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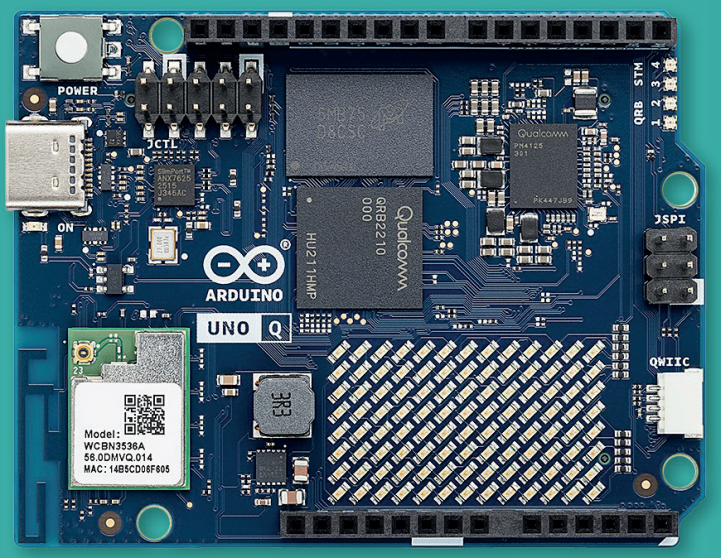
Arduino UNO Q and AI

Learn to Build Intelligent Embedded Systems



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Preface

The rapid evolution of embedded systems has significantly lowered the barrier between concept and real-world deployment. Modern development boards now combine powerful heterogeneous processors, rich software ecosystems, and accessible tools that enable engineers, students, and hobbyists to prototype intelligent systems with remarkable efficiency. This book is written with that spirit in mind and focuses on exploring the capabilities of the Arduino UNO Q board as a versatile platform for embedded and edge-AI development.

The Arduino UNO Q board integrates the STM32U585 MCU microcontroller alongside a Qualcomm Dragonwing QRB2210 MPU processor, offering a unique combination of low-power real-time control and high-level application processing on a single platform. The STM32U585 MCU is fully programmable using the familiar Arduino IDE, allowing users to develop embedded applications using standard Arduino workflows. In parallel, the Qualcomm Dragon processor enables higher-level application development using Python through Arduino App Lab, making it possible to rapidly prototype, test, and deploy applications without deep system-level configuration.

This book begins with an overview of the board's architecture and key features, providing readers with a solid understanding of both the microcontroller (MCU) and microprocessor (MPU) environments. It then progresses to a series of hands-on example projects that demonstrate how to program the STM32U585 MCU using the Arduino IDE. These projects emphasize practical design patterns and illustrate how to efficiently utilize the hardware resources of the board.

In addition to custom MCU-based projects, the book explores the use of example applications provided through the Arduino App Lab. These examples highlight Python-based development on the Qualcomm Dragonwing processor and demonstrate how App Lab can be used to accelerate application development, testing, and system integration using both the MCU and the MPU for advanced AI based applications.

The later chapters introduce Edge Impulse Studio, covering its installation, core features, and its role in developing machine learning models for embedded and edge devices. The book culminates with a complete walkthrough of building a keyword spotting application using Edge Impulse Studio, illustrating the end-to-end workflow from data collection and model training to deployment and on-device inference.

This book is intended for students, educators, embedded developers, and enthusiasts who have a basic understanding of microcontrollers and are interested in expanding their skills into modern embedded, heterogeneous, and edge-AI system design. Prior practical knowledge of using the Arduino IDE and the Python programming language will be an advantage, but not essential. By combining clear explanations with practical examples across both Arduino and Python-based workflows, it aims to serve as both a learning guide

and a reference for developing AI based intelligent applications on the Arduino UNO Q platform.

The author hopes that readers will be inspired to use the Arduino UNO Q as a platform for developing their own future projects, including applications that explore and apply the important topic of artificial intelligence.

Dr Dogan Ibrahim
London, February, 2026