Visvesvaraya National Institute of Technology (VNIT), Nagpur

Embedded System Endsem Report

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Semester 5

Submitted to :
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Question 1 = Using ESP32 make ATM like functioning machine

Requirements = Arduino software, telegram, ESP32, wires(optional), Google sheets

Code:

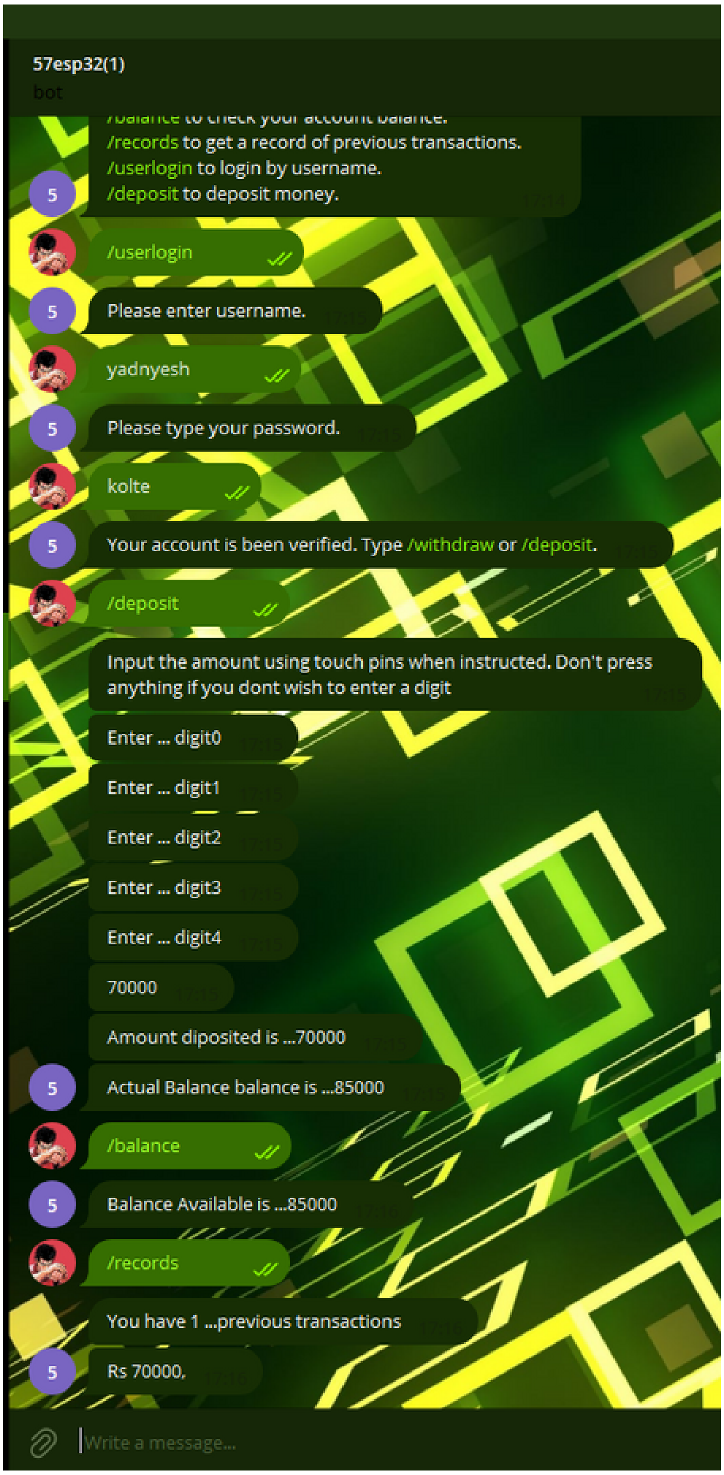
```
#include <WiFi.h>
#include <WiFiClientSecure.h>
#include <UniversalTelegramBot.h>
#include <ArduinoJson.h>
#include <HTTPClient.h>

const char* ssid = "Ammmmm";
const char* password = "yadnyesh2289";

//define chat_id and bottoken
#define BOTtoken "5924533106:AAEeuVoDofcxB71JC0U4CP_txzfCLNzs0bU"
#define CHAT_ID "1783892261"

int otp;
int v;
int otp_ip[9];
int amount_ip[9];
int withdraw_amount[5];
int pinOrder[9] = { 4, 2, 15, 13, 12, 14, 27, 33, 32 };
int incorrect_otp_flag = 0;
int authorised_flag = 0;
int amount = 15000;
int notesleft[] = { 5, 10, 10 };
int denominations[] = { 200, 100, 50 };
int transactions[5];
int transactionCount = 0;
WiFiClientSecure client;
UniversalTelegramBot bot(BOTtoken, client);
// Checking for new commands every 1 second.
int botRequestDelay = 1000;
unsigned long lastTimeBotRan;
//function to return the touch value inputted from touch pins
int getTouchValue(String val) {
 //for otp input
 if (val == "otp input") {
  for (int x = 0; x < 9; x++)
   otp_ip[x] = touchRead(pinOrder[x]);
  return 0;
 }

 //for amount input
 else if (val == "amount_ip") {
  int retval = 99;
  Serial.println("enter");
  for (int x = 0; x < 9; x++)
   amount_ip[x] = touchRead(pinOrder[x]);
  for (int y = 0; y < 9; y++) {
   if (amount_ip[y] < 60 && y != 1)
    retval = y;
  }
  return retval;
 }
}
void newCommand(int numNewMessages) {
 Serial.println("New Command Found");
 for (int i = 0; i < numNewMessages; i++) {
  String chat_id = String(bot.messages[i].chat_id);
  if (chat_id != CHAT_ID) {
   bot.sendMessage(chat_id, "Unauthorized user", "");
   continue;
  }
  String text = bot.messages[i].text;
  Serial.println(text);
  if (text == "/start") {
   String welcome = "Welcome, \n";
   welcome += "Use the following commands to control your outputs.\n\n";
   welcome += "/login to login into the atm.\n";
   welcome += "/withdraw to withdraw money.\n";
   welcome += "/balance to check your account balance.\n";
   welcome += "/records to get a record of previous transactions.\n";
   welcome += "/userlogin to login by username.\n";
   welcome += "/deposit to deposit money.\n";
   bot.sendMessage(chat_id, welcome, "");
  }
  if (text == "/userlogin") {
   bot.sendMessage(chat_id, "Please enter username.\n", "");
  }
  if (text == "yadnyesh") {
   bot.sendMessage(chat_id, "Please type your password.\n", "");
  }
  if (text == "kolte") {
   bot.sendMessage(chat_id, "Your account is been verified. Type /withdraw or /deposit.\n", "");
   authorised_flag = 1;
  }
  if (text == "/login") {
   otp = random(1, 9);
   bot.sendMessage(chat_id, "Your OTP for login is ..." + String(otp), "");
   delay(9000);
   int ff = getTouchValue("otp input");
   for (int k = 0; k < 8; k++) {
    Serial.println(otp_ip[k]);
   }
   for (int k = 0; k < 8 && k != otp / 10 && k != otp % 10; k++) {
    if (otp_ip[k] <= 50) {
     incorrect_otp_flag = 1;
     break;
    }
   }
   if ((incorrect_otp_flag == 0) && (otp_ip[otp % 10] <= 50) && (otp_ip[otp / 10] <= 50)) {
    bot.sendMessage(chat_id, "Welcome! You have been ... authorised!", "");
    authorised_flag = 1;
   } else {
    bot.sendMessage(chat_id, "Incorrect OTP. Please ... try and login again", "");
   }
  }
  if (text == "/withdraw") {
   if (authorised_flag == 0)
    bot.sendMessage(chat_id, "Unauthorised User", "");
   else {
    bot.sendMessage(chat_id, "Input the amount using touch pins when instructed. Don't press anything if you dont wish to enter a digit", "");
    for (int countDigit = 0; countDigit < 5; countDigit++) {
     bot.sendMessage(chat_id, "Enter ... digit" + String(countDigit), "");
     delay(1000);
     withdraw_amount[countDigit] = getTouchValue("amount_ip");
     delay(1000);
    }
    int sum = 0;
    for (int countDigit = 0; countDigit < 5; countDigit++) {
     if (withdraw_amount[countDigit] != 99)
      sum = (sum * 10) + withdraw_amount[countDigit];
    }
    bot.sendMessage(chat_id, String(sum), "");
    if (sum % 100 == 0) {
     bot.sendMessage(chat_id, "Amount withdrawn is ..." + String(sum), "");
     amount = amount - sum;
     bot.sendMessage(chat_id, "Remaining balance is ..." + String(amount), "");

     int temp = sum;
     int i = 0;
     for (i = 0; i < 3; i++) {
      while (notesleft[i] > 0 && temp > denominations[i]) {
       temp = temp - denominations[i];
       notesleft[i] = notesleft[i] - 1;
      }
      if (temp == 0)
       break;
     }
     Serial.print(notesleft[0]);
     Serial.print(notesleft[1]);
     Serial.print(notesleft[2]);

     transactions[transactionCount] = sum;
     transactionCount++;
    } else
     bot.sendMessage(chat_id, "Invalid amount. Please ...withdraw again", "");
   }
  }
  if (text == "/deposit") {
   if (authorised_flag == 0)
    bot.sendMessage(chat_id, "Unauthorised User", "");
   else {
    bot.sendMessage(chat_id, "Input the amount using touch pins when instructed. Don't press anything if you dont wish to
enter a digit", "");
    for (int countDigit = 0; countDigit < 5; countDigit++) {
     bot.sendMessage(chat_id, "Enter ... digit" + String(countDigit), "");
     delay(1000);
     withdraw_amount[countDigit] = getTouchValue("amount_ip");
     delay(1000);
    }
    int sum = 0;
    for (int countDigit = 0; countDigit < 5; countDigit++) {
     if (withdraw_amount[countDigit] != 99)
      sum = (sum * 10) + withdraw_amount[countDigit];
    }
    bot.sendMessage(chat_id, String(sum), "");
    if (sum % 100 == 0) {
     bot.sendMessage(chat_id, "Amount diposited is ..." + String(sum), "");
     amount = amount + sum;
     bot.sendMessage(chat_id, "Actual Balance balance is ..." + String(amount), "");

     int temp = sum;
     int i = 0;
     for (i = 0; i < 3; i++) {
      while (notesleft[i] > 0 && temp > denominations[i]) {
       temp = temp - denominations[i];
       notesleft[i] = notesleft[i] - 1;
      }
      if (temp == 0)
       break;
     }
     Serial.print(notesleft[0]);
     Serial.print(notesleft[1]);
     Serial.print(notesleft[2]);

     transactions[transactionCount] = sum;
     transactionCount++;
    } else
     bot.sendMessage(chat_id, "Invalid amount. Please ...withdraw again", "");
   }
  }
  if (text == "/balance") {
   if (authorised_flag == 0)
    bot.sendMessage(chat_id, "Unauthorised User", "");
   else {
    String avail_bal = "Balance Available is ..." + String(amount);
    bot.sendMessage(chat_id, avail_bal, "");
   }
  }
  if (text == "/records") {
   String ans = "You have " + String(transactionCount) + " ...previous transactions ";
   String rec;
   for (int l = 0; l < transactionCount; l++)
    rec = rec + "Rs " + String(transactions[l]) + ",";
   bot.sendMessage(chat_id, ans, "");
   bot.sendMessage(chat_id, rec, "");
  }
 }
}
void setup() {
 Serial.begin(115200);
#ifdef ESP8266
 client.setInsecure();
#endif

 pinMode(2, INPUT);
 pinMode(4, INPUT);
 pinMode(15, INPUT);
 pinMode(13, INPUT);
 pinMode(12, INPUT);
 pinMode(14, INPUT);
 pinMode(27, INPUT);
 pinMode(33, INPUT);
 pinMode(32, INPUT);
 // Connect to Wi−Fi
 WiFi.mode(WIFI_STA);
 WiFi.begin(ssid, password);
 client.setCACert(TELEGRAM_CERTIFICATE_ROOT);
 WiFi.setSleep(false);
 while (WiFi.status() != WL_CONNECTED) {
  delay(1000);
  Serial.println("Connecting to WiFi..");
 }
 // Print ESP32 Local IP Address
 Serial.println(WiFi.localIP());
}
void loop() {
 if (millis() > lastTimeBotRan + botRequestDelay) {
  int numNewMessages = bot.getUpdates(bot.last_message_received + 1);
  while (numNewMessages) {
   Serial.println("got response");
   newCommand(numNewMessages);
   numNewMessages = bot.getUpdates(bot.last_message_received + 1);
  }
  lastTimeBotRan = millis();
 }
}
/*
#include "WiFi.h"
#include <HTTPClient.h>
// WiFi credentials
const char* ssid = "Ammmmm"; // change SSID
const char* password = "yadnyesh2289"; // change password

// Google script ID and required credentials
String GOOGLE_SCRIPT_ID = "AKfycbwENyTEUDVFwheGLLUIYYrwQsdUEnJN6-iVyBm1W-
TXdFWKbQFcD1Qp32vLgLJrve1gjw";
int count1 = 0;
int count2 = 0;
void setup () {
 delay (1000);
 Serial.begin(115200);
 delay(1000);
 // connect to WiFi
 Serial.println ();
 Serial.print("Connecting to wifi: ");
 Serial.println(ssid);
 Serial.flush() ;
 WiFi.begin (ssid, password);
 while (WiFi.status() != WL_CONNECTED)
 {
  delay (500);
  Serial.print(".");
 }
}

void loop () {
 if (WiFi.status () == WL_CONNECTED) {
  count2 = count1 *count1;
  String urlFinal = "https://script.google.com/macros/s/"+GOOGLE_SCRIPT_ID+
  "/exec?"+"data1=" + String (count1) + "&data2=" + String (count2);
  Serial.print ("POST data to spreadsheet:");
  Serial.println (urlFinal);
  HTTPClient http;
  http.begin (urlFinal.c_str () );
  http.setFollowRedirects (HTTPC_STRICT_FOLLOW_REDIRECTS) ;
  int httpCode = http.GET () ;
  Serial.print ("HTTP Status Code: ");
  Serial.println (httpCode);
  http.end () ;
 }
 count1++;
 delay (1000);
}
*/
```

Code Explanation :-

- First of all the username and password were given in Google sheets that are to be verified by the Telegram bot as the user input the username and password.
- This is to be initialized by stating the telegram bot, /start is the command that is used to start the bot. After that, I have given the user two ways to verify him first by his username and password and another by OTP that is generated by the telegram bot.
- /userlogin is used to log in by username and /login is used to verify by OTP. As stated in the question given by the instructor it is to be done by username and password. so as that we are doing here.
- First, the user puts in his username and password and if it verifies then the bot gives two option one to withdraw and one to deposit. as the name suggest /withdraw and /deposit respectively.
- Since the highest amount is 15000, the bot will ask for 5 digits. So for eg, if my input is 4000, then the last digit won't be anything inputted by the user.
- After input, the code checks if the entered amount is right. If not multiple of 100, then the bot replies ”invalid amount” and the user has to input again.
- The amount is inputted using touch functionality as explained above. Since there can max of 5 digits to amount input, the function is called 5 times with a certain delay after each call to allow user input.
- One extra component is added in the code that is to be verified by OTP.
- One extra component added to it was the record of previous transactions An array was created to store the last 5 transactions of the user. The ”records” command will show the number of past successful transactions and the amount that has been withdrawn. It is updated after every transaction.
- The time the amount is updated is always updated to google sheets. By App script it is updated in google sheets.

Output :-

The outputs are shown in the given video or there is a youtube video link can watch there also. But this video covers only a few things. As the instructor instructed.



/balance to check your account balance.
/records to get a record of previous transactions.
/userlogin to login by username.
/deposit to deposit money.

/userlogin

Please enter username.

yadnyesh

Please type your password.

kolte

Your account is been verified. Type /withdraw or /deposit.

/deposit

Input the amount using touch pins when instructed. Don't press anything if you dont wish to enter a digit

Enter ... digit0

Enter ... digit1

Enter ... digit2

Enter ... digit3

Enter ... digit4

70000

Amount diposited is ...70000

Actual Balance balance is ...85000

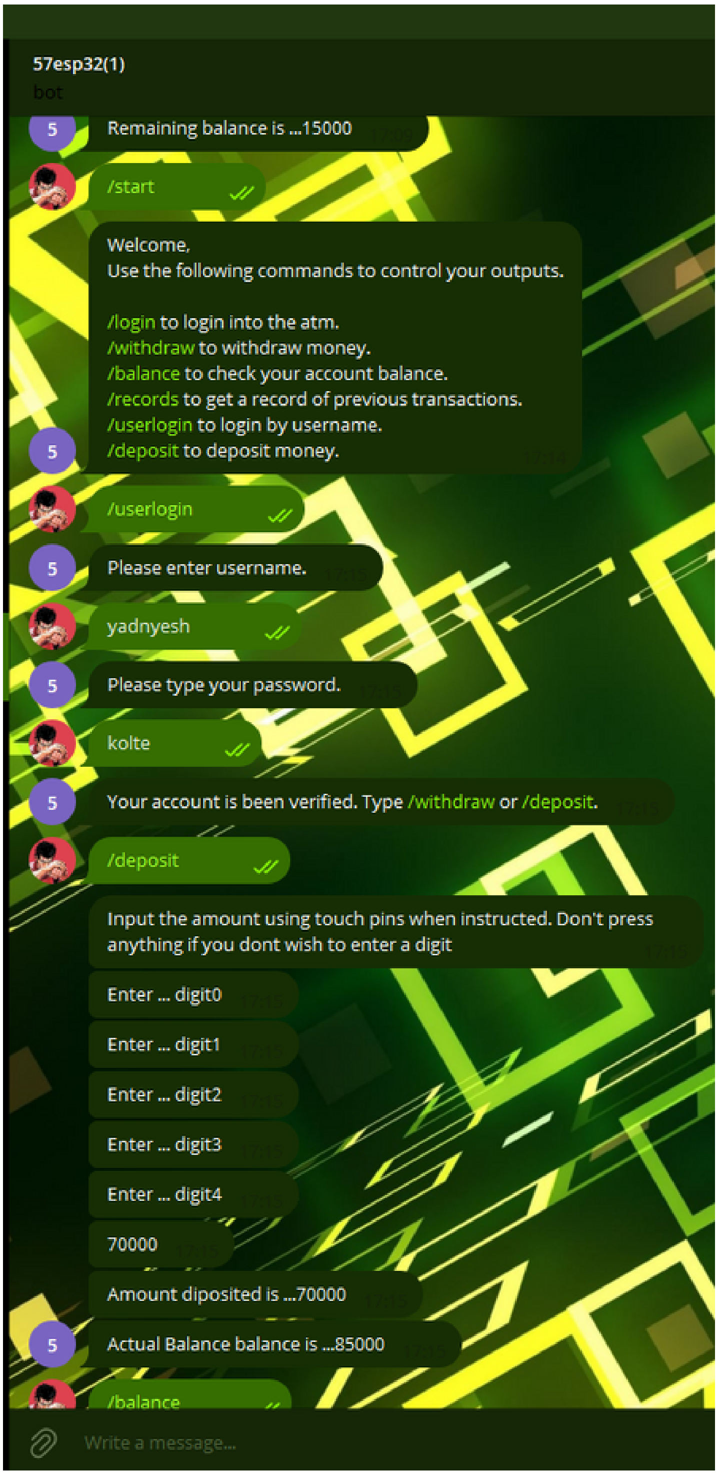
/balance

Balance Available is ...85000

/records

You have 1 ...previous transactions

Rs 70000,



Remaining balance is ...15000

/start

Welcome,
Use the following commands to control your outputs.

/login to login into the atm.
/withdraw to withdraw money.
/balance to check your account balance.
/records to get a record of previous transactions.
/userlogin to login by username.
/deposit to deposit money.

/userlogin

Please enter username.

yadnyesh

Please type your password.

kolte

Your account is been verified. Type /withdraw or /deposit.

/deposit

Input the amount using touch pins when instructed. Don't press anything if you dont wish to enter a digit

Enter ... digit0

Enter ... digit1

Enter ... digit2

Enter ... digit3

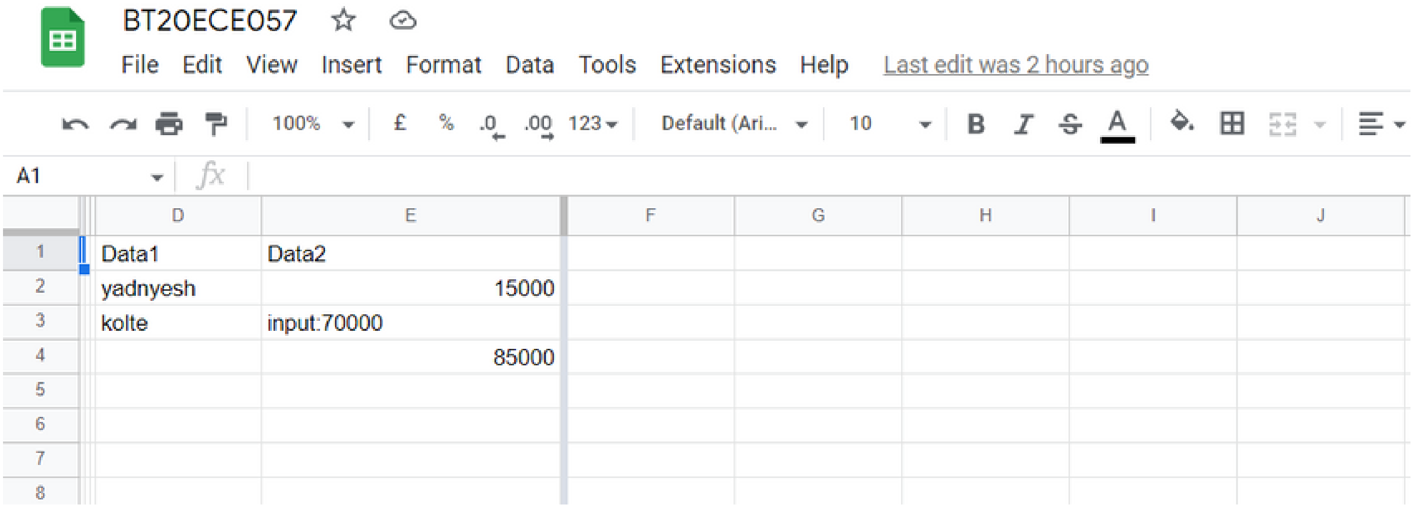
Enter ... digit4

70000

Amount diposited is ...70000

Actual Balance balance is ...85000

/balance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File Edit View Insert Format Data Tools Extensions Help Last edit was 2 hours ago
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A1 fx

	D	E	F	G	H	I	J
1	Data1	Data2					
2	yadnyesh	15000					
3	kolte	input:70000					
4		85000					
5							
6							
7							
8							

Youtube Link:-

https://youtu.be/1mQ0rEVkSAc