance and health of these devices and predict when they may fail or need maintenance. By collecting and analyzing data from sensors and other sources, algorithms can identify patterns and anomalies that indicate potential problems with appliances.

This information can then be used to schedule repairs or replacements before a failure occur, reducing the risk of safety hazards and downtime. In the case of medicine in smart homes, predictive analysis could be used to monitor medication adherence and predict potential adverse events or drug interactions. By tracking medication usage and analyzing data from health sensors, algorithms could provide alerts or reminders to patients or caregivers when it is time to take medication or when there may be a risk of an adverse event.

Additionally, predictive analysis could help healthcare providers identify patterns in medication usage and health outcomes, which could inform treatment plans and improve patient outcomes. The use of predictive analysis in smart homes has the potential to improve safety, reduce costs, and enhance the overall quality of life for residents. However, it is important to carefully consider privacy and security concerns related to the collection and use of sensitive health and personal data. Appropriate safeguards and regulations must be in place to ensure that these technologies are used ethically and responsibly.

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