Medimart: your ultimate automated medical companion

*United International University

1st Abu Bakar Fahad
Dept. of CSE
011201119

2nd Md. Ashik
Dept. of CSE
011201123

3rd Mithila Farjana
Dept. of CSE
011201127

4th Syed Eftasum Alam
Dept. of CSE
011201133

***Abstract*—This paper presents the design and implementation of an automated first aid kit and medicine system for university campus using Arduino,RFID technology,database and server. The proposed system is designed to provide easy and convenient access to first aid medical equipment for students and employees of the university. The system is based on a "pay as you go" model where users can pay for the products via RFID scanner and a digital paying platform, this project also contains other features such as-smart dustbin and automated hand sanitizer for the users.The proposed system offers several benefits over the traditional first aid kit system, including easy access, convenience, automation.**

***Index Terms*—Arduino UNO, RFID, Automated, ESP32, Ultrasonic, Servo, Database.**

I. Project Overview

The exponential advancement of technology is fundamentally transforming the landscape of our world on a daily basis, it is essential that we cultivate a deeper understanding of its potential benefits in a responsible and sustainable manner. In our university, a medical center is provided to cater to the healthcare needs of all students. However, it has come to our attention that a majority of the students are not aware of its existence. In the case of minor injuries,occurrences and emergencies, it would be advantageous for the students to have access to first-aid treatment equipment and medicine provider in a hassle-free manner. To address this issue, we propose the implementation of a smart system that utilizes Arduino-based technology and various sensors to provide automated medical first-aid kits. This system will employ a "pay-as-you-go" approach, with payment for the products being made via an RFID scanner and a digital payment platform. The system will also incorporate an automated hand-sanitizer section and an automated waste bin section. Additionally, RFID cards will be provided for students.This RFID cards will be included in our database with user details information.If a user scans the RFID an email will be automatically sent from the server with our website link,user name and random generated password to the users.It will also provide consumers with access to their previous medical prescriptions provided by doctors. Upon selection of the desired items, payment will be deducted from the rechargeable user account, and a confirmation message will be sent to the consumer. Our proposed system aims to ensure the availability of basic first-aid treatment for all students and employees of the university.

II. Introduction

As students, we often face various unexpected situations, especially when it comes to our health. The lack of access to basic first aid equipment and medical facilities can be a major issue, leading to unnecessary stress and inconvenience. To address this problem, our team has developed a smart system that provides an automated medical first aid kit and medicine provider equipped with various technological features to ensure that students have easy access to essential medical supplies. With our system, students will be able to easily locate and purchase required medicines through a user-friendly interface. Additionally, our system features an automated hand-sanitizer section, automated waste bin section. With the integration of our system, we aim to ensure that all students in our university have easy access to basic medical treatment, improving the overall health and well-being of the campus community.

III. Component List

Our used componets are given below-

1) Arduino UNO - BDT 850
2) RFID Sensor - BDT 120
3) Servo Motor - BDT 110
4) Ultrasonic Sensor - BDT 80
5) ESP32 - BDT 350

IV. Hardware Shop: Swadesh Electronics

Rabeya Elias Market,
1st Floor,
Shop No.15;
62, Patuatuli, Dhaka-1100, Bangladesh,
Contact No: 01911-35744,
Facebook: swadeshelectronics,
Email: swadeshelectronics@gmail.com

V. Feature Components

All Feature components are given below-

1) Feature: Smart Dustbin
Components: Arduino UNO , Ultrasonic Sensor, Servo Motor.

2) Feature: Hand Sanitizer

Components: Arduino UNO , Ultrasonic Sensor, Servo Motor.

3) Feature: Register User
Components: Esp32.
Web Server: Free Domain Hosting, Database, Website.

4) Feature: RFID Scan
Components: Esp32, RFID, RFID card and tag.

5) Feature: Buy Medicine
Components: Esp32, Arduino UNO, Servo
Web Server: Database, Patient page, Currency Recharge

6) Feature: Prescribe Medicine(for Doctors only)
Components: Esp32
Web Server: Database, Doctor page

VI. Component Description

A. Aurduino Uno

Arduino is a highly popular platform that is renowned for its cost-effectiveness, user-friendly programming, open-source architecture, and reliability, amongst other features. For our project, we have opted for the Arduino UNO R3 board, which comes equipped with 14 digital pins, 6 analog pins, a flash memory of 32 KB, an operating voltage of 3.3V and 5V, and an input voltage range of 7-20V. It is powered by a Microchip AVR 8-bit CPU and has a clock speed of 16 MHz. With a weight of just 25 grams, it is lightweight and compact, making it ideal for our project.

Fig. 1. Arduino Uno.

B. RFID

Radio Frequency Identification (RFID) is a technology that utilizes electromagnetic fields to automatically detect and identify tagged objects. It operates by storing electronic information on a thin, credit-card-like tag or chip which contains a small electronic device with a chip, coil, and antenna.

C. Servo Motor

A servo motor is a type of rotary actuator that provides precise control of angular position. It consists of a motor, a gear train, and a control circuit, and is capable of rotating to a specific angle and holding that position.

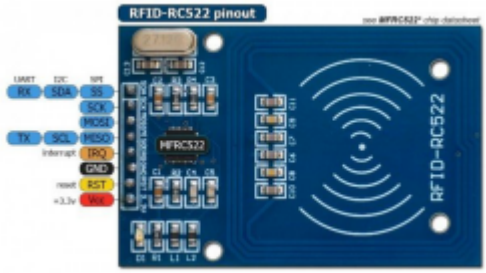

Fig. 2. RFID

Fig. 3. Servo Motor

D. Ultrasonic Sensor

Ultrasonic sensor is a device that uses sound waves to measure distance or detect objects. It emits high-frequency sound waves and measures the time taken for the sound to reflect back, which is then used to calculate distance.

Fig. 4. Ultrasonic Sensor

E. Esp32

ESP32 is a powerful Wi-Fi and Bluetooth enabled microcontroller developed by Espressif Systems. It is equipped with a dual-core processor, multiple digital and analog input/output pins, and a range of communication protocols. Its versatility and low power consumption make it suitable for a variety of IoT applications.

VII. Implementation

A. Flowchart

In this flowchart our whole working procedure is given-

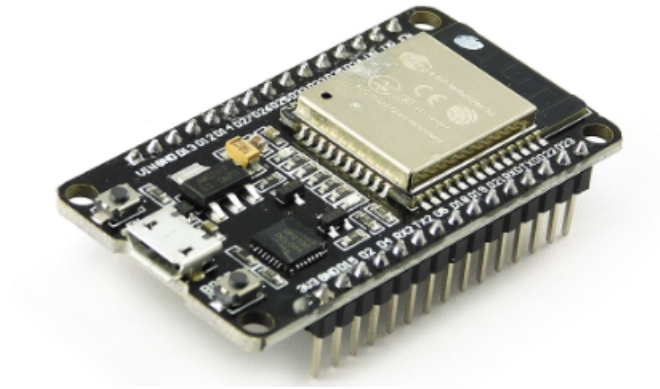

Fig. 5. ESP32

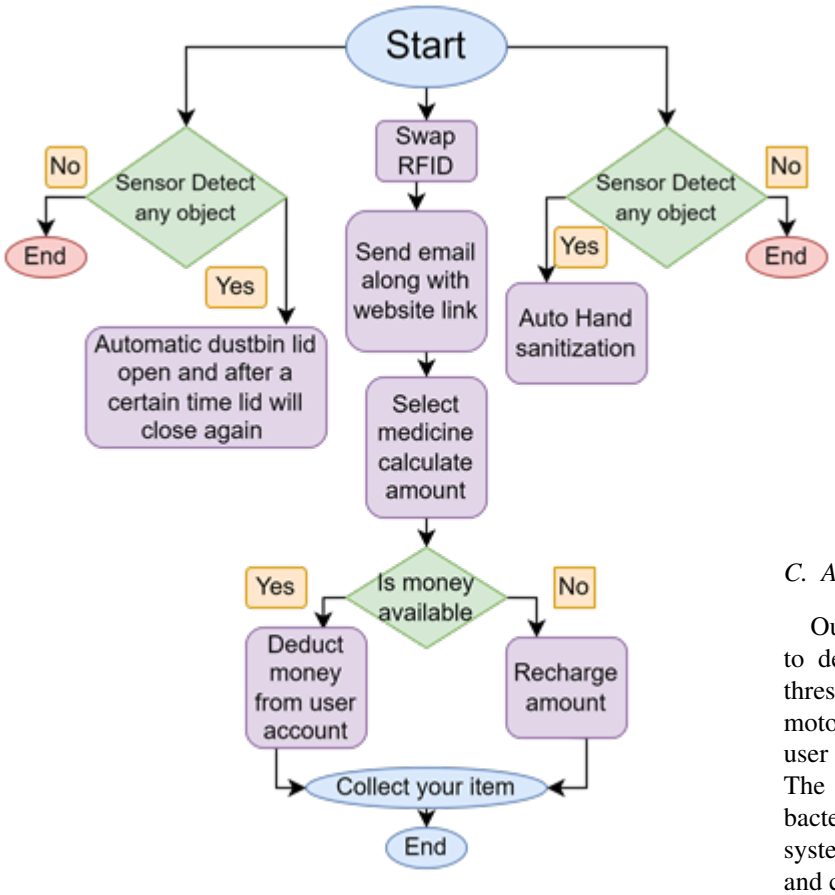

Fig. 6. Flowchart of our proposed project

B. *Smart Dustbin*

Our project involves creating a smart dustbin that can measure the distance using an ultrasonic sensor. If someone place a hand in front of the dustbin, if the distance exceeds a certain threshold, the lid of the dustbin will automatically open with the help of a servo motor. After a predetermined time, the lid will close on its own. This automated system eliminates the need for manual opening and closing of the dustbin, reducing the risk of contamination and providing a convenient solution.

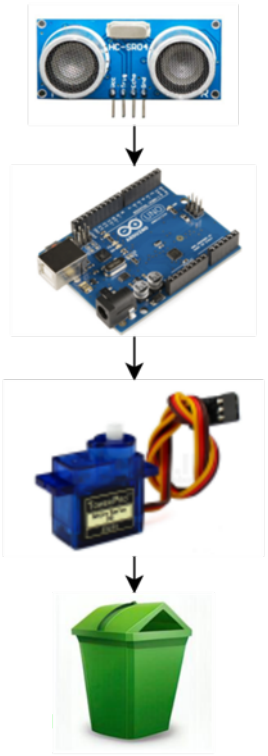

Fig. 7. Smart Dustbin

C. *Automated Hand-Sanitizer*

Our automated hand sanitizer utilizes an ultrasonic sensor to detect the presence of a hand within a certain distance threshold. Once the sensor detects a hand, it triggers a servo motor to open the lid of the sanitizer dispenser, allowing the user to access the hand sanitizer without any physical contact. The design is intended to reduce the spread of germs and bacteria, promoting better hygiene and health practices. The system is powered by a microcontroller, such as an Arduino, and can be easily programmed to adjust the distance threshold, timing, and other parameters to suit different environments and preferences. By using sensors and automation, smart hand sanitizer systems can reduce waste and ensure that sanitizer is used efficiently, which can ultimately lead to cost savings.

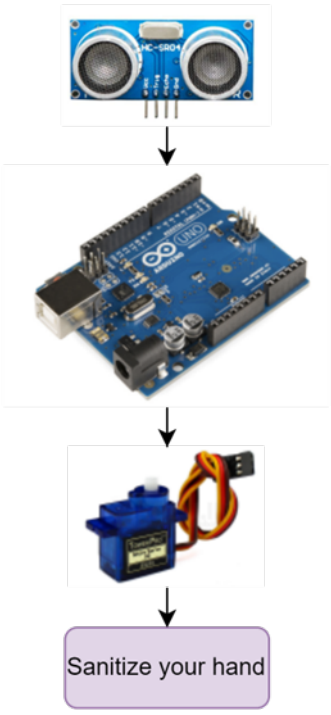

Fig. 8. Automated Hand Sanitizer

D. RFID Scan

The proposed system involves scanning the RFID card for user authorization, followed by sending an email to the user's registered email ID with the website link, username, and randomly generated password. After logging in, the user can access the patient page, which consists of options such as recharge section, previous prescription details, purchase of new medicines, and deletion of previous prescriptions. The user can select the desired medicine and make payment through the website. Upon purchase, an email will be sent to the user with the purchase details, and the payment will be deducted from the rechargeable user account.

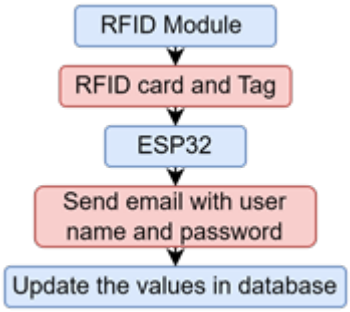

Fig. 9. RFID Scan

E. Website Update

The proposed system incorporates an automated update of user information, including prescription details provided by doctors, and real-time updates of recharge amounts in the user's account. These updates will be made automatically in the database upon prescription and payment. Additionally, users will have access to their latest information through our website. This will enable the user to manage their account effectively and efficiently, thereby enhancing their overall experience with the system.

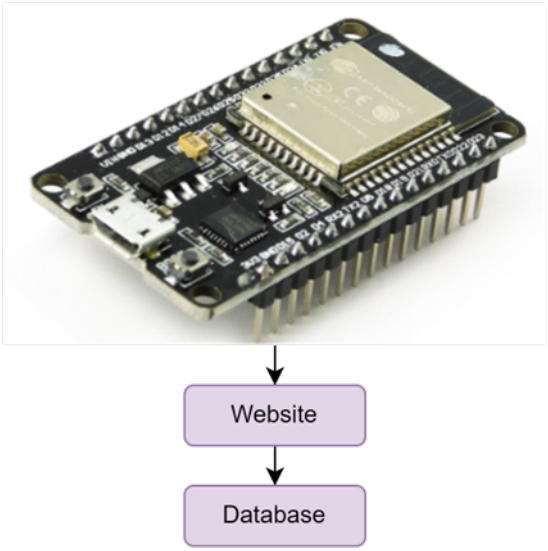

Fig. 10. Website Update

VIII. Project

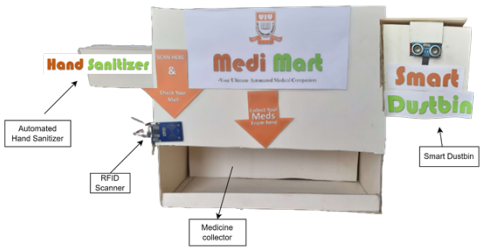

Fig. 11. Website Update

IX. Future Plan

For this project our future plans are- Integration with a mobile app: A mobile app can be developed for the students to access the system easily from their phones.

Real-time monitoring: A system can be added to monitor the inventory of medicines, medical equipment and notify the concerned authority to restock them.

Expansion of the system: The system can be expanded to include other medical facilities like scheduling appointments with doctors and booking tests.

Collaboration with the university's medical center: The project can be collaborated with the university's medical center to provide better medical facilities for the students.

X. Important links

Important links for this project are given below-

Project Video Link and Source code: https://drive.google.com/drive/folders/1uPtX-ylfPAIV2Iwqh7u7WkaZrKWn9uui?usp=share_link

XI. Conclusion

In conclusion, our medical facility project aims to provide easy access to first aid treatment equipment and medication for university students. With the use of advanced technology such as RFID and Arduino, we have developed a smart system that allows students to quickly access the medical supplies they need. Our project also includes a user-friendly interface that allows students to view their medical history and access previous prescriptions provided by doctors. Overall, we believe that our system can greatly improve the health and well-being of university students by providing them with easy and efficient access to medical resources.