

## WEB-BASED SYSTEM FOR NAVIGATION FOR STUDENTS AT THE UNIVERSITY OF MINING AND GEOLOGY

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**ABSTRACT.** Nowadays telephones are used as a means of orientation in unfamiliar environments, using mobile applications. It is important to help newcoming students adapt and get oriented for the educational process. In the current report, the term orientation will be examined as a way of optimizing point-to-point movement. An algorithm is proposed for the orientation and movement of students from one place to another as quickly as possible. For this purpose, an interactive web application for navigation across the material basis of the University of Mining and Geology "St. Ivan Rilski" is provided. For the creation of this app, the latest trends in the construction of dynamic sites are used. The project was created for the needs of the students and the guests of the university. A survey was held among students from different years and various courses of study.

**Keywords:** web-based, application, responsive design, dynamic site

### WEB-БАЗИРАНА СИСТЕМА ЗА НАВИГАЦИЯ НА СТУДЕНТИТЕ ОТ МГУ

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**РЕЗЮМЕ.** В днешно време телефоните се използват като средство за ориентирване в непозната обстановка посредством мобилните приложения. Особено е важно, за да се помогне на новодошлите студенти да се адаптират и ориентират бързо за започване на учебния процес. В настоящия доклад понятието за ориентация ще бъде разгледано като начин за оптимизиране придвижването от точка до точка.

Предложен е алгоритъм за максимално бързо ориентирване и придвижване на студентите от едно занятие в друго, като за целта е представено интерактивно web приложение за навигация на материалната база на Минно-геоложки университет „Св. Иван Рилски“.

За създаването на приложението са използвани най-новите тенденции за изграждане на динамични сайтове.

Проектът е създаден за нуждите на студентите и гостите на университета. Проведена е анкета сред студентите от различни курсове и специалности.

**Ключови думи:** веб-базиран, приложение, адаптивен дизайн, динамичен сайт.

## Introduction

Navigation is the science and technique for establishing the position of a moving object relative to a coordinate system. It can also be used to calculate the path that has to be traversed to reach another point with known coordinates. In the past navigation was mainly done by compass. Nowadays, mobile applications for navigation (GPS) based on geostationary satellites are increasingly used.

In the report, navigation is considered in terms of a manner for a faster guidance and quicker adaptation in an unfamiliar environment. For this purpose, a method is described for creating a web-based application for the premises of the University of Mining and Geology "St. Ivan Rilski".

## WEB- Based information System

A web-based information system is the information system

which employs Internet web technology to deliver information and services to consumers or other information systems/applications. This is a software system whose primary purpose is to publish and maintain data using hypertext-based principles. An information web system usually consists of one or more web applications, specific functions, component oriented, along with information elements and other non-web components. A web browser is mostly used as front-end, while databases are back-end (Ivanov I.,2015).

Several important issues have to be considered when formatting each application:

1. Why it is necessary to create it
2. For whom it is intended.

In our case, creating such an application is prompted by the need to get newly admitted students oriented in the university environment and, to a large extent, to improve the quality of the educational process. It can be used by students and lecturers, as well as by university guests.

## Application architecture and instruments for its development

To describe the contents of "Navigation for students at the University Of Mining and Geology", the HTML markup language is use. Styling is achieved through CSS, the JavaScript scripting language, and the jQuery and Bootstrap libraries. To create the database, SQL is used, and PHP is used for the server part.

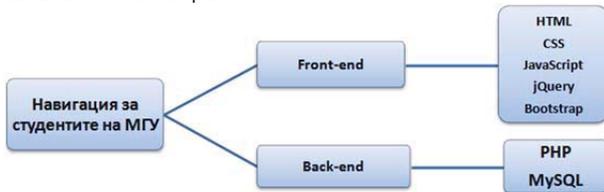


Fig.1 Architecture of "Navigation for students at the University of Mining and Geology"

Front-end is this application with which the user interacts directly. Front-end is the interface between user and back-end.

- HTML (or Hyper Text Markup Language) is the primary language for describing a web page. HTML elements (tags) are the basic units of the webpage. Using the tags from the latest version so far (HTML 5), the page structuring is achieved, as well as clear distinction among the various sections of the page, namely:



Fig.2. Structure of a web page (HTML 5).

- For a web site to look in exactly the same way with different screen widths and on various platforms, the so-called adaptive design (responsive design) is used. The technology behind it is CSS(Cascading Style Sheets). This is a language for describing styles. Through the style of the site, the size and arrangement of the elements in it are determined: background, font style and color, etc. A handy tool is CSS Media Queries, where it is recorded and determined at what resolution and how exactly the site is going to look. The latest version is CSS 3.

```

@media only screen and ( max-width: 62.5em ) /* 1000 */
{
  #nav
  {
    width: 100%;
    position: static;
    margin: 0;
  }
}
    
```

Fig.3. Page styling at 1000px screen width (CSS Media Queries).

- **JavaScript, jQuery, Bootstrap**

JavaScript is a programming language that allows dynamic performance of the browser within a given HTML page. This is the most widely used programming language on the Internet.

Bootstrap is the most common HTML, CSS, and JavaScript framework for the development of responsive web design for sites.

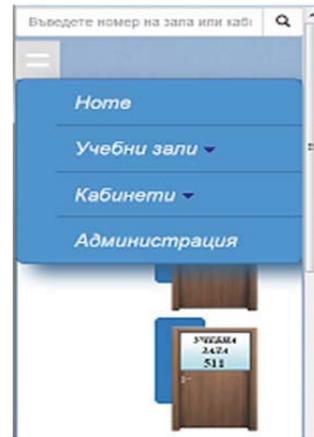


Fig.4 Hamburger menu with Bootstrap (with a minimum screen width)

jQuery is a widespread alternative to JavaScript. It offers a powerful toolbox for selecting items in a document.

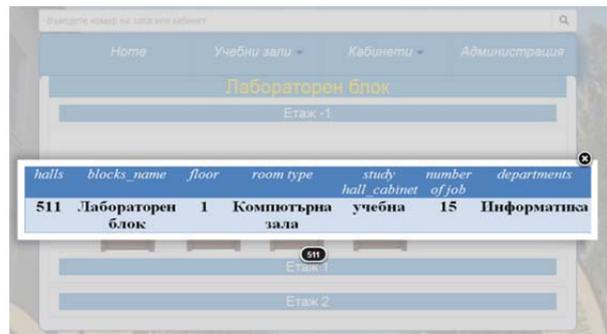


Fig.5. Sideshow gallery with jQuery

Back-end – the application serves as a support for front-end services. It can interact directly with the front-end application or, which is more common, with a program called intermediate program, which mediates between front and back-end applications.

- The database is created with help of MySQL, the most common open code program. This program presents information in the form of tables (relations).

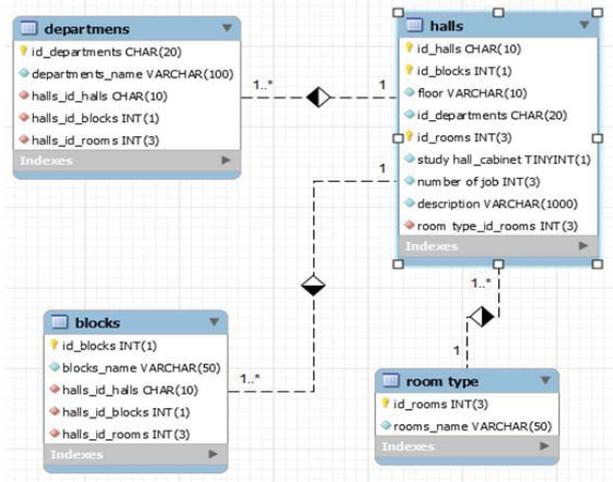


Fig.6. The relationship among tables in the database

So far, 4 tables have been created:

- The **blocks** table – it contains the numbers and full names of faculties, laboratories, the sports complex and the Rectorate;
- The **departments** table –it contains the abbreviations and the full names of all departments at the university;
- In the **room type** table, the types of study with their numbers are extracted;
- The **halls** is the combining table. It combines all the information about a hall, accompanied by a brief description.

```
CREATE TABLE `halls` (
  `id_halls` char(10) COLLATE utf8_unicode_ci NOT NULL,
  `id_blocks` int(1) NOT NULL,
  `floor` varchar(10) COLLATE utf8_unicode_ci NOT NULL,
  `id_departments` char(20) COLLATE utf8_unicode_ci NOT NULL,
  `id_rooms` int(3) NOT NULL,
  `study hall_cabinet` tinyint(1) NOT NULL,
  `number of job` int(3) NOT NULL,
  `description` varchar(1000) COLLATE utf8_unicode_ci NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8 COLLATE=utf8_unicode_ci;

INSERT INTO `halls` (`id_halls`, `id_blocks`, `floor`, `id_departments`, `id_rooms`, `study hall_cabinet`, `number of job`, `description`) VALUES
('400', 4, '1', '', 104, 0, 400, 'АУЛА \"/>

```

Fig.7. SQL code for generating and inserting information in the **halls** table.

- To turn the application from static (i.e. one which can be viewed on only one device) into dynamic, the PHP script language (Hypertext Preprocessor) is used. Upon request, the code, which is written on PHP, is

interpreted by the webserver to which it is uploaded, and the result is transferred back to the web browser. The user can not clearly see the PHP code without having access to the very file where it was saved. This is how security is taken into consideration. PHP files can contain text, HTML, CSS, JavaScript, and PHP code. PHP files have a .php extension.

- As for a text in a real environment, an Apache virtual server.

```
<?php
if(isset($_GET['id'])) {
    $id=$_GET['id'];
    if($id==24) {
        echo (
            <div class="container">
            <h2>Лабораторен блок</h2>
            .....
        ');
    }
}
?>
```

Fig.8. Part of the PHP code for opening the “Laboratory block” panel.

## Conclusion

The functions of the navigation system are to inform, guide and direct people in an spatially unfamiliar environment. It is essential that the guiding information be positioned in such a manner as to be effective. The proposed web application meets these requirements.

The web-based information system “Navigation for students at the University of Mining and Geology” is currently being developed. Concurrently, a fully mobile application for internal spatial navigation is also being developed.

## References

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