

Certification Page

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I, Ulvi Bajarani, certify that the work I am uploading represents efforts of my team member and mine per the following task-contribution table, and is not copied from anyone else or any other resource (such as Internet).

	<i>Tasks on the schedule for this quiz are 1, 2, 3, and 4. You may break these tasks further down into <u>subtasks</u> as needed.</i>	Percent contributed	Percent contributed	Total percent
#	<u>Subtask</u> Description	Ulvi Bajarani	Gwendolyn Poulos	
1.1	Design & create DB tables in PaaS	50%	50%	100%
1.2	Create DB tables in PaaS	50%	50%	100%
1.3	Populate DB tables with "example" data to help in developing other parts of the project, e.g. website, charts, and notification of alarms.	50%	50%	100%
1.4	Implement Android App screen (labels & SwitchCompats) to show status of the sensors & actuators	50%	50%	100%
1.5	Implement sensors (SW1, SW2, . . .) and actuators (LED1, LED2, . . .) on breadboard and test their functionality with RPi locally	50%	50%	100%
1.6	Interface & test the functionality of sensors and actuators between DB tables & RPi	50%	50%	100%

The code of SQL tables:

```
CREATE TABLE IF NOT EXISTS SensorsAndActuators(  
    DevID VARCHAR(10),  
    DevType ENUM('SENSOR', 'ACTUATOR'),  
    FunctionDescription VARCHAR(255),  
    Control ENUM('RPI', 'ANDROID'),  
    DeviceStatus INT NOT NULL,  
    PRIMARY KEY(DevID)  
);
```

```
CREATE TABLE IF NOT EXISTS Alarms(  
    AlarmID VARCHAR(10),  
    Alarm ENUM('ALARM'),  
    MessageID VARCHAR(255),  
    PRIMARY KEY(AlarmID)  
);
```

```
CREATE TABLE IF NOT EXISTS ActiveAlarms(  
    AlarmID VARCHAR(10),  
    SinceTS VARCHAR(255),  
    AcknowledgementStatus INT NOT NULL,  
    PRIMARY KEY(AlarmID)  
);
```

```
CREATE TABLE IF NOT EXISTS CannedMessages(  
    MessageID VARCHAR(10),  
    MessageType VARCHAR(255),  
    MessageDescription VARCHAR(255),  
    PRIMARY KEY(MessageID)  
);
```

```
CREATE TABLE IF NOT EXISTS TransactionalLogs  
(  
    logID VARCHAR(10),  
    TimestampInfo VARCHAR(255),  
    MessageID VARCHAR(255),  
    DataInformation VARCHAR(255),  
    PRIMARY KEY(logID)  
);
```

```
CREATE TABLE IF NOT EXISTS Users(  
    pname VARCHAR(30) NOT NULL,  
    password VARCHAR(255) NOT NULL,  
    PRIMARY KEY(pname)  
);
```

/* Inserting */

```
INSERT INTO SensorsAndActuators VALUES ('SW1', 'SENSOR', 'sense systolic BP > 140 mm Hg',  
'RPI', 0);  
INSERT INTO SensorsAndActuators VALUES ('SW2', 'SENSOR', 'sense diastolic BP < 30 mm Hg',  
'RPI', 0);  
INSERT INTO SensorsAndActuators VALUES ('SW3', 'SENSOR', 'sense blood sugar > 120 mg/dL',  
'RPI', 0);  
INSERT INTO SensorsAndActuators VALUES ('SW4', 'SENSOR', 'sense blood sugar < 50 mg/dL',  
'RPI', 0);  
INSERT INTO SensorsAndActuators VALUES ('LED1', 'ACTUATOR', 'IV infusion of pressor to  
increase BP', 'ANDROID', 0);  
INSERT INTO SensorsAndActuators VALUES ('LED2', 'ACTUATOR', 'IV infusion of Y to decrease  
BP', 'ANDROID', 0);  
INSERT INTO SensorsAndActuators VALUES ('LED3', 'ACTUATOR', 'IV infusion of W to decrease  
blood sugar', 'ANDROID', 0);  
INSERT INTO SensorsAndActuators VALUES ('LED4', 'ACTUATOR', 'IV infusion of Z to increase  
blood sugar', 'ANDROID', 0);
```

```
INSERT INTO Alarms VALUES ('1', 'ALARM', '1');  
INSERT INTO Alarms VALUES ('2', 'ALARM', '2');  
INSERT INTO Alarms VALUES ('3', 'ALARM', '3');  
INSERT INTO Alarms VALUES ('4', 'ALARM', '4');
```

```
INSERT INTO ActiveAlarms VALUES ('3', '2020-03-11 14:25:21', '0');  
INSERT INTO ActiveAlarms VALUES ('1', '2020-03-11 13:17:23', '1');
```

```
INSERT INTO CannedMessages VALUES ('1', 'ALARM', 'Systolic BP HIGH');  
INSERT INTO CannedMessages VALUES ('2', 'ALARM', 'Diastolic BP LOW');  
INSERT INTO CannedMessages VALUES ('3', 'ALARM', 'BLOOD SUGAR HIGH');  
INSERT INTO CannedMessages VALUES ('4', 'ALARM', 'BLOOD SUGAR LOW');  
INSERT INTO CannedMessages VALUES ('5', 'CNST', 'Diastolic & Systolic BP simultaneously out of  
range');  
INSERT INTO CannedMessages VALUES ('6', 'CNST', '?');  
INSERT INTO CannedMessages VALUES ('7', 'SYSTEM', 'System up');  
INSERT INTO CannedMessages VALUES ('8', 'SYSTEM', 'System shutting down');  
INSERT INTO CannedMessages VALUES ('9', 'SYSTEM', 'User login - success');  
INSERT INTO CannedMessages VALUES ('10', 'SYSTEM', 'User login - failure');  
INSERT INTO CannedMessages VALUES ('11', 'SYSTEM', 'User logout');  
INSERT INTO CannedMessages VALUES ('12', 'ADVISE', 'Reboot system');  
INSERT INTO CannedMessages VALUES ('13', 'OPER', 'IV infusion of pressor');  
INSERT INTO CannedMessages VALUES ('14', 'OPER', 'IV infusion of X');  
INSERT INTO CannedMessages VALUES ('15', 'OPER', 'IV infusion of W');
```

```
INSERT INTO TransactionalLogs VALUES ('1', '2020-03-11 12:23:16', '7', '');  
INSERT INTO TransactionalLogs VALUES ('2', '2020-03-12 10:8:37', '9', "ben");  
INSERT INTO TransactionalLogs VALUES ('3', '2020-03-12 10:8:37', '11', "ben");
```

The code of p2_t8.py Python file, which was changed to test multiple inputs:

```
#!/usr/bin/python
import requests #import JSONRequests library
import time #import time library for sleep function
import datetime #import datetime library for timestamp
import RPi.GPIO as GPIO #import GPIO library
GPIO.setmode(GPIO.BCM) #set the pins according to BCM scheme
GPIO.setup(4,GPIO.OUT) #configure BCM Pin #4 as OUTPUT
GPIO.setup(17,GPIO.IN) #configure BCM Pin #17 as INPUT
GPIO.setup(22,GPIO.IN) #configure BCM Pin #17 as INPUT
i=0; n=3; delay=5 #limit number of tries to 5 (initially set it to 1 for debugging)
while i<n:
    LED1=GPIO.input(4) #read what BCM Pin #4 is set to (LED1)
    SW1=GPIO.input(17) #read the status of BCM Pin #17 (SW1)
    SW2=GPIO.input(22) #read the status of BCM Pin #17 (SW1)
    data = {'username': 'Test', 'password': 'Tester3', 'SW1': SW1, 'SW2': SW2, 'LED1': LED1}
    res = requests.post("https://team2project3342.online/scripts/sync_rpi_data.php", json=data)
    #in case of errors (especially, syntax) , you may want to print res.text and comment out the
statements below
    r = res.json()
    ts = datetime.datetime.now() #get the time stamp
    print "=====Server Response at " + str(ts) + "=====
    if r['success']==1:
        print "+++++Server request successful: "
        if LED1!=r['LED1']:
            print "Changing LED status as requested by the server"
            if r['LED1']==1:
                GPIO.output(4,GPIO.HIGH)
            else: GPIO.output(4,GPIO.LOW)
        print "The status of LED1 is " + str(r['LED1'])
        print "The status of SW1 is " + str(r['SW1'])
        print "The status of SW2 is " + str(r['SW2'])
    else:
        print ">>>>> Server request failed - Error #" + str(r['error'])
    time.sleep(delay) #wait for delay seconds before sending another request
    i+=1
GPIO.cleanup()
```

The code of sync_rpi_data.php, which was changed to test the inputs:

```
<?php
require_once __DIR__ . '/.././required/db_connect.php';
$input = file_get_contents("php://input");
$error = 0;
$out_json = array();
$out_json['success'] = 1; //assume success
$SW1_status = 0;
$SW2_status = 0;
```

```

$LED1_status = 0;
if ($input)
{
    $json = json_decode($input, true); //check if it json input
    if (json_last_error() == JSON_ERROR_NONE)
    {
        if (isset($json["username"]) && isset($json["password"]) && isset($json["SW1"]) &&
isset($json["SW2"]) && isset($json["LED1"]))
        {
            $in_username = $json["username"];
            $in_password = $json["password"]; //if the expected fields are not null, get them
            $in_SW1 = $json["SW1"];
            $in_SW2 = $json["SW2"];
            $in_LED1 = $json["LED1"];
            if ($stmt = $mysqli->prepare("SELECT password FROM Users WHERE pname = ? LIMIT
1"))
            {
                $stmt->bind_param('s', $in_username);
                $stmt->execute();
                $stmt->store_result(); //store_result to get num_rows etc.
                $stmt->bind_result($db_password); //get the hashed password
                $stmt->fetch();
                if ($stmt->num_rows == 1)
                { //if user exists, verify the password
                    if (password_verify($in_password, $db_password))
                    {
                        $stmt->close();
                        if ($stmt = $mysqli->prepare("UPDATE SensorsAndActuators SET DeviceStatus=?
WHERE DevID = 'SW1'"))
                        { //update SW1
                            $stmt->bind_param('i', $in_SW1);
                            $stmt->execute();
                        }
                        else
                        {
                            $error = 1;
                        }
                        $stmt->close();
                        if (!$error && ($stmt = $mysqli->prepare("SELECT DeviceStatus FROM
SensorsAndActuators WHERE DevID = 'SW1'")))
                        { //read SW1
                            $stmt->execute();
                            $stmt->bind_result($SW1_status);
                            $stmt->fetch();
                        }
                        else
                        {
                            $error = 2;
                        }
                    }
                }
            }
        }
    }
}

```

```

        $stmt->close();
        if ($stmt = $mysqli->prepare("UPDATE SensorsAndActuators SET DeviceStatus=?
WHERE DevID = 'SW2'"))
        { //update SW1
            $stmt->bind_param('i', $in_SW2);
            $stmt->execute();
        }
        else
        {
            $error = 1;
        }
        $stmt->close();
        if (!$error && ($stmt = $mysqli->prepare("SELECT DeviceStatus FROM
SensorsAndActuators WHERE DevID = 'SW2'")))
        { //read SW1
            $stmt->execute();
            $stmt->bind_result($SW2_status);
            $stmt->fetch();
        }
        else
        {
            $error = 2;
        }
        $stmt->close();
        if (!$error && ($stmt = $mysqli->prepare("SELECT DeviceStatus FROM
SensorsAndActuators WHERE DevID = 'LED1'")))
        { //read LED1
            $stmt->execute();
            $stmt->bind_result($LED1_status);
            $stmt->fetch();
        }
        else
        {
            $error = 3;
        }
        $stmt->close();
    }
    else
    {
        $error = 4;
    }
}
else
{
    $error = 5;
}
}
else
{

```

```

        $error = 6;
    }
}
else
{
    $error = 7;
}
}
else
{
    $error = 8;
}
}
else
{
    $error = 9;
}
if ($error)
{
    $out_json['success'] = 0; //flag failure
}
$out_json['SW1'] = $SW1_status;
$out_json['SW2'] = $SW2_status;
$out_json['LED1'] = $LED1_status;
$out_json['error'] = $error; //provide error (if any) number for debugging
echo json_encode($out_json); //encode the data in json format

?>

```

the code of db_config.php:

```

<?php
define('DB_HOST', 'localhost');
define('DB_USER', 'u551001383_project');
define('DB_PASSWORD', 'Qwer1234');
define('DB_DATABASE', 'u551001383_team');
?>

```

the code of db_connect.php:

```

<?php
require_once 'db_config.php'; //tell the script that file is in this folder (not in this script)
$mysqli = new mysqli(DB_HOST, DB_USER, DB_PASSWORD, DB_DATABASE);
?>

```

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PHP My Adminauth-db136.h...Googlelogin form php...PHP - MySQL Lo...team2project3342.on...Facebooklogin screen php...PHP - Login Exan...FVD Speed Dial

←→↺🏠🔒https://auth-db136.hostinger.com/db_sql.php?db=u551001...🔍Search

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- CannedMessages
- SensorsAndActuators
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←Server: 127.0.0.1:3306 » Database: u551001383_team » Table: ActiveAlarms⚙️🔍

BrowseStructureSQLSearchInsertExportImportOperationsTriggers

Show query box

✔Showing rows 0 - 1 (2 total, Query took 0.0002 seconds.)

SELECT * FROM ActiveAlarms

☐ Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

☐ Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

+ Options

↔️⌵

	AlarmID	SinceTS	AcknowledgementStatus
<input type="checkbox"/> Edit Copy Delete	1	2020-03-11 13:17:23	1
<input type="checkbox"/> Edit Copy Delete	3	2020-03-11 14:25:21	0

⬆️ ☐ Check all With selected: Edit Copy Delete Export

☐ Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

Query results operations

🖨️ Print 📄 Copy to clipboard 📄 Export 📊 Display chart 📄 Create view

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[Show query box](#)

Showing rows 0 - 3 (4 total, Query took 0.0003 seconds.)

```
SELECT * FROM 'Alarms' WHERE 1
```

☐ Profiling [\[Edit inline\]](#) [\[Edit\]](#) [\[Explain SQL\]](#) [\[Create PHP code\]](#) [\[Refresh\]](#)

☐ Show all
 Number of rows: 25
 Filter rows: Search this table
 Sort by key: None

+ Options

					AlarmID	Alarm	MessageID
<input type="checkbox"/>		Edit		Copy		Delete	1
<input type="checkbox"/>		Edit		Copy		Delete	2
<input type="checkbox"/>		Edit		Copy		Delete	3
<input type="checkbox"/>		Edit		Copy		Delete	4

☐ Check all
 With selected:
 Edit
 Copy
 Delete
 Export

☐ Show all
 Number of rows: 25
 Filter rows: Search this table
 Sort by key: None

Query results operations

Print Copy to clipboard Export Display chart Create view



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[Show query box](#)

























Showing rows 0 - 7 (8 total, Query took 0.0002 seconds.)

```
SELECT * FROM 'SensorsAndActuators' WHERE 1
```

☐ Profiling [\[Edit inline\]](#) [\[Edit\]](#) [\[Explain SQL\]](#) [\[Create PHP code\]](#) [\[Refresh\]](#)

☐ Show all
 Number of rows: 25
 Filter rows: Search this table
 Sort by key: None

+ Options

← T →					DevID	DevType	FunctionDescription	Control	DeviceStatus
<input type="checkbox"/>	 Edit	 Copy	 Delete	LED1	ACTUATOR	IV infusion of pressor to increase BP	ANDROID	0	
<input type="checkbox"/>	 Edit	 Copy	 Delete	LED2	ACTUATOR	IV infusion of Y to decrease BP	ANDROID	0	
<input type="checkbox"/>	 Edit	 Copy	 Delete	LED3	ACTUATOR	IV infusion of W to decrease blood sugar	ANDROID	0	
<input type="checkbox"/>	 Edit	 Copy	 Delete	LED4	ACTUATOR	IV infusion of Z to increase blood sugar	ANDROID	0	
<input type="checkbox"/>	 Edit	 Copy	 Delete	SW1	SENSOR	sense systolic BP > 140 mm Hg	RPI	0	
<input type="checkbox"/>	 Edit	 Copy	 Delete	SW2	SENSOR	sense diastolic BP < 30 mm Hg	RPI	0	
<input type="checkbox"/>	 Edit	 Copy	 Delete	SW3	SENSOR	sense blood sugar > 120 mg/dL	RPI	0	
<input type="checkbox"/>	 Edit	 Copy	 Delete	SW4	SENSOR	sense blood sugar < 50 mg/dL	RPI	0	

☐ Check all
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☐ Show all
 Number of rows: 25
 Filter rows: Search this table
 Sort by key: None

Console

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- TransactionalLogs
- Users

←Server: 127.0.0.1:3306 » Database: u551001383_team » Table: TransactionalLogs

📄Browse

📊Structure

📄SQL

🔍Search

🔧Insert

📄Export

📄Import

🔧Operations

⚙️Triggers

Show query box

✔Showing rows 0 - 2 (3 total, Query took 0.0003 seconds.)

```
SELECT * FROM `TransactionalLogs` WHERE 1
```

☐ Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

☐ Show all

Number of rows: 25

Filter rows: Search this table

Sort by key: None

+ Options

↔️⌵

	logID	TimestampInfo	MessageID	DataInformation
<input type="checkbox"/> Edit Copy Delete	1	2020-03-11 12:23:16	7	
<input type="checkbox"/> Edit Copy Delete	2	2020-03-12 10:8:37	9	ben
<input type="checkbox"/> Edit Copy Delete	3	2020-03-12 10:8:37	11	ben

☐ Check all With selected: Edit Copy Delete Export

☐ Show all

Number of rows: 25

Filter rows: Search this table

Sort by key: None

Query results operations

🖨️Print 📄Copy to clipboard 📄Export 📊Display chart 📄Create view

Console

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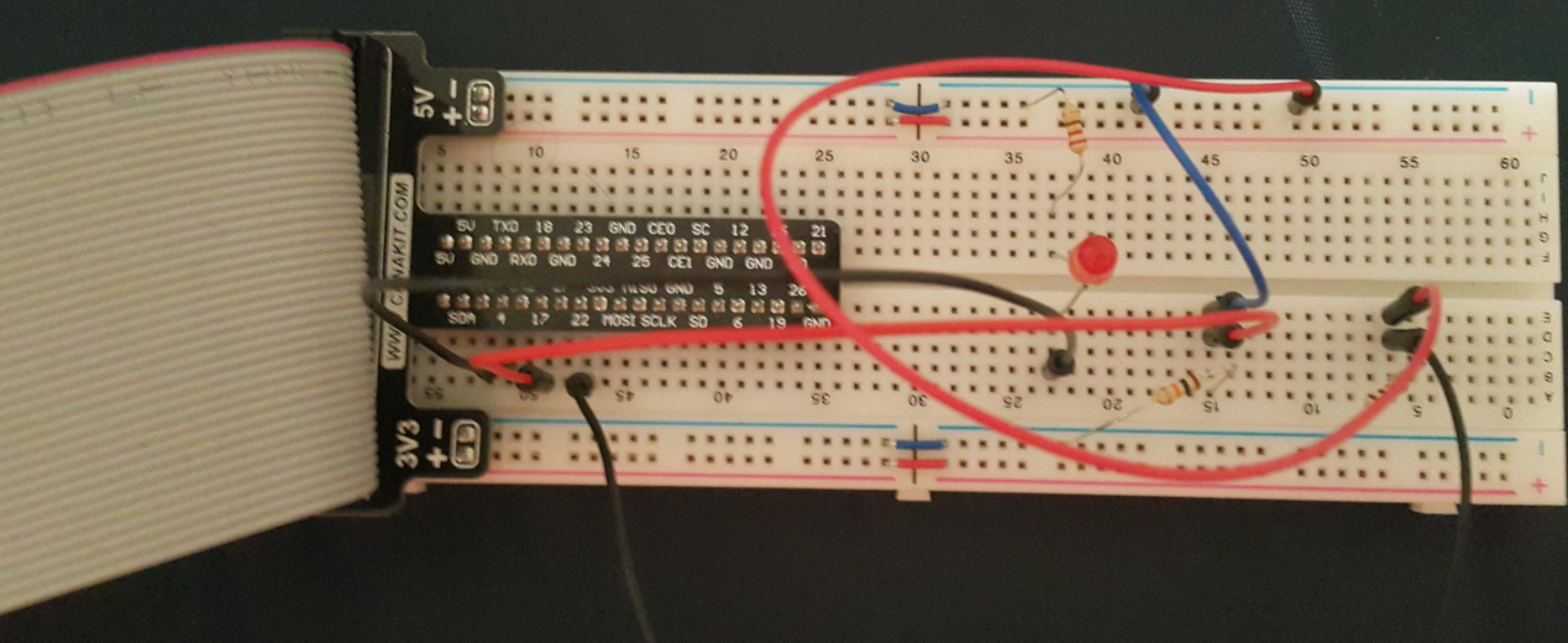
12:54 21/06/2020 ENG

File Edit Tabs Help

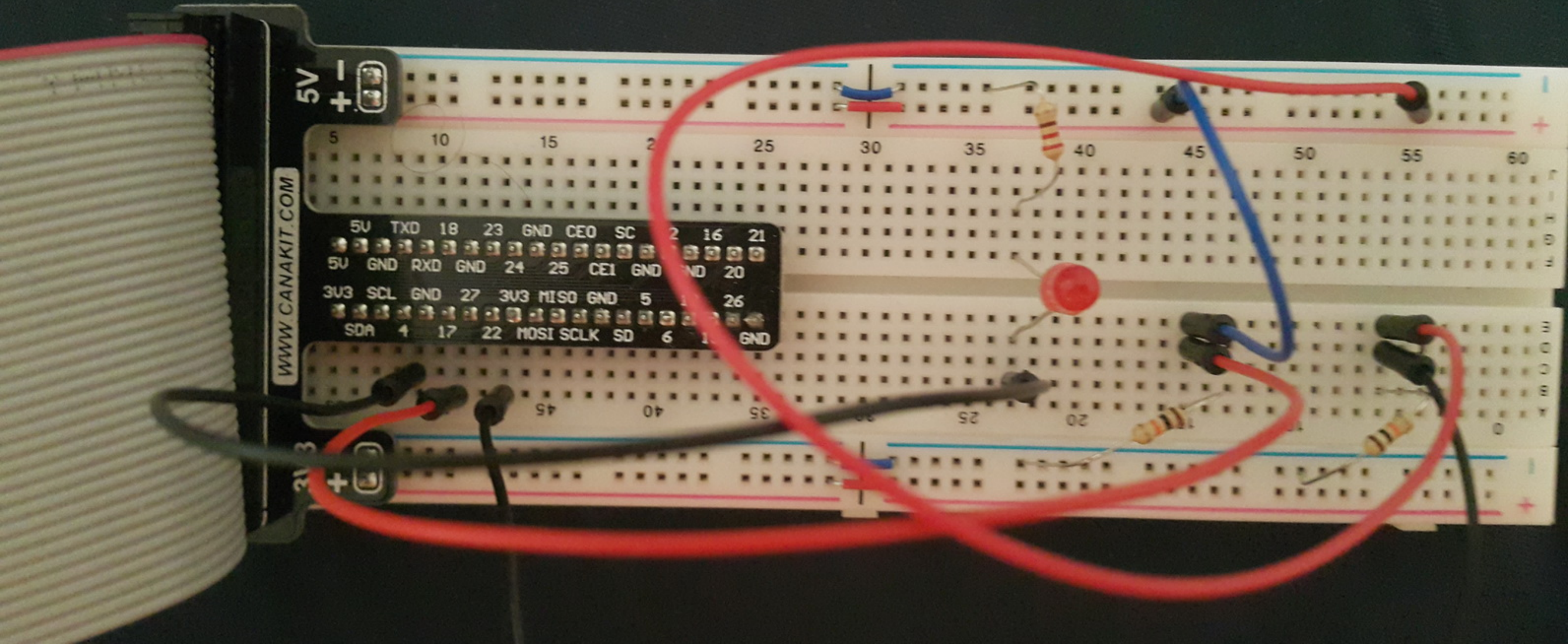
```
pi@raspberrypi:~ $ python p2_t8.py
=====Server Response at 2020-06-21 21:54:02.109636=====
++++Server request successful:
The status of LED1 is 0
The status of SW1 is 0
=====Server Response at 2020-06-21 21:54:07.480636=====
++++Server request successful:
The status of LED1 is 0
The status of SW1 is 0
=====Server Response at 2020-06-21 21:54:12.855480=====
++++Server request successful:
The status of LED1 is 0
The status of SW1 is 0
pi@raspberrypi:~ $
```


File Edit Tabs Help

```
pi@raspberrypi:~ $ python p2_t8.py
=====Server Response at 2020-06-21 23:03:12.339667=====
++++Server request successful:
The status of LED1 is 0
The status of SW1 is 0
The status of SW2 is 0
=====Server Response at 2020-06-21 23:03:17.686788=====
++++Server request successful:
The status of LED1 is 0
The status of SW1 is 0
The status of SW2 is 0
=====Server Response at 2020-06-21 23:03:23.068645=====
++++Server request successful:
The status of LED1 is 0
The status of SW1 is 0
The status of SW2 is 0
pi@raspberrypi:~ $
```


```
pi@raspberrypi:~ $
```

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5V	TXD	18	23	GND	CEO	SC	2	16	21
5V	GND	RXD	GND	24	25	CE1	GND	GND	20
3V3	SCL	GND	27	3V3	MISO	GND	5	1	26
SDA	4	17	22	MOSI	SCLK	SD	6	1	GND

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Search

Server: 127.0.0.1:3306 » Database: u551001383_team » Table: SensorsAndActuators

Browse

Structure

SQL

Search

Insert

Export

Import

Operations

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- SensorsAndActuators
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- Users

Showing rows 0 - 7 (8 total, Query took 0.0006 seconds.)

SELECT * FROM `SensorsAndActuators`

Profiling

Edit inline

Edit

Explain SQL

Create PHP code

Refresh

Show all

Number of rows: 25

Filter rows: Search this table

Sort by key: None

+ Options

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↔

			DevID	DevType	FunctionDescription	Control	DeviceStatus	
<input type="checkbox"/>				LED1	ACTUATOR	IV infusion of pressor to increase BP	ANDROID	1
<input type="checkbox"/>				LED2	ACTUATOR	IV infusion of Y to decrease BP	ANDROID	0
<input type="checkbox"/>				LED3	ACTUATOR	IV infusion of W to decrease blood sugar	ANDROID	0
<input type="checkbox"/>				LED4	ACTUATOR	IV infusion of Z to increase blood sugar	ANDROID	0
<input type="checkbox"/>				SW1	SENSOR	sense systolic BP > 140 mm Hg	RPI	0
<input type="checkbox"/>				SW2	SENSOR	sense diastolic BP < 30 mm Hg	RPI	0
<input type="checkbox"/>				SW3	SENSOR	sense blood sugar > 120 mg/dL	RPI	0
<input type="checkbox"/>				SW4	SENSOR	sense blood sugar < 50 mg/dL	RPI	0

↑

☐ Check all

With selected:

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Delete

Export

Show all

Number of rows: 25

Filter rows: Search this table

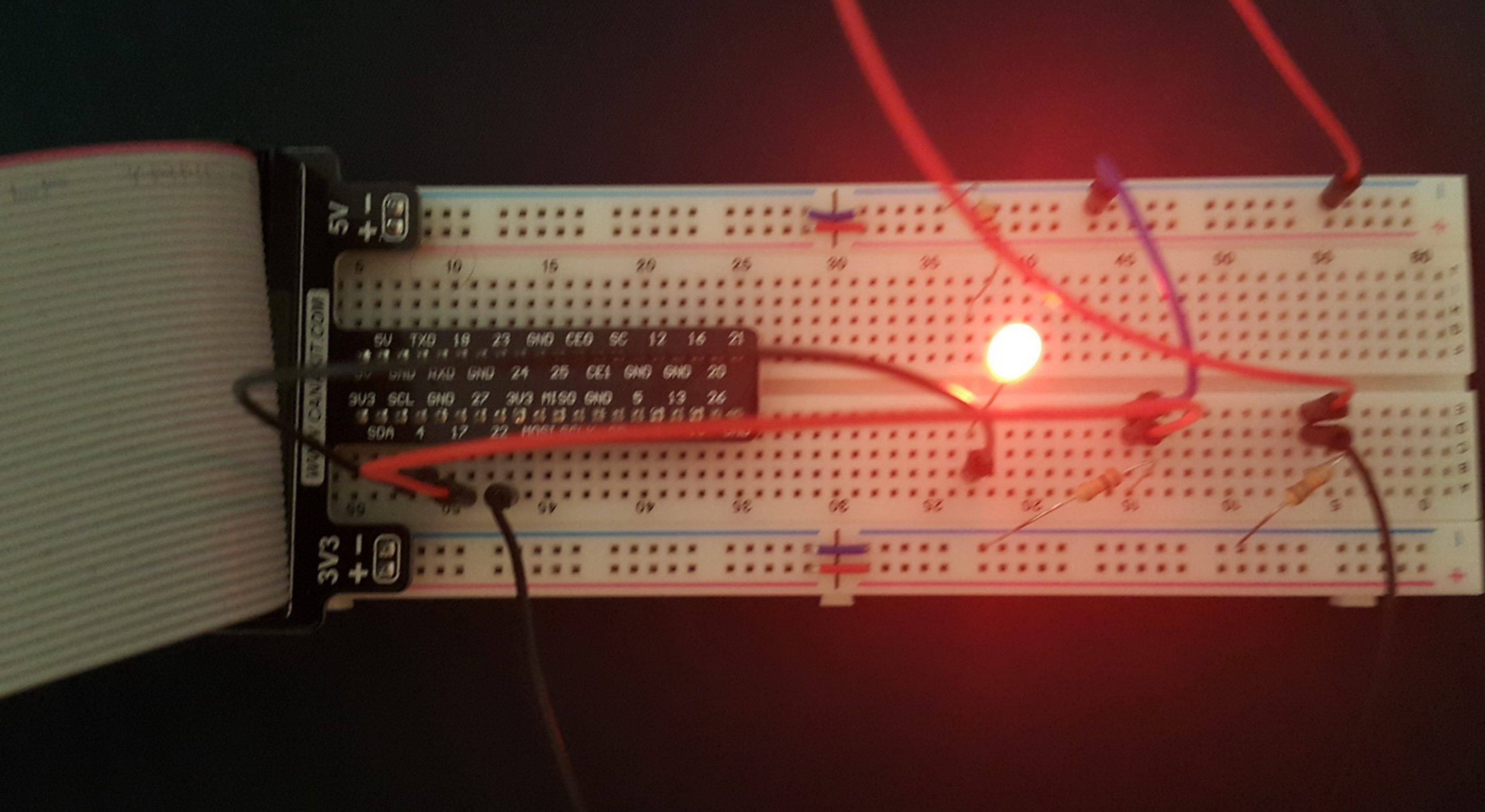
Sort by key: None

Console

sults operations

Windows Taskbar

System Tray



File Edit Tabs Help

```
pi@raspberrypi:~ $ python p2_t8.py
=====Server Response at 2020-06-21 23:05:48.398627=====
+++++Server request successful:
The status of LED1 is 1
The status of SW1 is 0
The status of SW2 is 0
=====Server Response at 2020-06-21 23:05:53.736784=====
+++++Server request successful:
The status of LED1 is 1
The status of SW1 is 0
The status of SW2 is 0
=====Server Response at 2020-06-21 23:05:59.076956=====
+++++Server request successful:
The status of LED1 is 1
The status of SW1 is 0
The status of SW2 is 0
pi@raspberrypi:~ $
```