

## Internet of things (IoT): – Communication, characteristics, results

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**Abstract:** The purpose of this paper is explain the matter of Internet of Things, what are the advantages from its use, what type of characteristics it has, the technological trends and the practical implementation - Connecting to Arduino shield with Plotly service and connecting to Arduino Yun shield with Amazon web service. The paper is consisted of 4 parts. The first part refers to the introduction of what Internet of things is and what it is used for, the second part refers to hardware component and software service, while the third and fourth part refers to the practical example of Internet of Things works. The practical part refers to connecting Arduino shield with Plotly service.

**Keywords:** Internet, Web services.

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### I. Introduction

Internet of Things refers to the network of physical objects which itself have implemented some electronics, software, sensors and connection that allows objects to exchange data with operators or other devices. Via Internet of Things the existing network devices are enabled to communicate with each other, with selected media and it can be managed remotely. This enables efficiency, precision and economic benefit. Internet of Things is expected to offer advanced connectivity of devices, systems will be far better than communicating machine-to-machine (M2M) and it includes different domains, applications and protocols. Connection of devices is expected to be performed automatically in all areas, by allowing advanced applications such as Smart Grid, and expanding areas such as smart cities. "Things" in Internet of Things refers to wide range of devices such as biochips that are installed on stray dogs, for monitoring devices such as implants and for monitoring the heart rate. The purpose of these devices is to collect as much useful information as possible with existing different technologies and then send data to other devices. The Internet of Things is expected to generate a large amount of data from different areas in order to improve service, storage and processing of data.

### II. Application Of Hardware Components And Software Services

The hardware components that are used for presenting the work of the Internet of Things are the following:

- Arduino shield
- Yun shield

The software services used in this paper are:

- Plotly service

### III. Connecting To Arduino Shield With Plotly Service

Plotly allows connecting with Arduino device, receiving data in real time however, using wire mode operation that Arduino board must be connected to the PC. The connection of the board with Plotly is done in several steps:

- Preparation of the board
- Configuring Plotly and its documentation
- Code Upload

Preparation plate applies to its connection to the power supply, and connects the appropriate USB port to a computer.

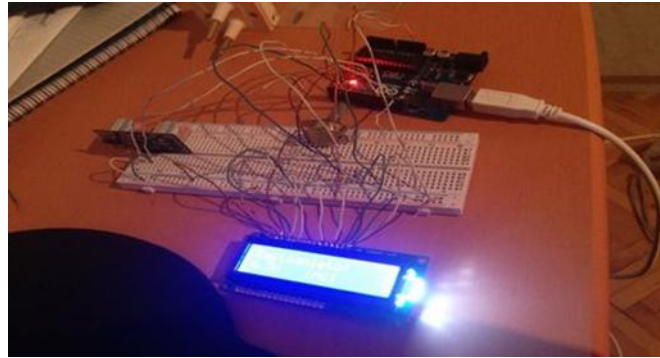


Figure No. 1 – Preparation of the board.

Configuration refers to logging in Plotly website and creating a new workspace which is followed by providing username, password and token to the appropriate desktop.



Figure No. 2 – Creating a new workspace.

After creating a desktop with the necessary data such as username, password and token the user needs to perform upload of code in plate to execute connection. After executing the code, the board starts data readings from the corresponding sensor but does not perform the presentation. For the execution of adequate presentation of Plotly nod.js needs to be used. The procedure used is as follows:

- firstly you need to open a folder where you will create directory that will invoke a command line execution,
- secondly you need to open the folder with the file containing the code to execute the installation of the gateway for connection.
- After executing the installation of the gateway for connection, the next step is to create a file with the extension .js which will contain the code that is needed for presenting the results. The code is shown in the picture with item number 3.

```
1 var serialport = require('serialport'),
2     plotly = require('plotly')('base', 'b4hddac10c'),
3     token = 'mqaf5m7pcc';
4
5 var portName = 'COM3';
6 var sp = new serialport.SerialPort(portName, {
7   baudRate: 9600,
8   dataBits: 8,
9   parity: 'none',
10  stopBits: 1,
11  flowControl: false,
12  parser: serialport.parsers.readline("\n")
13 });
14
15 // helper function to get a nicely formatted date string
16 function getDateStr() {
17   var time = new Date().getTime();
18   // 32400000 is (GMT+9 Japan)
19   // for your timezone just multiply +/-GMT by 36000000
20   var datestr = new Date(time + 32400000).toISOString().replace(/T/, '').replace(/Z/, '');
21   return datestr;
22 }
23
24 var initdata = [{x: [], y: []}, {stream: {token: token, maxpoints: 500}}];
25 var initlayout = {fileopt: "extend", filename: "sensor-test"};
26
27 plotly.plot(initdata, initlayout, function (err, msg) {
28   if (err) return console.log(err);
29
30   console.log(msg);
31   var stream = plotly.stream(token, function (err, res) {
32     console.log(err, res);
33   });
34 });
```

Figure No. 3 – Code for connection and presentation of data.

By executing the code the results are being presented. Therefore it is necessary to write the priority file in the code itself, name of the port which is connected with the board and finally there is an opening of the connection and the results presentations begins.

#### **IV. Presentation Of The Results**

The results relate to the measurement of daylight. The results are shown in Figure no.4.

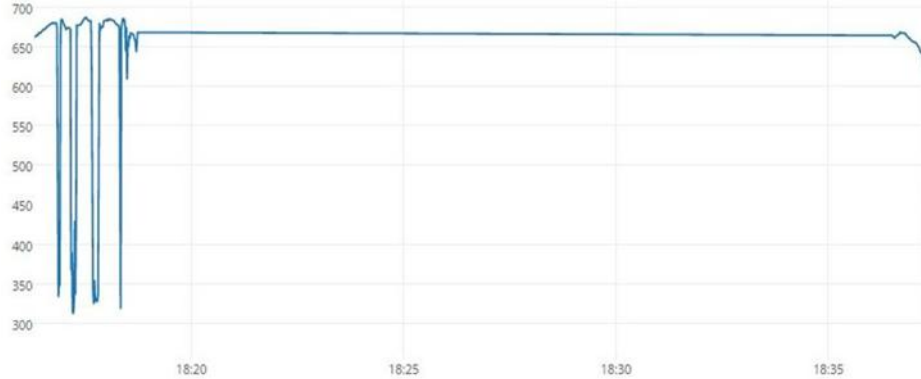


Figure No. 4 – Presentation of results.

Results are shown in graphical display presenting the requested data, therefore they are visible in a proper way. The display presents information according to date, time, and measurement unit. The results can be seen from any place that the user can log in on the website. The results are derived from daylight in intervals of 10-20 minutes before the sunset. The purpose was to receive results that can be accessed using the Internet of Things.

#### **V. Conclusion**

Regarding the analyses provided above it can be concluded that the IoT will drastically change the human lifestyles. In this paper, besides theoretical overview of the Internet of Things and its characteristics a practical attempt was made as well, where it is displayed hardware and software connecting elements were displayed to present how the Internet of Things works. The advantage of the Internet of Things is that it allows consideration of results from any place, which saves the time of work. The Internet Society cares about IoT because it represents a growing aspect of how people and institutions are likely to interact with and incorporate the Internet and network connectivity into their personal, social, and economic lives. Solutions to maximizing the benefits of IoT while minimizing the risks will not be found by engaging in a polarized debate that pits the promises of IoT against its possible perils. Rather, it will take informed engagement, dialogue, and collaboration across a range of stakeholders to plot the most effective ways forward.

#### **References**

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