Medicine Orgenizer

We help you to live healthire

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ABSTRACT

one of the most important topics that should be taken care of in H-IOT field is how Organizing medicines to patients to ensure that they receive the full doses without any personal error especially dangerous medicine such cancer medicine and sickle cell anemia and diabetes. this paper proposed prototype for " medicine organizer" Where the user can organize one of his medications, so when the patient takes his medicine, the weight is calculated and sent to the cloud with the date, time, and number of doses taken, and reviewed on the tracking page that the user can access. paper shows the developing of the proposed solution in steps, starting from the connecting hardware then presenting the real results and enhancements for future work

KEYWORDS—***H-IOT , Thing Speak , CGM , RFID ,Medicine Organizer***

I. INTRODUCTION

Over the past decade, the Internet of Things (IoT) has Megatrend 4th Generation Innovative Technology that Makes It Possible Provide superior connectivity to each uniquely identifiable Intelligent objects and devices of the Internet infrastructure . Of The structure of the advanced connectivity of these devices and A service that runs on Machine-to-Machine (M2M).IoT is a high-performance distributed network It formed so many objects. prospectus IoT as a guideline for the world Connect physical objects, substances, people, and each other new ways of working, communication, interaction, Interesting and lively. IoT enables transformation carry a physical object to obtain information Use underlying assets to coordinate decisions Technologies such as ubiquitous and pervasive computing, embedded devices, intelligent technology, sensor networks, Internet protocols and domain-specific applications . The recent rise of Internet of Things (IoT) is causing paradigm shifts in all areas of human machine interaction, from manufacturing to healthcare, government to infrastructure management, and consumer services. The Internet of Things has seen massive adoption across multiple sectors in recent years. Some of the company's IoT applications will bring in $3.9 trillion to his $11.1 trillion annual economic impact worldwide, according to McKinsey Global Institute projections. The healthcare sector is one of the most important areas where technology needs to be integrated. This integration is one of the benefits of the Internet of Things in medical devices, as it has greatly contributed to improving the quality and effectiveness of healthcare services. The integration of the Internet of Things into the health care sector, which is called H-IOT, is considered a transitional stage in the health sector, especially as it contributed to the early detection of some disorders and the implementation of a preventive treatment plan, as well as the organizing of treatment for patients such as those with diabetes. Few references found in the literature about organizing medicine so her we will review some of the literature about IOT in healthcare (H-IOT) in general And close to the topic : In [1] Although current medicine delivery strategies are more precise, Administer drugs to the right place at the right time, Several clinical difficulties hamper control of habitual complaint. poor drug compliance, indecorous drug, or disinclination medicine control due to side goods, etc. The further ails you treat, the further physical and cerebral the stress they endured. These loads are long- term dad- clinging to Chronic Disease Management and Enhancing Cognitive Performance stress and internal illness. For illustration," diabetic collapse" is a term for this. Explain the long- term miracle of cerebral restraint glycemic control. Comprehensive, Case- Centric, Automated Dynamic medicine delivery and delivery models can reduce case stress Increase compliance. Mini Med Paradigm REAL- TIME System(Medtronic Diabetes, Northridge, CA) launched in 2006. This device was insulin Livery device with erected- in nonstop real- time glucose monitoring(CGM). Insulin was administered with a unrestricted insulin delivery system. It's assessed according to measured serum glucose situations. Medicine Tronic Mini Med Helps further Diabetics Get Advanced Values Degree of treatment satisfaction and compliance. In [2] Self-regulated drug delivery devices with closed-loop systems are designed to achieve autonomous delivery of therapeutics and improve patient compliance. A micro/nano sensor detects subtle in vivo pathophysiological change of targeted tissue/markers and monitors in vivo drug concentrations, generating feedback systems to modify drug release until the concentration achieves the thera- peutic level. In[3] Since 2020, as the pandemic of the new coronavirus infection (COVID-19) has spread around the world, Due to social distancing and travel restrictions, more people "stay at home". Telemedicine is definitely new, Evolving technology to meet home medical needs Screening, diagnosis and monitoring. 2019 Nicola di Trani and others.

Introduced a remote controlled drug delivery device Track drug delivery rates via Bluetooth. this Technology does more than just give patients control over drug release Although external, it inspires new means of data transmission -Wireless data communication between implant and area outside the body. Internet and cloud synchronization Healthcare providers can also professionally provide transferable datasets Advice based on the information we collect. In[4] presents an overview of RFID applications in body-centric systems that collect information about a user's life (temperature, humidity, and gases) neighborhood. Full lifecycle monitoring and Effective healthcare monitoring system developed with IoT and RFID keyword. This system evaluates, monitors and verifies true results Assess patient health, IoT functionality in combination with microcontrollers sensor. In[5] uses an intelligent home-based platform. Propose and implement iHome Health-IoT Enable the open platform based iMed Box (intelligent medicine box) for integrating devices and services into the platform It has great connectivity and compatibility. passive RFID and Arduino Ethernet Shield enable communication of Intelligent Pharmaceutical Packaging (iMed Pack).

II. MEDICINE ORGANIZER

A. main idea

The proposed solution is to create a small refrigerator or a closed box based on the Internet of Things. A scale is installed inside the refrigerator or box, and this scale is connected to the electronic application. How the patient puts all the medicines inside the refrigerator so that each medicine has a specific weight, all the medicines and their weights are sent to the application for display, and when the patient opens the refrigerator to take a specific medicine and then returns it again, the new weight of the medicine is sent to the application, and the date and time that the medicine was taken In it and the number of doses that decreased, in this way the patient can organize his medication and know if he took the medication or not. To simulate this method, the proposal was applied to only one medicine .

B. The Prototype

It is a small scale that has an empty bottle installed. The user puts the medicine inside the bottle, then the scale calculates the weight of the medicine and sends information to the cloud which the information will appear. When the user takes the dose, the scale gives a reading that the weight has decreased, so the information appears to the user in the on the tracking page, so the patient can know the time of taking the medicine and track it.

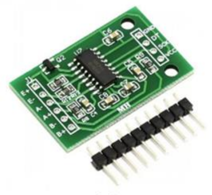
III. HARDWAERS:

The main hardware components used are shown in figure 1 that is as follows: (a) node MCU esp8266 , (b) HX711 module , (c) LCD display ,(d) 5kg load cell .

(a) node MCU esp8266 is an open source software and hardware development environment built around a low-cost system-on-chip (SoC) called ESP8266. Designed and manufactured by Espressif Systems, the ESP8266 contains the essential elements of a computer. CPU, RAM, network (Wi-Fi) and even the latest operating system and his SDK. This makes it a great choice for all kinds of Internet of Things (IoT) projects. (b) The HX711 module is a load cell amplifier breakout board for the HX711 IC that allows you to easily read load cells and measure weight. This module uses 24 high-precision A/D converter chips HX711.

(c)A load cell is an instrument that helps to determine the size of a load (either a force or weight) and converts the force into measurable electrical output. (d) a 16x2 LCD display screen with I2C interface. It is able to display 16x2 characters on 2 lines, white characters on blue background. it only needs 4 pins for the LCD display: VCC, GND, SDA, SCL. It save at least 4 digital/analog pins.

(c) NODE MCU ESP8266



(d) HX711 module

(b) 16x2 l2c LCD display

(a) 5kg load cell

Figure 1 : Hardware components

IV. SOFTWARE

The software used for this proposed solution has the following 2 parts: (1) Arduino IDE: The Arduino IDE is used with C language to develop the sketch containing the code required to connect the components and capture the data form the sensors, store them into variables then send to the thing speak as a cloud environment. (2) Thing speak in figure 2 : Thing Speak is IoT Cloud platform where we can send sensor data to the cloud. we can also analyze and visualize the data with MATLAB or other software, including making our own applications.

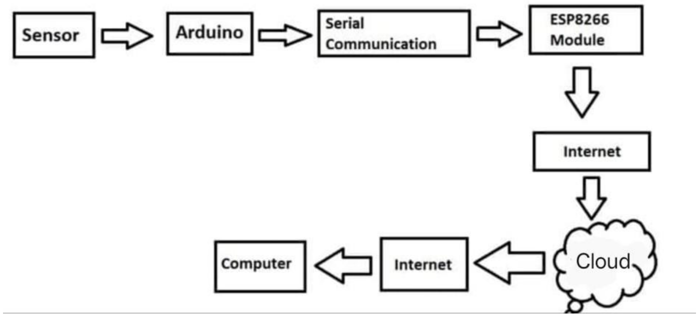


Figure 2: Thing speak environment working

A. Arduino IDE :

In Figure 3 is a circuit diagram for interfacing 5KG Load Cell and HX711 Module with Node MCU ESP8266 12E Board. The connection between Node MCU ESP8266 & HX711 connect VCC with 3V , gnd with G . Connect the DT & SCK Pins of Load Cell to ESP8266 D5 & D6 Pins respectively. I have used a 2 push-button white switch to reset the weight to zero Push-button Switch is a connected digital pin D0 of ESP8266. and red for saving and sending to cloud and it's connect with D8 of ESP8266. I used a 16X2 I2C LCD Display to minimize the connection. So, connect the SDA & SCL pin of I2C LCD Display to D3 & D4 of Node MCU respectively.

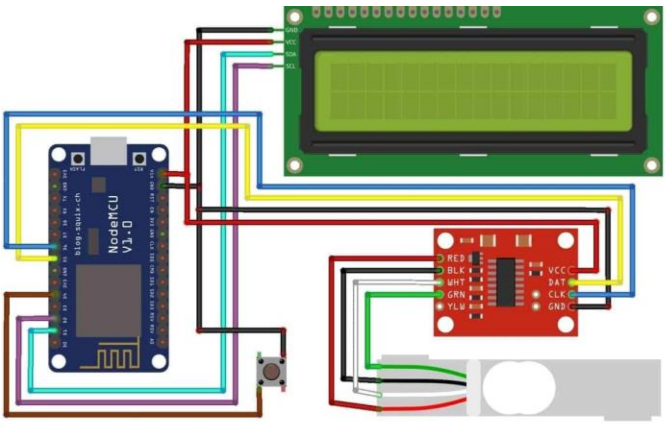


Figure 3: circuit diagram for interfacing

The model will include the following libraries:

```
#include <HX711_ADC.h> // 1.2.12
#if defined(ESP8266)|| defined(ESP32) || defined(AVR)
#endif
#include <EEPROM.h>
#include <Wire.h>
#include <LiquidCrystal_I2C.h> // 1.1.2
#include "ThingSpeak.h" // 2.0.1
#include <ESP8266WiFi.h>
#include <WiFiManager.h> // 2.0.15-rc.1
```

Figure 3: circuit diagram for interfacing

(ESP8266), (ESP32), (AVR) to defined node mcu , <EEPROM.h> & <Wire.h> rom library and wires for output , <LiquidCrystal_I2C.h> The library allows to control I2C displays with functions extremely similar to LiquidCrystal library, "ThingSpeak.h" this library to allow the ide to connect with cloud , <ESP8266WiFi.h> to connect with wifi , <WiFiManager.h> When ESP8266 boots it is set up in Station mode and tries to connect to a previously saved Access Point (a known SSID and password combination).

```
// for thingspeak
float value = 0;
int thingSpeakRespose = 0; // http response
//----------- Enter you Wi-Fi Details---------//
char ssid[] = "hawra";   // your network SSID (name)
char pass[] = "hawra12345";   // your network password
//-----------------------------------------//

//----------- Channel Details -------------//
unsigned long Channel_ID = 1996922; // Channel ID
const int Field_1 = 1; // Don't change
const int Field_2 = 2; // Don't change
const char * WriteAPIKey = "JCCKDUG9G4YM7XHO"; // Your write API Key
```

Figure 4: set up the network

For thing speak setup we will save the name and the password for the Wi-Fi network and set up the channel details by inter the channel ID and `Write API Key.`

```
void internet()
{
  if (WiFi.status() != WL_CONNECTED)
  {
    Serial.print("Attempting to connect to WiFi: ");
    lcd.print("                "); // print out to LCD
    lcd.setCursor(0, 1); // set cursor to second row
    lcd.print("Waiting for WiFi"); // print out to LCD
    wifiManager.autoConnect("NodeMCU", "123456789");
```

Figure 5: set up the network 2

If the network not connect direct the massage "waiting foe Wi-Fi " will appear in the display and we should connected manually by " node MCU" network then enter to the manager and connect with the network that registered before.

```
void setup() {
  Serial.begin(57600); // serial monitor output
  Serial.println("\n"); // new line
  Serial.println("IoT Project is starting...");
  Wire.begin(2,0); // begin(int sda :D4, int scl:D3) i2c ports
  lcd.init(); // begins connection to the LCD module
  lcd.backlight(); // turns on the backlight
  lcd.setCursor(1, 0); // set cursor to first row
  lcd.print("Digital Scale "); // print out to LCD
  lcd.setCursor(0, 1); // set cursor to second row
  lcd.print(" 5KG MAX LOAD "); // print out to LCD
  delay(3000);
```

Figure 6: starting

When the setup connected with Wi-Fi the The following statements will appear sequentially "IoT Project is starting..." , "Digital Scale " , " 5KG MAX LOAD "
Then it will deleted after 3 millisecond .

```
lcd.setCursor(1, 1); // set cursor to second row
lcd.print(weight, 1); // print out the retrieved value to the second row
lcd.print("g ");
float weight_oz = weight/28.3495;
lcd.setCursor(9, 1);
lcd.print(weight_oz, 2);
lcd.print("oz ");

if (weight>=5000)
{
  weight=0;
lcd.setCursor(0, 0); // set cursor to secon row
lcd.print("  Over Loaded   ");
delay(200);
}
```

Figure 7: unit convert

On of the weight appears on the screen in two units of oz and grams Where the weight in grams is divided by 28.3495 to obtain the weight in oz and printed in Line 2 after weight with g . This scale can bear up to 5 kg of weight, but if the weight is heavier, it will appear over loaded as shown in figure 7 .

```
if (digitalRead (taree) == HIGH)
{
  lcd.setCursor(0, 1); // set cursor to secon row
  lcd.print("    Taring...     ");
  LoadCell.start(1000);
  lcd.setCursor(0, 1);
  lcd.print("                  ");
}
```

Figure 8: button 1

```
  // if the button state has changed:
  if (digitalRead(save) != buttonState) {
    buttonState = digitalRead(save);

    // only toggle the LED if the new button state is HIGH
    if (buttonState == HIGH) {
      lcd.setCursor(0, 1); // set cursor to secon row
      lcd.print("    Saving...     ");
      Serial.println(weight);
      value = weight;
```

Figure 9: button 2

In this prototype we have to buttons white and red , as shown in figure 8 the first one is Calle it taree for make the weight 0 , so if taree = high it means it is press the massage will appear in the display " taring" , then we should put the medicine on the surface and press button 2 to calculate the weight and save it and send it to the cloud as shown in figure 9.

B. Thing speak

We build 2 interfaces first is intro and second tracking page that present the date and time , that taken dose .We modified the setup for channel as shown in the figure 10.

```
// set thingspeak
thingspeak['url'] = 'https://api.thingspeak.com';
thingspeak['channel'] = 1996922;
thingspeak['read_api_key'] = 'UO7VQQGIGFI5VK4F';
thingspeak['results'] = 20;
thingspeak['timezone'] = 'Asia/Riyadh';
thingspeak['location'] = false;
thingspeak['status'] = false;
thingspeak['start'] = true;
```

Figure 10: thing speak channel set up

V. RESULT

So the results is When the user puts all the medicine pills in the bottle and presses the red button, it's calculate the weight, saves the data, and sends it to the thing speak , Then he repeats the experiment, but one pill reduces the amount of the medicine, so the new weight is recorded and it turns out that it is less than the previous weight, and this means that the medicine has been taken as shown in figure 12.

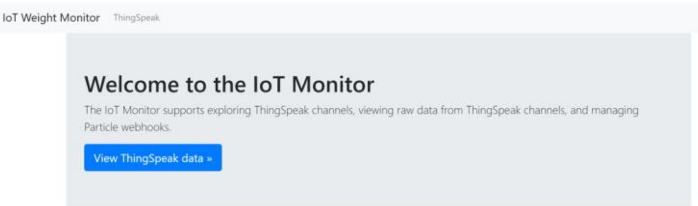
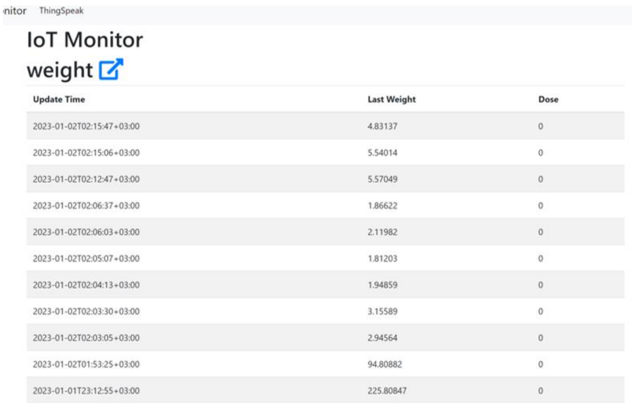


Figure 11: thing speak first interface



Update Time	Last Weight	Dose
2023-01-02T02:15:47+03:00	4.83137	0
2023-01-02T02:15:06+03:00	5.54014	0
2023-01-02T02:12:47+03:00	5.57049	0
2023-01-02T02:06:37+03:00	1.86622	0
2023-01-02T02:06:03+03:00	2.11982	0
2023-01-02T02:05:07+03:00	1.81203	0
2023-01-02T02:04:13+03:00	1.94859	0
2023-01-02T02:03:30+03:00	3.15589	0
2023-01-02T02:03:05+03:00	2.94564	0
2023-01-02T01:53:25+03:00	94.80882	0
2023-01-01T23:12:55+03:00	225.80847	0

Figure 12: thing speak tracking page

VI. FUTURE WORK

In the future, we look forward to implementing the main idea that will directly benefit the user, with the possibility of applying it and proving its effectiveness on a number of medicines. We also look forward to linking the idea to an electronic application that the user can download on his mobile phone and track his medication schedule, in addition to adding a medication reminder feature.

VII. CONCLUSION

A proposal is presented "medicine organizer" to organize the lives of patients and help them reduce making mistakes in taking medicines, which contributes to reducing the chances of spreading diseases or death due to wrong doses. It also contributes to integrating the Internet into medical life more to contribute to technical and social development. This proposal included a mini scale model that calculates the weight of the medicine and records it in the cloud, and shows the time, date, new weight, and dose taken, looking forward to its contribution to organizing patients' lives.

VIII. REFERENCES

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