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1 INTRODUCTION

Graphical User Interface (GUI) is a junction between a person interacting with things, in our case computer applications (systems), and it is an important part of these systems (smart phones, tablets or desk top computer applications, ATMs or ticket automats, microwave ovens, TV sets, wrist watches or automatic washing machines). GUI is part of the more general User Interfaces (UI) and this is the domain of The Human Computer Interaction (HCI) – scientific and engineering field, dealing with the communication between humans and computers [2], [7], [10], [11], [16].

Every information system, even the simplest computer program created by a novice programmer, has some form of the UI, otherwise such a product would be useless. Sometimes the UI is the most important marketing parameter of the product.

Some scientific applications, where the program simulates complex phenomena and the input and output of the program are large data sets in the form of tables or graphs, have very simple UI and the ratio of user interaction to the program execution is low. On the other hand, there exist programs which use simple algorithms, but communication between user and program is very complex.

What is GUI? It is a user interface that takes advantage of computer graphics capabilities to make programs easier to use. The GUI comprises the screen text, symbols, icons, menus, keyboard shortcuts, mouse, finger or gesture movements and command language, as well as physical buttons, sliders, dials and levers. These elements are called gadgets. The most widely known GUI are windows. Elements of the interaction in windows systems (WIMP – Windows Icons Menu Pointer) are window gadgets – widgets. The main interaction paradigm behind the windows user interface is a pointing cursor and clicking mouse button.
In the last few years, a new paradigm emerges which is based on touch sensitive displays. This way of HCI is more intuitive, yet the programming principles remain the same.

The objective of this publication is to introduce fundamental problems of HCI and GUI, as well as practical skills of creating simple applications in the Java programming language. Learning programming is like a learning foreign language. It cannot be managed in a few hours spent memorizing words and the rules how these words could be composed into sentences. The knowledge of the most often used words and the basics of grammar are both necessary, but programming of non-trivial applications requires some experience. To gain experience means to do something. Therefore the way how readers can acquire skills is a ‘learning by doing’ process. For this reason, this publication contains a significant chapter dedicated to simple programming examples.

The book has six chapters: Introduction, Fundamentals of HCI, Usability and GUI Design, The Future of HCI, GUI Programming Principles and Tools, GUI Programming Examples and Bibliography. The first chapter defines what is the subject and motivations to study this subject. The second chapter explains basic theoretical problems of Human Computer Interaction. It also defines what is HCI, explains different aspects of HCI, compares human and computer sensory, motor and cognitive abilities, deals with usability, and covers HCI design methods and tools. The next chapter is an overview of the future trends in natural interaction using nonconventional input/output devices and sensors, hardware, systems and computing concepts. The fourth chapter is more practical, and summarizes theoretical and practical problems of GUI programming. Knowledge of the principles of GUI programming will help to understand the last chapter, which contains 27 simple Java applications – demos of programming different GUI elements.

To be able to understand content, and experiment with included programming examples, the following knowledge and skills are requested:

- Basic knowledge and experience in procedural programming style in any programming language.
- Fundamentals of Object Oriented Programming, preferably in Java, C# or Python, however readers with a good knowledge of C++ or JavaScript could easily to learn the necessary Java syntax and semantics required [53], [54], [59].
By the end of studying this book, and solving the included programming examples, the reader will:

- Have a broad understanding of HCI and GUI.
- Be able to gain fundamental theoretical knowledge on GUI design and the evaluation process and apply them in a practical setting.
- Be able to implement GUI for simple interactive applications using AWT and Swing packages and Graphics class.
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HCI AND USABILITY FUNDAMENTALS: PRINTED PUBLICATIONS


HCI AND USABILITY FUNDAMENTALS: INTERNET RESOURCES


THE FUTURE OF HCI


PROGRAMMING GRAPHICS, VISION AND SOUND IN JAVA


PROGRAMMING GUI IN JAVA: PRINTED PUBLICATIONS


PROGRAMMING GUI IN JAVA: INTERNET RESOURCES


OTHER RECOMMENDED READING


