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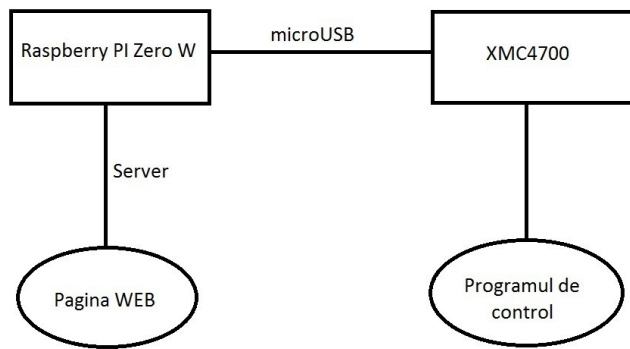


Tema/subiect: **Monitorizarea WEB a unui sistem mobil**

Rezumat, resurse materiale, atributii in echipa:

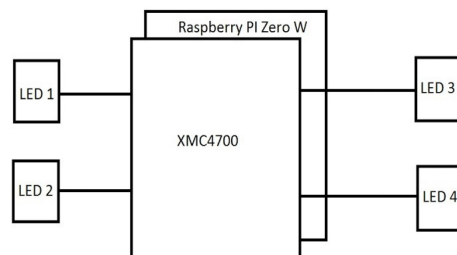
Acest proiect are ca scop controlul si monitorizarea unui sistem mobil pe o pagina WEB prin intermediul unei placute Raspberry PI Zero W. Sistemul va simula deplasarea printr-o incapere a caror dimensiuni vor fi approximate unui display canvas pe pagina WEB, iar deplasarea in sine va fi efectuata prin comenzi date de butoane de pe pagina. La apasarea unui buton, deplasarea va fi animata pe canvas printr-un javascript si, de asemenea, se vor executa programe python prin intermediul php ce vor trimite date prin serial la placuta XMC4700. Cele 2 placute vor fi conectate intre ele pentru schimbul de date printr-un cablu USB. La primirea unei date, placuta XMC4700 o va trata intr-un switch pentru directie, iar sistemul se va deplasa in directia respectiva pana la apasarea altui buton. De exemplu, daca apas butonul "North" de pe pagina WEB, obiectul reprezentat ca un cerc in canvasul nostru se va deplasa in sus si placuta RPI va trimite valoarea "2" catre XMC si aceasta va seta intensitatea LED-urilor intr-o maniera similara cu motoarele unei drone, adica cele 2 LED-uri din fata vor avea intensitatea scazuta si cele 2 din spate sporita, toate acestea presupunand ca sistemul mobil este indreptat corespunzator catre nord si daca nu, atunci punctele cardinale de pe pagina WEB sunt doar orientative.

Schema proiectului:



Hardware:

- XMC4700 development board
- breadboard
- 4 LED-uri
- 4 rezistente de 1 kOhm
- Raspberry Pi Zero W
- Alimentator de 5 V 2.5 A Compatibil cu Raspberry Pi 3, Raspberry Pi Zero
- card microSD cu Raspbian
- cablu USB OTG
- Adaptor HDMI Mama-Mini HDMI Tata
- HUB cu 4 sloturi de USB
- cablu USB-microUSB



Software:

- Raspbian OS
- Windows 7 OS

- C programming (Dave IDE)
- Linux machine programming (python)
- web programming (html + php)

Bibliografie:

<http://embedac.ro/SI/Lab/Lab3/Laborator3.htm>

https://elinux.org/Raspberry_Pi_console

https://elinux.org/RPi_Hub

<https://www.instructables.com/id/Raspberry-Pi-Projects/>

Ciorna de solutii:

Software

Am facut Raspbian OS bootabil pe microSD si am instalat pachetele pentru servere Apache si pentru php.

Am testat un simplu fisier html pentru a vedea ca se hosteaza serverul.

Am scris fisierul meu html in Notepad, l-am salvat cu extensia .php si l-am pus pe RPI in `/var/www/html/`.

Am scris 5 fisiere python in Notepad pentru cele 5 butoane de pe pagina, le-am salvat cu extensia .py si le-am pus pe RPI in `/var/www/`.

Am conectat RPI la XMC si am rulat comanda `ls /dev/tty*` pentru a vedea ce port trebuie sa folosesc pentru seriala.

Am rulat comanda `hostname -I` pentru a vedea care este adresa IP a RPI-ului.

Am scris codul C in Dave IDE pentru controlul sistemului meu mobil, acesta avand ca aplicatii 4 PWM-uri si un UART.

Hardware

Am asamblat sistemul meu RPI cu un monitor conectat prin HDMI, mouse si tastatura conectate prin HUB si alimentarea.

Am asamblat sistemul meu XMC cu 4 LED-uri si rezistente conectate prin fire tata-tata la breadboard si placuta.

Am conectat RPI la XMC pentru comunicatie seriala printr-un cablu USB-microUSB.


```
for (i = 0; i < 0xffff; i++);
for (i = 0; i < 0xffff; i++);
for (i = 0; i < 0xffff; i++);
for (i = 0; i < 0xffff; i++);
}
```

```
int main(void)
{
    DAVE_STATUS_t status;
    UART_STATUS_t init_status;
```

```
    uint8_t msg_is_ready;
    uint8_t start_msg[2];
    uint8_t message[3];
```

```
    status = DAVE_Init();      /* Initialization of DAVE APPs */
    init_status = (UART_STATUS_t)UART_Init(&UART_0);
```

```
    if(status != DAVE_STATUS_SUCCESS)
    {
        XMC_DEBUG("DAVE APPs initialization failed\n");
        while(1U)
        {
        }
    }
}
```

```
PWM_SetDutyCycle(&PWM_0, 5000);
PWM_SetDutyCycle(&PWM_1, 5000);
PWM_SetDutyCycle(&PWM_2, 5000);
PWM_SetDutyCycle(&PWM_3, 5000);
```

```
while(1U)
{
    // 1 0
    // ^
    // |
    // 2 3
```

```

msg_is_ready = 0;
start_msg[1] = start_msg[0] = 0;
uint8_t len_msg = sizeof(message)/sizeof(uint8_t);
for (int i = 0; i <= len_msg; i++)
{
message[i] = 0;
}
//receive message
while (msg_is_ready == 0)
{
UART_Receive(&UART_0, start_msg, sizeof(start_msg));
if (start_msg[0] == '<' && start_msg[1] == 38)
{
UART_Receive(&UART_0, message, sizeof(message));
}
if (message[1] == 38 && message[2] == '>')
{
msg_is_ready = 1;
}
}
//-----
switch(message[0]){
case '0':
PWM_SetDutyCycle(&PWM_0, 5000);
PWM_SetDutyCycle(&PWM_1, 5000);
PWM_SetDutyCycle(&PWM_2, 5000);
PWM_SetDutyCycle(&PWM_3, 5000);
delay();
break;
case '3':
PWM_SetDutyCycle(&PWM_0, 500);
PWM_SetDutyCycle(&PWM_1, 9000);
PWM_SetDutyCycle(&PWM_2, 9000);
PWM_SetDutyCycle(&PWM_3, 500);
delay();
break;
case '4':
PWM_SetDutyCycle(&PWM_0, 500);

```

```

    PWM_SetDutyCycle(&PWM_1, 500);
    PWM_SetDutyCycle(&PWM_2, 9000);
    PWM_SetDutyCycle(&PWM_3, 9000);
    delay();
    break;
    case '1':
    PWM_SetDutyCycle(&PWM_0, 9000);
    PWM_SetDutyCycle(&PWM_1, 500);
    PWM_SetDutyCycle(&PWM_2, 500);
    PWM_SetDutyCycle(&PWM_3, 9000);
    delay();
    break;
    case '2':
    PWM_SetDutyCycle(&PWM_0, 9000);
    PWM_SetDutyCycle(&PWM_1, 9000);
    PWM_SetDutyCycle(&PWM_2, 500);
    PWM_SetDutyCycle(&PWM_3, 500);
    delay();
    break;
    }
}
return 1;
}

```

Codul python (pentru toate cele 5 fisiere):

```

import serial
port = serial.Serial("/dev/ttyACM0",baudrate=9600, timeout=2.0)
port.write("<&0&>") # sau 1, 2, 3, 4 pentru fiecare directie
port.close()

```

Codul html:

```

<html>
<head>
<?php
if (isset($_POST['North']))
{
exec('sudo python /var/www/sendnorth.py');
}
if (isset($_POST['West']))
{
exec('sudo python /var/www/sendwest.py');
}

```

```

}
if (isset($_POST['Stop']))
{
exec('sudo python /var/www/sendstop.py');
}
if (isset($_POST['East']))
{
exec('sudo python /var/www/sendeast.py');
}
if (isset($_POST['South']))
{
exec('sudo python /var/www/sendsouth.py');
}
?>

```

```

<title>Movement Monitoring</title>
</head>
<body style="background-color:powderblue;">
<form method="POST">
<<<<<<<<<button type="button" name="North" onclick="north()">North</button>>>>>>>>>>>><br>
<<<<button type="button" name="West" onclick="west()">West</button>
<button type="button" name="Stop" onclick="stop()">Stop</button>
<button type="button" name="East" onclick="east()">East</button>>>><br>
<<<<<<<<<button type="button" name="South" onclick="south()">South</button>>>>>>>>>>>>
</form>
<hr>
<canvas id="myCanvas" width="200" height="200" style="border:1px solid #000000;"></canvas>
<script>

```

```

var canvas = document.getElementById("myCanvas");
canvas.width = 400;//document.getElementById("width").value;
canvas.height = 300;//document.getElementById("height").value;
    var ctx = canvas.getContext("2d");
var startingx = canvas.width/2;
var startingy = canvas.height/2;
    ctx.fillStyle = "white";
ctx.fillRect(5,5,canvas.width-10,canvas.height-10);
ctx.fillStyle = "#000000";
ctx.beginPath();
ctx.arc(startingx,startingy,10,0,2*Math.PI);
    ctx.stroke();
var requestId;

```



```

function loopn(){
    requestId = undefined;
    ctx.fillStyle = "white";
    ctx.fillRect(5,5,canvas.width-10,canvas.height-10);
    ctx.fillStyle = "#000000";
    ctx.beginPath();
    ctx.arc(startingx,startingy,10,0,2*Math.PI);
    ctx.stroke();
    startingy -= 2;
    north();
}

```

```

function north(){
    stop();
    if (!requestId){
        requestId = window.requestAnimationFrame(loopn);
    }
}

```

```

function loope(){
    requestId = undefined;
    ctx.fillStyle = "white";
    ctx.fillRect(5,5,canvas.width-10,canvas.height-10);
    ctx.fillStyle = "#000000";
    ctx.beginPath();
    ctx.arc(startingx,startingy,10,0,2*Math.PI);
    ctx.stroke();
    startingx += 2;
    east();
}

```

```

function east(){
    stop();
    if (!requestId){
        requestId = window.requestAnimationFrame(loope);
    }
}

```

```

function loops(){
    requestId = undefined;
    ctx.fillStyle = "white";
    ctx.fillRect(5,5,canvas.width-10,canvas.height-10);
    ctx.fillStyle = "#000000";
    ctx.beginPath();

```

```
ctx.arc(startingx,startingy,10,0,2*Math.PI);
  ctx.stroke();
  startingy += 2;
  south();
}

function south(){
stop();
  if (!requestId){
    requestId = window.requestAnimationFrame(loops);
  }
}
function loopw(){
  requestId = undefined;
  ctx.fillStyle = "white";
  ctx.fillRect(5,5,canvas.width-10,canvas.height-10);
  ctx.fillStyle = "#000000";
  ctx.beginPath();
  ctx.arc(startingx,startingy,10,0,2*Math.PI);
  ctx.stroke();
  startingx -= 2;
  west();
}

function west(){
stop();
  if (!requestId){
    requestId = window.requestAnimationFrame(loopw);
  }
}

function stop(){
  if (requestId){
    window.cancelAnimationFrame(requestId);
    requestId = undefined;
  }
}

</script>
</body>
</html>
```

