

Transactions on Computer Systems and Networks

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Python Programming Recipes for IoT Applications

 Springer

Transactions on Computer Systems and Networks

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Foreword



I am extremely happy to write a foreword for the book “Python programming recipes for IoT applications”. This book aims to provide a comprehensive guide on how to use Python to develop applications for the Internet of Things (IoT). The IoT has revolutionized the way we interact with the world around us, and Python is one of the most popular programming languages used for developing IoT applications. This book will teach how to use Python to develop solutions that can connect to and interact with IoT devices.

This book is divided into six chapters, each focusing on a different aspect of Python programming for IoT applications. The first chapter will introduce you to the world of IoT and provide an overview of the Python programming language. The subsequent chapters will delve into various topics, such as data handling, networking, security, and machine learning. Each chapter will contain several recipes, which are step-by-step guides that will teach one how to solve specific problems or accomplish specific tasks. The recipes are designed to be easy to follow, and they provide practical examples that one can use to build own IoT applications.

This book is designed for anyone who wants to learn how to use Python to develop IoT applications. Whether you are a beginner or an experienced programmer, this book will provide you with the knowledge and tools you need to build your own IoT solutions. If you are interested in developing applications that can connect to and interact with IoT devices, this book is for you.

In conclusion, I would like to say that Python is an excellent language for developing IoT applications, and this book will provide one with the knowledge and tools one need to get started. Whether you are building a simple sensor network or a complex machine learning application, the recipes in this book will guide you through the process. So, let's dive in and start building some awesome IoT applications with Python.

Taleigao, India
March 2023

Professor Harilal B. Menon
Vice Chancellor
Goa University

Preface

We are pleased to present this book titled “Python Programming Recipes for IoT Applications” to the readers. As we all know, Python is powerful, yet flexible, easy to learn, and can be adapted to work with most of the microcontroller-based environments. Simplicity serves as a great asset to Python, which allows it to flourish on every platform. The coding flexibility and dynamic nature of Python help developers to create intelligent Internet of Things (IoT) devices.

So, we thought this is the right time to bring such a book to the market which explains the basic glimpses of Python followed by three different embedded platforms and their configuration setup. Various IoT applications with FoG and cloud-based computation on these platforms are explained in a very simple and understandable manner so that the readers can start programming on any of the platforms of their choice with ease.

The detailed chapter-wise flow is as follows:

Chapter 1 “Python Programming and IoT” discusses the basics of Python language such as features of Python, Integrated Development Environment (IDE), data types, and so on. It also discusses comparison of Python with C and C++ language. The C/C++ programming languages dominates embedded systems programming. On the other hand, Python has many strengths that make it a great programming language for embedded systems. This chapter also gives the overview of IoT and its applications.

Chapter 2 provides detailed step-wise configuration setup of Raspberry Pi, MicroPython Pyboard, and NVIDIA Jetson Nano. This chapter also covers the details of all above boards including block diagram, features available in these boards, and functions of each block.

Chapter 3 gives the detailed implementation steps of simple IoT applications using Raspberry Pi such as controlling LED blinking, OLED display interface, camera interface, and motor control (DC motor, stepper motor, and servo motor).

Chapter 4 gives the detailed implementation steps of MicroPython Pyboard for IoT applications such as home automation, smart e-waste bin, industrial environment monitoring, green house monitoring, and aquaculture monitoring.

Chapter 5 focusses on FoG and cloud computing with NVIDIA Jetson Nano board. It covers the introduction and the model architecture of both the FoG and

cloud computing. Detailed stepwise implementation of patient monitoring with cloud computing and home security (home surveillance, home safety lock, fire alert system) with FoG computing.

Chapter 6 covers the implementation of Machine Learning (ML) applications such as pattern recognition, object classification, and prediction using Jetson Nano.

Taleigao, India

Jivan S. Parab
Madhusudan Ganuji Lanjewar
Marlon Darius Sequeira
Gourish Naik
Arman Yusuf Shaikh

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The book is a result of practical implementation of various IoT applications using Python programming on Raspberry Pi, MicroPython Pyboard, and NVIDIA Jetson Board with a hands-on approach. Special thanks to Mrs. Kamiya Khatter, Associate Editor and publishing team of Springer to bring this book in the market.

Authors are thankful to Prof. Harilal. B. Menon, Vice-Chancellor and Prof. Vishnu Nadkarni, Registrar, Goa University for encouraging and providing administrative and financial support. The main motivational force behind this book is Professor, Dr. Rajanish Kamat (Vice-Chancellor of Dr. Homi baba State University, Mumbai) who has co-authored several books with authors.

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Finally, authors wish to express their gratitude to God, whose presence has given them strength to finish the book.

We will be failing in our duties, if we do not mention the support, encouragement received from friends, supporting staff and colleagues.

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