Лабораторне заняття 3

Використання технології ESP_NOW для побудови проектів IoT

Завдання 1-2

Хід роботи:

Sketch.ino

```
#include <esp_now.h>
#include <WiFi.h>
#include <Wire.h>
#include <Adafruit_GFX.h>
#include <Adafruit_SSD1306.h>

#define ROLE_PIN 4

#define TRIG_PIN 5
#define ECHO_PIN 18
#define SCREEN_WIDTH 128
#define SCREEN_HEIGHT 64

uint8_t broadcastAddress[] = {0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF};

Adafruit_SSD1306 display(SCREEN_WIDTH, SCREEN_HEIGHT, &Wire, -1);

typedef struct struct_message {
  float distance;
} struct_message;

struct_message myData;
bool isReceiver = false;

void OnDataRecv(const esp_now_recv_info_t * info, const uint8_t *incomingData, int
len) {
  memcpy(&myData, incomingData, sizeof(myData));
  display.clearDisplay();
  display.setTextSize(1);
  display.setTextColor(WHITE);
  display.setCursor(0, 0);
  display.println("ESP-NOW: RECEIVED");
  display.setTextSize(2);
  display.setCursor(0, 25);
  display.print(myData.distance, 1);
  display.print(" cm");
  display.display();
}
```

```
void setupReceiver() {
  Serial.println("РЕЖИМ: ПРИЙМАЧ З ЕКРАНОМ");

  if(!display.begin(SSD1306_SWITCHCAPVCC, 0x3C)) {
    Serial.println("Помилка SSD1306 allocation failed");
    for(;;);
  }

  display.clearDisplay();
  display.setTextSize(1);
  display.setTextColor(WHITE);
  display.setCursor(0,0);
  display.println("Waiting for Data...");
  display.display();
  esp_now_register_recv_cb(OnDataRecv);
}

void OnDataSent(const uint8_t *mac_addr, esp_now_send_status_t status) {
}

void setupSender() {
  Serial.println("РЕЖИМ: ПЕРЕДАВАЧ (ДАТЧИК)");
  pinMode(TRIG_PIN, OUTPUT);
  pinMode(ECHO_PIN, INPUT);
  esp_now_register_send_cb(OnDataSent);
  esp_now_peer_info_t peerInfo;
  memcpy(peerInfo.peer_addr, broadcastAddress, 6);
  peerInfo.channel = 0;
  peerInfo.encrypt = false;

  if (esp_now_add_peer(&peerInfo) != ESP_OK){
    Serial.println("Failed to add peer");
  }
}

void loopSender() {
  digitalWrite(TRIG_PIN, LOW); delayMicroseconds(2);
  digitalWrite(TRIG_PIN, HIGH); delayMicroseconds(10);
  digitalWrite(TRIG_PIN, LOW);
  long duration = pulseIn(ECHO_PIN, HIGH);
  float distanceCm = duration * 0.034 / 2;
  if (distanceCm > 400 || distanceCm < 2) distanceCm = 0;
  myData.distance = distanceCm;
  esp_now_send(broadcastAddress, (uint8_t *) &myData, sizeof(myData));
  Serial.print("Відстань: "); Serial.println(distanceCm);
  delay(500);
}
```

```
void setup() {
  Serial.begin(115200);
  pinMode(ROLE_PIN, INPUT_PULLUP);

  WiFi.mode(WIFI_STA);

  if (esp_now_init() != ESP_OK) {
    Serial.println("ESP-NOW Init Failed");
    return;
  }

  if (digitalRead(ROLE_PIN) == LOW) {
    isReceiver = true;
    setupReceiver();
  } else {
    isReceiver = false;
    setupSender();
  }
}

void loop() {
  if (!isReceiver) {
    loopSender();
  }
  delay(10);
}
```

Diagram.json

```
{
  "version": 1,
  "author": "Захаров Іван",
  "editor": "wokwi",
  "parts": [
    { "type": "board-esp32-devkit-c-v4", "id": "esp", "top": 0, "left": -50, "attrs":
{} },
    { "type": "wokwi-hc-sr04", "id": "ultrasonic1", "top": -171.3, "left": -80,
"attrs": {} },
    {
      "type": "board-esp32-devkit-c-v4",
      "id": "esp-receiver",
      "top": 0,
      "left": 350,
      "attrs": {}
    },
    {
      "type": "board-ssd1306",
      "id": "oled1",
      "top": 127.94,
```

```
      "left": 528.23,
      "attrs": { "i2cAddress": "0x3c" }
    }
  ],
  "connections": [
    [ "esp:TX", "$serialMonitor:RX", "", [] ],
    [ "esp:RX", "$serialMonitor:TX", "", [] ],
    [ "ultrasonic1:TRIG", "esp:5", "green", [ "v0" ] ],
    [ "ultrasonic1:ECHO", "esp:18", "green", [ "v0" ] ],
    [ "ultrasonic1:VCC", "esp:5V", "red", [ "v0" ] ],
    [ "ultrasonic1:GND", "esp:GND.2", "black", [ "v0" ] ],
    [ "oled1:SDA", "esp-receiver:21", "blue", [ "v0" ] ],
    [ "oled1:SCL", "esp-receiver:22", "yellow", [ "v0" ] ],
    [ "oled1:VCC", "esp-receiver:3V3", "red", [ "v0" ] ],
    [ "oled1:GND", "esp-receiver:GND.1", "black", [ "v0" ] ],
    [ "esp-receiver:4", "esp-receiver:GND.2", "black", [ "v0" ] ]
  ],
  "dependencies": {}
}
```

Libraries.txt

Wokwi Library List

See https://docs.wokwi.com/guides/libraries

Automatically added based on includes:

Adafruit GFX Library

Adafruit SSD1306

Результат виконання програми:

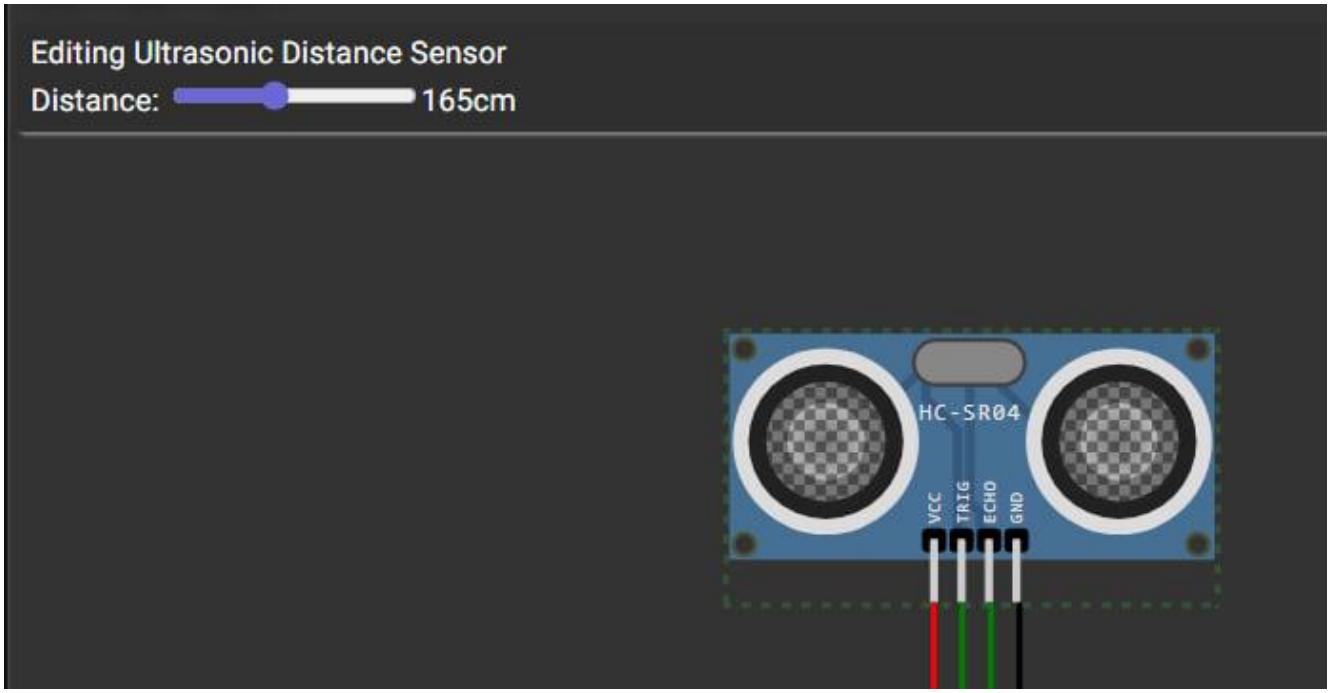
Editing Ultrasonic Distance Sensor
Distance:
165cm
HC-SR04
VCC
TRIG
ECHO
GND

Рис. 1

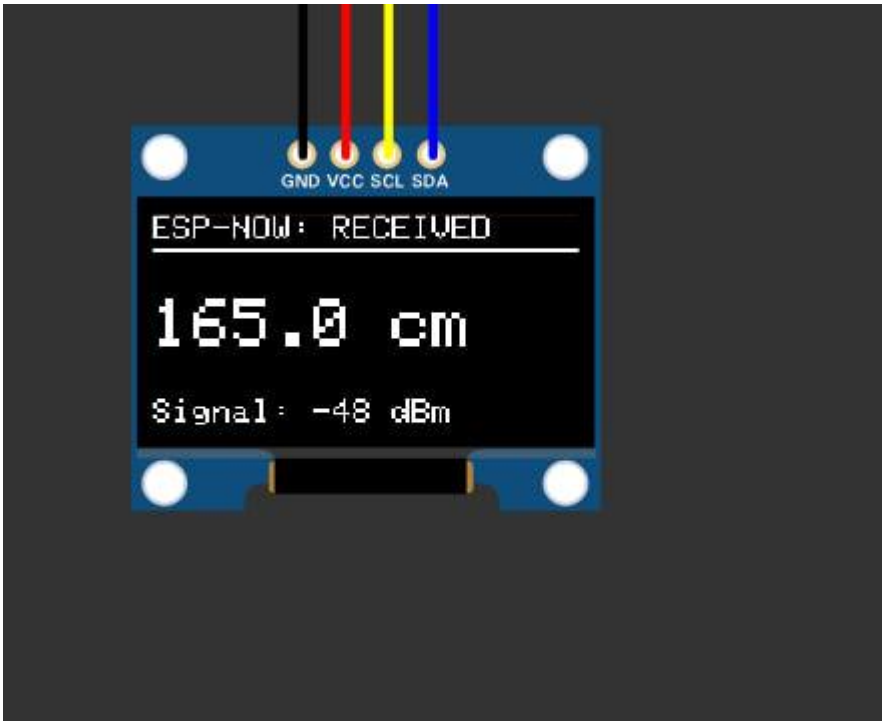
GND VCC SCL SDA
ESP-NOW: RECEIVED
165.0 cm
Signal: -48 dBm

Рис. 2

```
ets Jul 29 2019 12:21:46

rst:0x1 (POWERON_RESET),boot:0x13 (SPI_FAST_FLASH_BOOT)
configsip: 0, SPIWP:0xee
clk_drv:0x00,q_drv:0x00,d_drv:0x00,cs0_drv:0x00,hd_drv:0x00,wp_drv:0x00
mode:DIO, clock div:2
load:0x3fff0030,len:1156
load:0x40078000,len:11456
ho 0 tail 12 room 4
load:0x40080400,len:2972
entry 0x400805dc
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.96
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.91
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.91
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.89
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.89
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.89
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.89
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.89
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.89
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.89
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.89
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.91
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.91
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.91
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.91
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.91
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.91
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.91
Packet received from 24:6F:28:XX:XX:XX | Dist: 399.91
Packet received from 24:6F:28:XX:XX:XX | Dist: 291.98
Packet received from 24:6F:28:XX:XX:XX | Dist: 126.90
Packet received from 24:6F:28:XX:XX:XX | Dist: 164.99
Packet received from 24:6F:28:XX:XX:XX | Dist: 164.99
Packet received from 24:6F:28:XX:XX:XX | Dist: 164.99
Packet received from 24:6F:28:XX:XX:XX | Dist: 164.99
Packet received from 24:6F:28:XX:XX:XX | Dist: 164.99
Packet received from 24:6F:28:XX:XX:XX | Dist: 164.99
Packet received from 24:6F:28:XX:XX:XX | Dist: 164.99
Packet received from 24:6F:28:XX:XX:XX | Dist: 164.99
```

Рис. 3

Висновок: сьогодні ми дослідили використання технології ESP_NOW для побудови проектів IoT.

Репозиторій: https://github.com/Vanchik21/IOT