TEMPERATURE DATA LOGGER WITH TIMESTAMPS FOR MEDICINE COOLER BOX

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Abstract: Compared to other temperature monitoring systems, our temperature data logger is capable of continuously monitoring temperature and humidity while timestamping the readings. Upon receiving a message through GSM, the system generates a log file in formats such as xls/csv/txt. This proposed system aims to ensure the safe storage of temperature-sensitive medication. The data can be easily accessed and analyzed, enabling healthcare professionals to verify that medications are stored within the recommended temperature range, thereby maintaining their efficiency and safety.

Index Terms - Arduino Uno, GSM, Temperature Sensor, SD Card, RTC, Humidity Sensor

I. INTRODUCTION

Pharmaceutical industries develop various systems tailored to the specific requirements of medication storage. As engineers, we have developed a system capable of continuously monitoring temperature to ensure the safe storage of temperature-sensitive medicines. Traditional temperature monitoring methods often lack the capability to provide continuous, real-time data, which poses challenges for healthcare providers in promptly detecting and addressing temperature fluctuations. Our system addresses this limitation by enabling continuous temperature monitoring with a real-time clock. Upon receiving a message from GSM, the system creates a log file on the SD card. A new file will be created each day for ease of access and handling of log data, with the file name formatted as yyyymmdd.

II. LITERATURE REVIEW

1)Design of Temperature Data Logger Using Thermocouple" by Wahyudi, Raditya Naufal Fathoni, Imam Santoso, 2023

The tools and materials that are being used are a type-K thermocouple, a MAX6675 module, an Arduino Uno board, and an Arduino Data Logger Shield. The system was being tested with creating a folder, a subfolder, and a file on SD Card. The recording result will be a .csv type file that can be opened using a spreadsheet like Microsoft Excel.

2) Enhancing Medication Safety Through Temperature Monitoring: A Review" by Emily Johnson et al. (Journal of Healthcare Engineering, 2021)

Reviews the role of temperature monitoring in enhancing medication safety and explores technological advancements in the field. The paper likely examines the impact of temperature variations on medication efficacy and discusses strategies for implementing effective monitoring systems.

III. PROPOSED METHODOLOGY

Existing System:

The current system is capable of storing temperature data on the SD card. However, it is time-consuming to locate the specific file needed, as it saves temperature data only and generates unnecessary files.

Proposed Solution:

Our system stores temperature data in sorted order on the SD card, with each entry including date and time. When a client requests temperature readings, the data can be readily accessed.
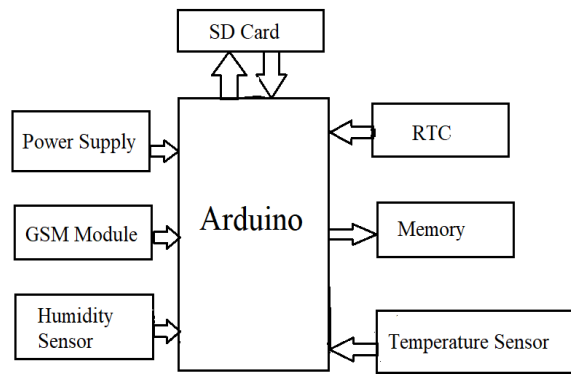
IV.   BLOCK DIAGRAM

Figure 1: Block diagram

The block diagram of our system includes an Arduino Uno, a temperature and humidity sensor, a Real-Time Clock (RTC), an SD card module, and a GSM module. The Arduino Uno serves as the central processing unit of our project. The temperature and humidity sensor continuously monitors the temperature inside the medicine cooler box and provides this data as input to the Arduino. The RTC ensures accurate timekeeping and records real-time data. Whenever a message is received through the GSM module, the Arduino activates the SD card module to create a log file, storing the temperature data along with the corresponding date and time stamp.

V.   FLOW CHART
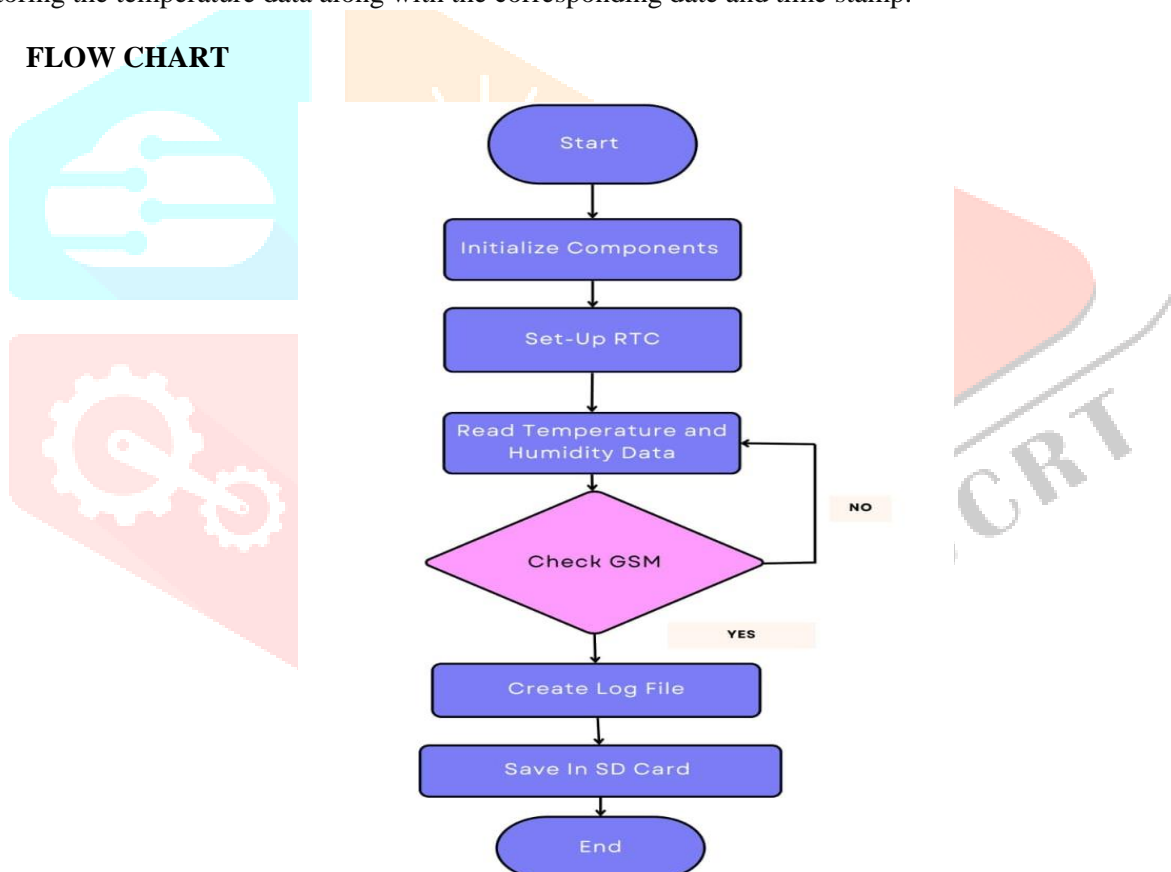
VI.   SIGNIFICANCE AND SCOPE

This paper addresses a critical need in the healthcare field: a portable, self-contained system for monitoring temperature and humidity within a medicine cooler. Leveraging an Arduino Uno, Real-Time Clock (RTC), SD card, and sensor, it logs time-stamped readings, ensuring medications are stored within the appropriate environmental conditions. This data can be instrumental in maintaining drug efficacy and preventing spoilage. The scope encompasses hardware assembly, Arduino programming for data acquisition and SD card storage, and potential development of a data visualization tool for further analysis.

VII.   RESULT
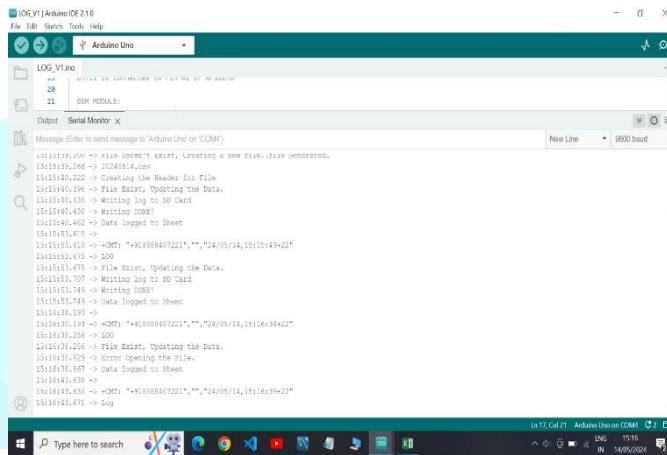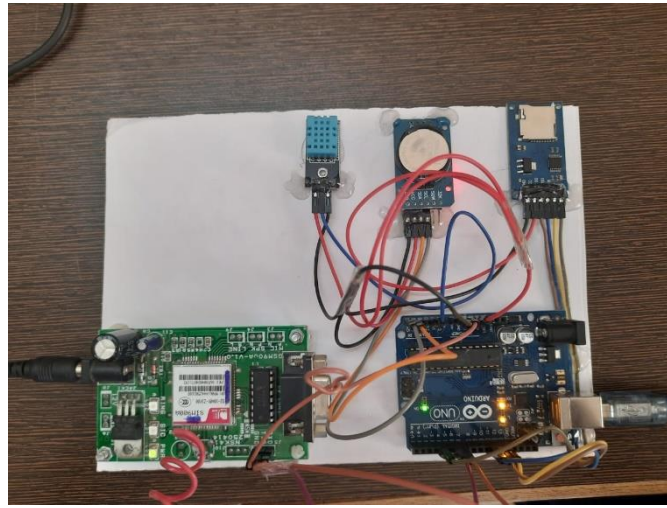
The GSM module is configured to handle incoming "LOG" commands. It employs a file management system that appends data to existing yyyymmdd formatted files or creates new ones for unrepresented dates.

This Microsoft Excel facilitates the import and analysis of temperature, humidity, and RTC temperature data collected and stored on an SD card.

VIII.   CONCLUSIONS

This paper culminated in a self-contained, microcontroller-based data logger specifically designed for temperature and humidity monitoring within medicine coolers. The Arduino Uno platform served as the foundation, interfacing with a Real-Time Clock (RTC) module, SD card, and a combined temperature/humidity sensor. This system meticulously logs time-stamped data, ensuring adherence to vital environmental conditions for medication storage. This paper offers significant value in safeguarding drug efficacy through verified temperature and humidity control. Further development could encompass the integration of alert mechanisms for temperature fluctuations and the exploration of wireless data transmission for remote monitoring.

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