

# **IoT, AI, and Blockchain for .NET**

**Building a Next-Generation  
Application from the Ground Up**

**Nishith Pathak  
Anurag Bhandari**

**Apress®**

## ***IoT, AI, and Blockchain for .NET***

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*Nishith dedicates this book to*

*Jai Gurudev*

*To the most important person in my life, my mother, the late Bina Pathak, for her guidance, sacrifices, prayers, and blessings, which made me what I am today. I miss her each day. To my father, Pankaj Pathak, for teaching me to do what I believe in. You are and will always be my role model and my hero for my entire life. To my Sadh-Gurudev, who has been an eternal guiding force and entirely changed my life. To my grandfather, the late Mahesh Chandra Pathak, for his blessings and moral values.*

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# Introduction

We are in midst of a technological revolution. As with previous revolutions, an inability to adapt to the new ways will make your existing developer skills obsolete sooner than later. Starting with the Cloud revolution, Big Data, Internet of Things (IoT), and Artificial Intelligence (AI) have all changed the landscape of software development. As we enter a new era of AI and IoT, we have another technology currently creating disruptive waves across the globe. This new technology is Blockchain. The lethal combination of IoT and Blockchain, powered by AI, is ready to revolutionize software development yet again. We are talking about the AI 2.0 revolution.

This book introduces you to each component of AI 2.0 and Industry 4.0 in detail, viz. AI, IoT, Blockchain, and machine learning. Building on a strong conceptual base, it will provide methodical, hands-on and step-by-step approaches to solving practical real-world problems. In each “applied” chapter, you will build one module of our example solution for a fictional smart healthcare chain.

The book starts with quick and interesting introductions to AI, IoT, and Blockchain, and explains how these will be used in creating smart hospitals.

It then delves deeper into IoT concepts a developer must know and gives you a good understanding of Azure IoT Suite. From there, you build a centralized patient monitoring solution using real and fake IoT devices, leveraging the incredible power of IoT Suite.

The book then talks in detail about artificial intelligence, the various tasks that make up AI, and how developers—who do not need a background in applied mathematics—can use Azure Cognitive Services to make their applications smart and offer richer experiences to end users.

The book introduces the complex topic of Blockchain in ways that are easy to comprehend even by absolute beginners. It then teaches you to apply Blockchain in real life—using Azure Blockchain-as-a-Service—by letting you design your own trust-based security and inventory management solution for our fictional chain of smart hospitals.

Real-time analysis of data received by IoT devices is sometimes useful in extracting key insights and at other times imperative in making crucial business decisions. You will learn to perform real-time analysis of IoT data at scale—saving thousands of lives on the way—using Azure Stream Analytics and PowerBI.



The book concludes with a detailed understanding of crucial machine learning concepts and a hands-on exercise where you create an ML-based diabetes prediction solution in Azure Machine Learning Studio.

## Who Is This Book For?

This book is targeted toward novice and intermediate developers who are curious about artificial intelligence, the Internet of Things (IoT), and Blockchain, and want to know how these work together to create next-gen software solutions. People who are curious about phenomena such as Industry 4.0 will also benefit. Developers and architects with no previous experience with .NET who want to apply the new technologies in their applications will benefit greatly from the discussion and code samples in this book.

## Prerequisites

To get the most out of this book, you need the .NET Framework and an Internet connection, although not all the code samples are written in C#. We recommend using Microsoft Visual Studio 2017 as the development environment to experiment with the code samples, which you can find in the Source Code section of the Apress website ([www.apress.com](http://www.apress.com)).

## Obtaining Updates to This Book

As you read through this text, you may find the occasional grammatical or code error (although we sure hope not). If this is the case, our sincere apologies. Being humans, we are sure that a glitch or two may be present, regardless of our best efforts. You can obtain the current errata list from the Apress website (located once again on the home page for this book), as well as information on how to notify us of any errors you might find.

## Contacting the Authors

If you have any questions regarding this book's source code, are in need of clarification for a given example, simply want to offer your thoughts regarding AI, or want to contact us for other needs, feel free to drop us a line at [nispathak@gmail.com](mailto:nispathak@gmail.com) or [anurag.bhd@gmail.com](mailto:anurag.bhd@gmail.com). We will do our best to get back to you in a timely fashion.

Thanks for buying this book. We hope you enjoy reading it and putting your new-found knowledge to good use.