RFID GUIDANCE SYSTEM

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Introduction:

**RFID** is an acronym for “radio-frequency identification” and refers to a technology whereby digital data encoded in **RFID** tags or smart labels (defined below) are captured by a reader via radio waves.RFID is similar to barcoding in that data from a tag or label are captured by a device that stores the data in a database. RFID, however, has several advantages over systems that use barcode asset tracking software. The most notable is that RFID tag data can be read outside the line-of-sight, whereas barcodes must be aligned with an optical scanner. If you are considering implementing a RFID solution, take the next step and contact the RFID experts at AB&R (American Barcode and RFID).

Working of RFID:

RFID belongs to a group of technologies referred to as Automatic Identification and Data Capture (AIDC). AIDC methods automatically identify objects, collect data about them, and enter those data directly into computer systems with little or no human intervention. RFID methods utilize radio waves to accomplish this. At a simple level, RFID systems consist of three components: an RFID tag or smart label, an RFID reader, and an antenna. RFID tags contain an integrated circuit and an antenna, which are used to transmit data to the RFID reader (also called an interrogator). The reader then converts the radio waves to a more usable form of data. Information collected from the tags is then transferred through a communications interface to a host computer system, where the data can be stored in a database and analyzed at a later time.

RFID Tags and Smart Labels:

As stated above, an RFID tag consists of an integrated circuit and an antenna. The tag is also composed of a protective material that holds the pieces together and shields them from various environmental conditions. The protective material depends on the application. For example, employee ID badges containing RFID tags are typically made from durable plastic, and the tag is embedded between the layers of plastic. RFID tags come in a variety of shapes and sizes and are either passive or active. Passive tags are the most widely used, as they are smaller and less expensive to implement. Passive tags must be “powered up” by the RFID reader before they can transmit data. Unlike passive tags, active RFID tags have an onboard power supply (e.g., a battery), thereby enabling them to transmit data at all times.

Smart labels differ from RFID tags in that they incorporate both RFID and barcode technologies. They’re made of an adhesive label embedded with an RFID tag inlay, and they may also feature a barcode and/or other printed information. Smart labels can be encoded and printed on-demand using desktop label printers, whereas programming RFID tags are more time consuming and requires more advanced equipment.

RFID Applications:

Although RFID technology has been in use since World War II, the demand for RFID equipment is increasing rapidly due to US department of defence and Wal-Mart requiring their suppliers to enable products to be traceable by RFID.

Whether or not RFID compliance is required, applications that currently use barcode technology are good candidates for upgrading to a system that uses RFID or some combination of the two. RFID offers many advantages over the barcode, particularly the fact that an RFID tag can hold much more data about an item than a barcode can. In addition, RFID tags are not susceptible to the damages that may be incurred by barcode labels, like ripping and smearing.

From the read distance to the types of tags available, RFID has come a long way since World War II and there is a bright future ahead.

RFID technology is applied in many industrial tasks such as:

\_Inventory management

– Asset tracking

– Personnel tracking

– Controlling access to restricted areas

– ID Badging

– Supply chain management

– Counterfeit prevention (e.g. in the pharmaceutical industry)

EQUIPMENTS USED:

1. ESP 32
2. RFID RC522
3. RFID cards
4. Connecting wires

SOFTWARE USED:

Arduino IDE

PROGRAM:

#include <deprecated.h>

#include <MFRC522.h>

#include <MFRC522Extended.h>

#include <require\_cpp11.h>

#include <ETH.h>

#include <WiFi.h>

#include <WiFiAP.h>

#include <WiFiClient.h>

#include <WiFiGeneric.h>

#include <WiFiMulti.h>

#include <WiFiScan.h>

#include <WiFiServer.h>

#include <WiFiSTA.h>

#include <WiFiType.h>

#include <WiFiUdp.h>

#include <SPI.h>

const char\* ssid = "priya";

const char\* password = "priya666";

WiFiClient client;

WiFiServer server(80);

constexpr uint8\_t RST\_PIN = 5; // Configurable, see typical pin layout above

constexpr uint8\_t SS\_PIN = 4; // Configurable, see typical pin layout above

MFRC522 rfid(SS\_PIN, RST\_PIN); // Instance of the class

MFRC522::MIFARE\_Key key;

// Init array that will store new NUID

byte nuidPICC[4];

int arr\_c[] = {203,185,242,54}; //data of the pre saved card

int arr\_b[] = {219,218,138,53};

int arr\_a[] = {203,57,99,54};

int arr\_d[] = {58,252,13,63};

void setup() {

Serial.begin(115200);

Serial.println();

Serial.println();

Serial.print("Connecting to ");

Serial.println(ssid);

WiFi.begin(ssid, password);

while (WiFi.status() != WL\_CONNECTED) {

delay(500);

Serial.print(".");

}

Serial.println("");

Serial.println("WiFi is connected");

server.begin();

Serial.println("Server started");

Serial.println(WiFi.localIP());

SPI.begin(); // Init SPI bus

rfid.PCD\_Init(); // Init MFRC522

for (byte i = 0; i < 6; i++) {

key.keyByte[i] = 0xFF;

}

Serial.println(F("This code scan the MIFARE Classsic NUID."));

// Serial.print(F("Using the following key:"));

// printHex(key.keyByte, MFRC522::MF\_KEY\_SIZE);

}

void loop() {

// Look for new cards

if ( ! rfid.PICC\_IsNewCardPresent())

return;

// Verify if the NUID has been readed

if ( ! rfid.PICC\_ReadCardSerial())

return;

Serial.print("PICC type: ");

MFRC522::PICC\_Type piccType = rfid.PICC\_GetType(rfid.uid.sak);

Serial.println(rfid.PICC\_GetTypeName(piccType));

// Check is the PICC of Classic MIFARE type

if (piccType != MFRC522::PICC\_TYPE\_MIFARE\_MINI &&

piccType != MFRC522::PICC\_TYPE\_MIFARE\_1K &&

piccType != MFRC522::PICC\_TYPE\_MIFARE\_4K) {

Serial.println(F("Your tag is not of type MIFARE Classic."));

return;

}

if (rfid.uid.uidByte[0] == arr\_a[0] &&

rfid.uid.uidByte[1] == arr\_a[1] &&

rfid.uid.uidByte[2] ==arr\_a[2] &&

rfid.uid.uidByte[3] == arr\_a[3] )

{

Serial.println(F("GRANTED."));

WiFiClient client = server.available();

client.println("HTTP/1.1 200 OK");

client.println("Content-Type: text/html");

client.println("Connection: close");

client.println("Refresh: 10");

client.println();

client.println("<!DOCTYPE HTML>");

client.println("<html>");

client.print("<p style='text-align: center;'><span style='font-size: x-large;'><strong>ZOO GUIDANCE SYSTEM</strong></span></p>");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Species Name: Hippopotamus ");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Scientific Name : Hippopotamus amphibius ");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Diet: Herbivores ");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Class: Mammalia ");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Kingdom : Animalia ");

client.print("</p>");

client.println("</html>");

delay(50);

}

else if (rfid.uid.uidByte[0] == arr\_b[0] &&

rfid.uid.uidByte[1] == arr\_b[1] &&

rfid.uid.uidByte[2] ==arr\_b[2] &&

rfid.uid.uidByte[3] == arr\_b[3] )

{

// Serial.println(F("GRANTED."));

WiFiClient client = server.available();

client.println("HTTP/1.1 200 OK");

client.println("Content-Type: text/html");

client.println("Connection: close");

client.println("Refresh: 10");

client.println();

client.println("<!DOCTYPE HTML>");

client.println("<html>");

client.print("<p style='text-align: center;'><span style='font-size: x-large;'><strong>MOBILE INFORMATION LOG</strong></span></p>");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Species Name: Rhinoceros ");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Scintific Name : Rhinocerotidae");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Diet: Herbivores ");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Class: Mammalia ");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Kingdom: Animalia ");

client.print("</p>");

client.println("</html>");

delay(50);

}

else if (rfid.uid.uidByte[0] == arr\_c[0] &&

rfid.uid.uidByte[1] == arr\_c[1] &&

rfid.uid.uidByte[2] ==arr\_c[2] &&

rfid.uid.uidByte[3] == arr\_c[3] )

{

// Serial.println(F("GRANTED."));

WiFiClient client = server.available();

client.println("HTTP/1.1 200 OK");

client.println("Content-Type: text/html");

client.println("Connection: close");

client.println("Refresh: 10");

client.println();

client.println("<!DOCTYPE HTML>");

client.println("<html>");

client.print("<p style='text-align: center;'><span style='font-size: x-large;'><strong>MOBILE INFORMATION LOG</strong></span></p>");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Species Name: Kiwi ");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Scientific name : Apteryx");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Diet: Omnivores ");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Class: Aves ");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Kingdom: Animalia ");

client.print("</p>");

client.println("</html>");

delay(50);

}

else if (rfid.uid.uidByte[0] == arr\_d[0] &&

rfid.uid.uidByte[1] == arr\_d[1] &&

rfid.uid.uidByte[2] == arr\_d[2] &&

rfid.uid.uidByte[3] == arr\_d[3] )

{

Serial.println(F("GRANTED."));

WiFiClient client = server.available();

client.println("HTTP/1.1 200 OK");

client.println("Content-Type: text/html");

client.println("Connection: close");

client.println("Refresh: 10");

client.println();

client.println("<!DOCTYPE HTML>");

client.println("<html>");

client.print("<p style='text-align: center;'><span style='font-size: x-large;'><strong>MOBILE INFORMATION LOG</strong></span></p>");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Species Name: Piranha ");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Scientific Name : Pygocentrus nattereri");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Diet: Omnivores ");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Class: Actinopterygii ");

client.print("<p style='text-align: center;'><span style='color: #0000ff;'><strong style='font-size: large;'>Kingdom: Animalia ");

client.print("</p>");

client.println("</html>");

delay(50);

}

else Serial.println(F("DENINED"));

// Halt PICC

rfid.PICC\_HaltA();

// Stop encryption on PCD

rfid.PCD\_StopCrypto1();

}

OUTPUTS:



