



**Silesian  
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Faculty of Automatic Control,  
Electronics and Computer Science

Internet Technologies – project work

### **WebPage with charts**

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# **Chapter 1**

## **Introduction**

The Internet is a worldwide collection of computer networks that began as a single network that was originally created in 1969 by ARPA (Advanced Research Projects Agency), a U.S. government agency that was far more interested in creating projects that would survive a nuclear war than in creating anything useful for the civilian population.

In its original form, ARPANET, the U.S. government hoped to create a network of computers that would allow communication between government agencies and certain educational centers that would be able to survive a nuclear explosion. It is doubtful that the original founders of ARPANET foresaw what we now know as "the Internet." From its humble beginnings as a military project, the ARPANET grew slowly throughout the 70's and 80's as a community of academics accomplished the truly monumental task of hammering out the building blocks of this new, open, modular conglomeration of networks.

In addition to the U.S. ARPANET, other countries also developed their own computer networks which quickly linked up to ARPANET, such as the UK's JANET (1983 onwards), and Australia's ACSnet (mid-1970s until replaced). Connecting these together would help develop a global internetwork.

The various protocols, including IP, TCP, DNS, POP, and SMTP, took shape over the years, and by the time the World Wide Web (HTML and HTTP) was created in the early 90's, this "Internet" had become a fully functional, fairly robust system of network communication, able to support this new pair of protocols which eventually turned the Internet into a household word.

While a large portion of users today confuse the Web with the Internet itself, it must be emphasized that the Web is only one type of Internet application, and one set of protocols among a great many which were in use for over a decade before the Web entered into the public awareness.

Odnosnik [1].

## Chapter 2

### Aim and scope of the project

The main goal of my project is to create a website that will allow to analyze data in easy way. A website will display charts which gives us data about velocity and distance traveled as a function of time. The page should have a menu where we can choose velocity chart, distance traveled chart, blog or contact. I want to use programming languages C, PHP, JavaScript and markup language HTML, CSS. Also after finish the project i want use bootstrap to make a page compatible with other devices.

Project assumptions:

- 1.Learn the basics. How to program in html, css, javascript, php.
- 2.Make simple WebPage with charts.
- 3.Project allows us to understand networks and servers.
- 4.Project allows to gain experience with solving problems.
- 5.Learn how to write report in latex.
- 6.Gives us experience in html, css, javascript etc. that we can program in frameworks.
- 7.Learn technical english and how to use it. Preparing to work with english language.



**Figure 2.1.** Goal and idea.

# Chapter 3

## Schedule

### 3.1 Schedule approved at the beginning

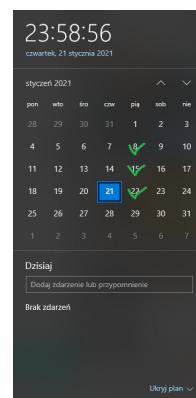
8.01 Learn the basics. How to program simple things. Create page or application without anything on it.

15.01 Send data to my page or application and create charts with this data.

22.01 Solve problems, upgrade your page, add some text to give information about page.

### 3.2 Schedule reflecting actual work

I did all things i want to and which i have in approved schedule, but i didn't manage to make properly work server with arduino which sends data to database. In future i want repair this problems and try webpage with bootstrap.



**Figure 3.1.** Schedule.

## **Chapter 4**

# **Software and/or hardware implementation WebPage with charts**

### **4.1 Defining the problem**

How we can do the WebPage? We can do it with standard languages or extensive frameworks like for example Angular. Firstly i thought about do html, css files which i need to create my WebPage. WebPage can exist because html files. Css files are for better look of the webpage. I thought about how my webpage will look like. I created html and css files and wrote lines of code in this files. Secondly i thought about elements which i must buy to send data from arduino sensors to database. I bought ArduCam with esp inside it, but something wasn't working, so then i bought Ethernet-Shield. Then i thought how to implement code in arduino environment. I didn't manage to properly implement it to send data from sensors by ethernet shield. In future i will try again or do it by python. After it i created javascript files and php files. Javascript files cause drawing charts and php files cause connect database with my webpage.



**Figure 4.1.** Defining the problem.

## 4.2 Analysis of possible solutions

To do html files the solution is just to write adequate code in html language. To do that I must learn basics of html with guides on youtube or google. How will my page look like? How to solve this problem? It is good question. To do that I must learn basics of html with guides on youtube or google. Firstly i think it is good to draw idea on paper and calculate everything. Then try to program our idea in css files. Also we must do different css files to different html files. We could change html files with php files to not changing all html files or save content of all subpages to database.

How can I do WebServer? I can do it with arduino, python or just try free hosting on internet. How can I send data from arduino to my WebPage? Firstly i must learn how to implement code in arduino to send data and buy required items. Then i must learn php files which will help me to receive the data from arduino and send data from database to my webpage. I think it can work with only arduino code in which is html code etc.

## 4.3 The proposed solution

I chose basic programming like html, css, javascript, php and of course C on arduino. I chose it because I could find really good guides on youtube-pasja informatyki and a lot of other video stuff with creating charts with javascript libraries. It is difficult to learn something like angular or something without knowing the basics. Also it is smaller amount of guides because it is hard to master something, lets say big amount of programming.

I thought about sending data from arduino to WebPage but finally i did it with database which i think is better. Data is sent from arduino to database and then WebPage receive this data from database and create charts.

I did my WebPage with a lot of htmls, css, javascript, php files which isn't that good, although it is ok, could be better with database, but there was small amount of time to do that project.

$$\frac{dQ}{dt} = Q_{in} - Q_{out} + P \frac{dV \cdot \rho \cdot c_w}{dt} = F \cdot \rho \cdot c_w \cdot T_{in} - F \cdot \rho \cdot c_w \cdot T_{out} + P \frac{dT_{out}}{dt} = \frac{F}{V} \cdot (T_{in} - T_{out}) + \frac{1}{V \cdot \rho \cdot c_w} \cdot P K(s) = \frac{\Delta T_{out}}{\Delta P} = \frac{V \cdot \rho \cdot c_w \cdot \frac{1}{F}}{V \cdot s + 1} G = \frac{1}{V \cdot \rho \cdot c_w} G$$

## 4.4 Implementation

Arduino Implementation:

Initialize the Ethernet server library with port:

EthernetServer server(80);

How to set up IP address for my controller:

```
IPAddress ip(192, 168, 0, 137);  
Start the Ethernet connection and the server:  
Ethernet.begin(mac, ip);  
Listen for incoming clients:  
EthernetClient client=server.available();
```

We check connection with:

```
if(client.connected())
```

And then arduino sends request to a server with:

```
client.print("GET /testcode/rower.php?v2=");  
client.print(v2);  
client.print("ANDprzebytadroga=");  
client.print(przebytadroga);  
Standard http response header  
client.print(" ");  
client.print("HTTP/1.1");  
client.println();  
client.println("Connection: close");  
client.println();
```

Html Implementation:

Standard code need:

```
<html></html>  
<body></body>  
<head></head>  
<!DOCTYPE HTML>  
<html lang="pl">  
<meta charset="utf-8"/>
```

Css Implementation:

We can add background by:

```
body  
nawiasklamrowy  
background-image:url('rower.jpg');
```

```
background-size:cover;  
background-position:center;  
position:relative;  
overflow:hidden;  
nawiasklamrowy
```

We should add Id by hashtag or class by dot. Then in id or class we should write width, height, color, text-align, padding, background-color, font-size and other stuff. For example:

```
hashtagwstep  
nawiasklamrowy  
background-color:black;  
color:black;  
text-align:center;  
padding: 15px;  
letter-spacing: 2px;  
nawiasklamrowy
```

The float command is usefull. The float CSS property places an element on the left or right side of its container, allowing text and inline elements to wrap around it.

Also to clear float command we need to use clear:both.

Creating charts:

You need to create a php file that will connect to the database and retrieve data using:  
`mysqli = new mysqli(DBHOST, DBUSERNAME, DBPASSWORD, DBNAME);` with dollar at the beginning of course  
`query = sprintf("SELECT v2, przebytadroga FROM rower");` with dollar at the beginning of course

Also we need to create a javascript files. In it, the push() method adds more points to the array. Using the get method we download the php url file. To create a chart, we need to create an instance of the Chart class with:

```
<canvas id = "mycanvas" width = "400" height = "400"></canvas>  
var ctx = ("mycanvas");with dollar after equal symbol of course and hashtag before mycanvas
```

We need to create an html file in which we need to include the appropriate files from javascript:

```
<script type="text/javascript" src="js/jquery.min.js"></script>
<script type="text/javascript" src="js/Chart.min.js"></script>
<script type="text/javascript" src="js/app1.js"></script>
```

## 4.5 Problems during project development

As always, there are problems with any project. In this project there were problems too.

The main problems was to implement the code and working properly.

First problem was to how implement graphic in website, but it is easy to solve, but sometimes i had problems with css files, where i saved this and nothing happens. 4.2

Secondly my ArduCam ESP8266-12E WiFi IoT didn't work i didn't know why, so i changed to ethernet shield. Then Ethernet shields need to use some of pins to work properly. The Ethernet shield uses digital pins 11, 12, 13, 10, and 4 for SPI communication, so i couldn't connect my lcddisplay and other stuff: rtc, buttons. Even simple program like "Hello world" didn't want display on lcd. When i changed to analog my program didn't want calculate, so i just removed lcd and other stuff to make project easier. 4.3

To create server was a problem too. Probably the problem was in library i used which is ethernet.h then i changed it to ethernet2.h, and i had server but it didn't send data to database I didn't figure out why. 4.4

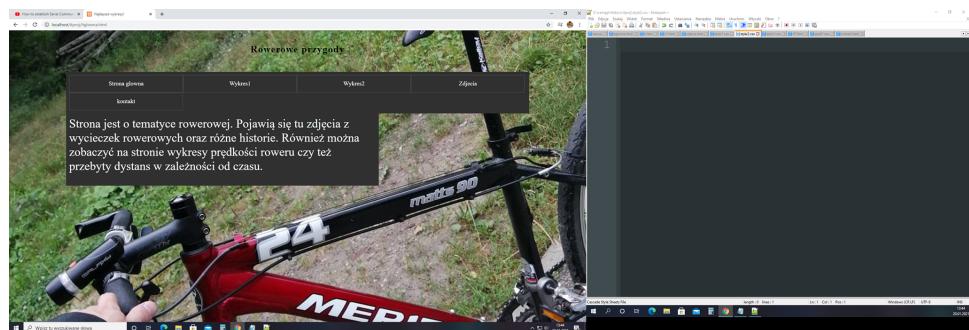
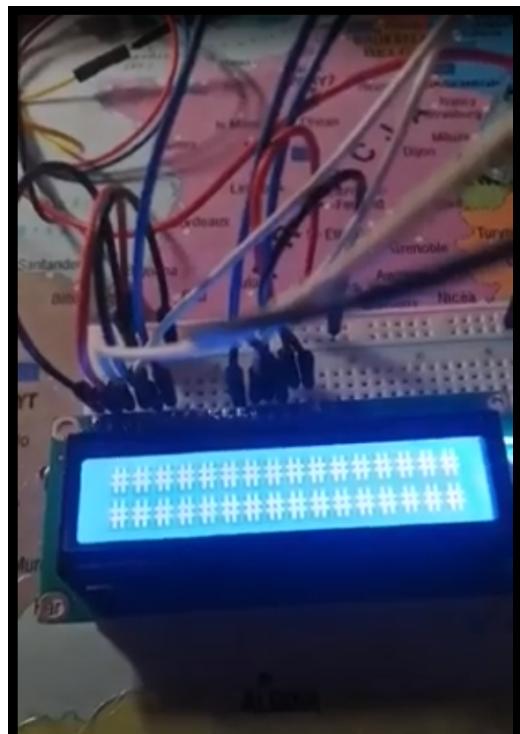
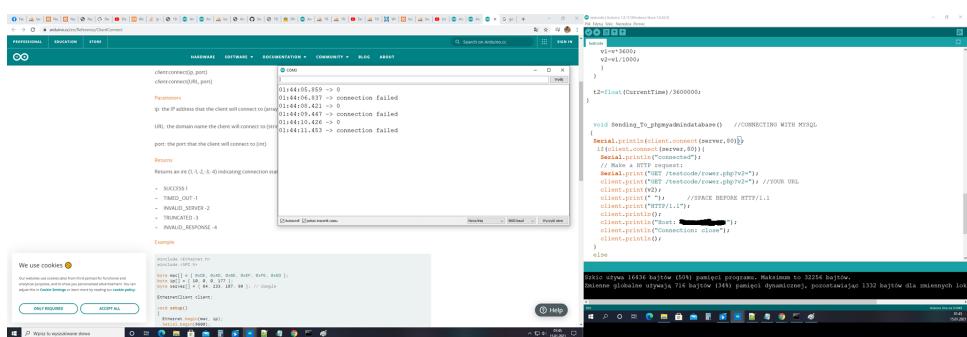


Figure 4.2. Css.



**Figure 4.3.** Ethernet Shield pins problem.



**Figure 4.4.** Server problem.

# **Chapter 5**

## **Summary**

Price of the project! It depends where u buy arduino, ethernet shields etc. If i didn't add project from other lesson it could be around from 70PLN to 170PLN depends on which website u will buy or in what store. Also the price is the time you have to learn many languages.



**Figure 5.1.** Price.

I gained the ability to program in various languages, to program in markup languages, i.e. html and css, to create graphs on a website with the help of data retrieval from a database.



**Figure 5.2.** Skill.

## What's next?

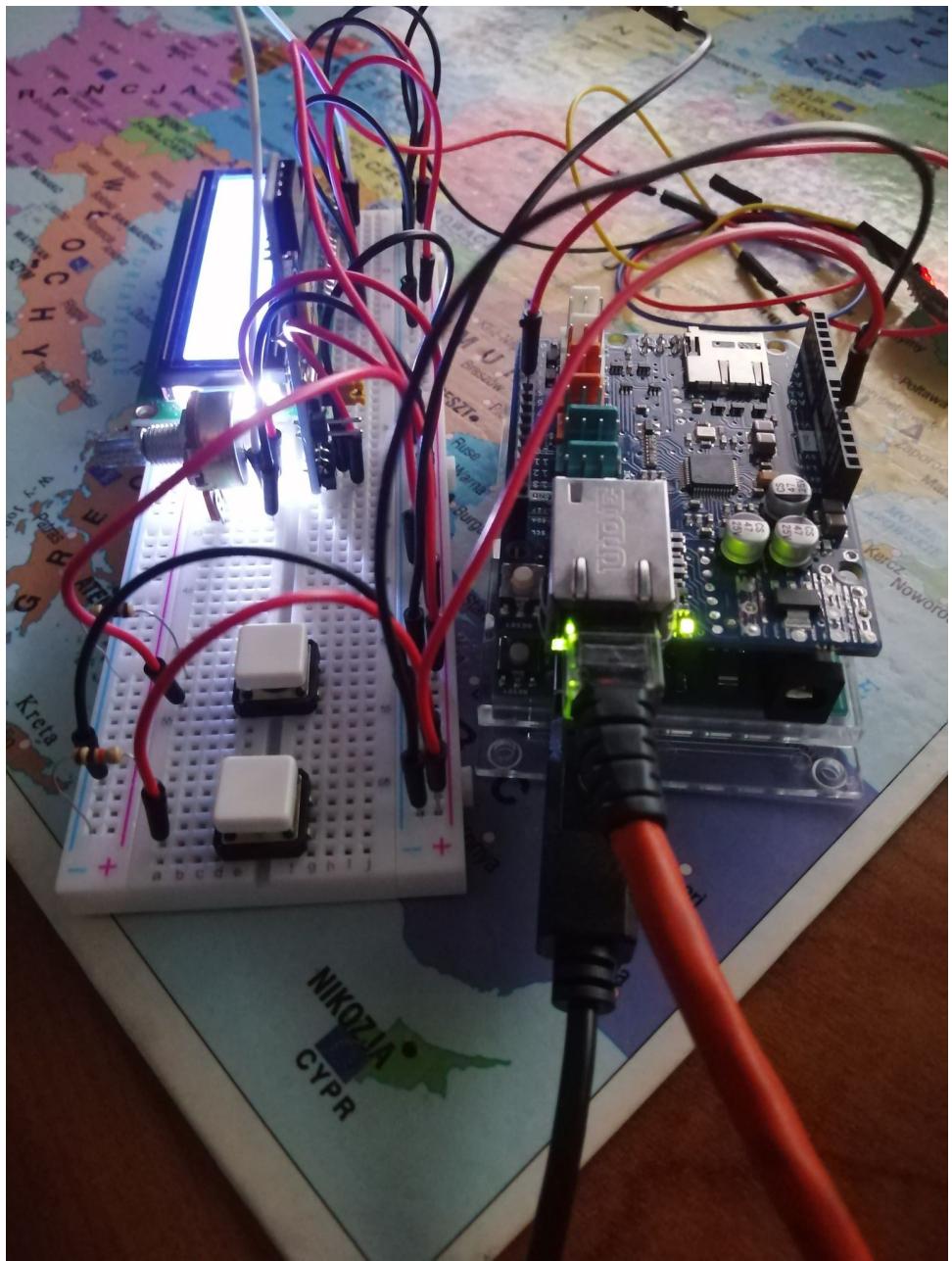
1. To fix not working properly server.
2. Maybe do it with only arduino without database.
3. Add some animation on page.
4. Add some other charts maybe do it with real time chart with showing only 20 data points.
5. Improve the website so that it can be used from various devices on the internet.

To sum up i learnt a lot of things. I learnt how to program in different languages. Also I gain knowledge to do my project or knowledge useless to my project but maybe usefull in future. Also I improved english skills with writing a rapport and making a presentation, I improved my english speach. I learnt how to send data from arduino to database and from database to WebPage. I improved my skills with database. I got experience in making charts on webpages. It was really fun to do the project. Now I have more knowledge and can do other projects or improve my WebPage to better stage.

On the end i can add photo with my arduino and how arduCam with build esp in it look like.



**Figure 5.3.** Moja Strona.



**Figure 5.4.** My arrangement.



Figure 5.5. arducam.

# Bibliography

- [1] Human, *Internet*. wikibooksorg, 2020.