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Patterns For

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Software

Systems In

C An

Embedded

Software

Engineering

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Toolkit
Patterns For

**Software -- Software
Engineering.**

**Automated testing is
a cornerstone of
agile development.**

**An effective testing
strategy will deliver
new functionality
more aggressively,
accelerate user
feedback, and**

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Patterns For

improve quality.

Embedded

Systems In C An

developers, creating

effective automated

tests is a unique and

unfamiliar challenge.

xUnit Test Patterns

is the definitive

guide to writing

automated tests

using xUnit, the most

popular unit testing

framework in use

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Talks

**today. Agile coach
and test automation
expert Gerard
Meszaros describes
68 proven patterns
for making tests
easier to write,
understand, and
maintain. He then
shows you how to
make them more
robust and
repeatable--and far**

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Systems In C An

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Software

Engineering

more cost-effective.

Loaded with

information, this

book feels like three

books in one. The

first part is a

detailed tutorial on

test automation that

covers everything

from test strategy to

in-depth test coding.

**The second part, a
catalog of 18**

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Toolkit

frequently encountered "test smells," provides trouble-shooting guidelines to help you determine the root cause of problems and the most applicable patterns. The third part contains detailed descriptions of each pattern,

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Patterns For

**including refactoring
instructions**

Embedded

illustrated by

Systems In C An

Embedded

extensive code

Software

samples in multiple

Programming

languages.

Languages

Looks at the

principles and clean

code, includes case

studies showcasing

the practices of

writing clean code,

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Until the late 1980s,

information

processing was

associated with large

mainframe

computers and huge

tape drives. During

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Toward

miniaturization

continues and in the

future the majority

of information

processing systems

will be small mobile

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computers, many of

which will be

embedded into larger

products and

interfaced to the

physical

environment. Hence,

these kinds of

systems are called

embedded systems.

Embedded systems

together with their

physical

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Text

environment are

called cyber-physical

systems. Examples

include systems such

as transportation

and fabrication

equipment. It is

expected that the

total market volume

of embedded systems

will be significantly

larger than that of

traditional

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Patterns For

Embedded

information processing systems such as PCs and

mainframes.

Embedded systems

share a number of

common

characteristics. For

example, they must

be dependable,

efficient, meet real-

time constraints and

require customized

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Patterns For

user interfaces

Embedded

(instead of generic

Systems In C An

keyboard and mouse

Embedded

interfaces).

Software

Therefore, it makes

Engineering

sense to consider

Texts

common principles

of embedded system

design. Embedded

System Design starts

with an introduction

into the area and a

survey of

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Patterns For

**specification models
and languages for
embedded and cyber-
physical systems. It**

provides a brief

overview of

hardware devices

used for such

systems and presents

the essentials of

system software for

embedded systems,

like real-time

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Patterns For

operating systems.

The book also

discusses evaluation

and validation

techniques for

embedded systems.

Furthermore, the

book presents an

overview of

techniques for

mapping

applications to

execution platforms.

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Due to the importance of resource efficiency, the book also

contains a selected set of optimization techniques for

embedded systems, including special compilation

techniques. The book closes with a brief survey on testing.

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**Embedded System
Design can be used**

as a text book for

courses on embedded

systems and as a

source which

provides pointers to

relevant material in

the area for PhD

students and

teachers. It assumes

a basic knowledge of

information

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Patterns For

**processing hardware
and software.**

Embedded

Courseware related

to this book is

available at <http://ls1>

2-www.cs.tu-dortmu

nd.de/~marwedel.

**This practical new
book provides much-
needed, practical,
hands-on experience
capturing analysis
and design in UML.**

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Unified

Modeling Language,

thereby supporting

professional

development for

engineers looking to

broaden their skill-

sets in order to

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Progressively more

complex exercises

that act as building

blocks, illustrating

the various aspects

of UML and its

application to real-

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**time and embedded
systems. With its**

focus on gaining

proficiency, it goes a

significant step

beyond basic UML

overviews, providing

both comprehensive

methodology and the

best level of

supporting exercises

available on the

market. Each

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Software

Engineering The

Techniques

used to

solve these problems

come from the

author's decades of

experience designing

and constructing real-

time systems. After

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Patterns For

**the exercises have
been successfully
completed, the book**

**will act as a desk
reference for**

engineers, reminding

**them of how many of
the problems they**

**face in their designs
can be solved.**

**Tutorial style text
with keen focus on in-
depth presentation**

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and solution of real-
world example
problems Highly
popular, respected
and experienced
author

Pattern-Oriented
Software

Architecture, A
System of Patterns
Introduction to
Embedded Systems
A Fundamental

Page 24/255

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**Technology for
Makers**

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System Software

Software
Clean Code

Engineering

Reusable Object-

Oriented Software

Making Embedded

Systems

Interested in

developing

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embedded systems?

Embedded

Since they don't

Systems In C An

tolerate inefficiency,

Embedded

these systems

Software

require a disciplined

Engineering

approach to

Toolkit

programming. This

easy-to-read guide

helps you cultivate a

host of good

development

practices, based on

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design patterns and
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to embedded
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programming. Learn
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how to build system
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architecture for
processors, not
operating systems,
and discover specific
techniques for
dealing with

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hardware difficulties
and manufacturing
requirements.

Written by an expert
who's created
embedded systems
ranging from urban
surveillance and
DNA scanners to
children's toys, this
book is ideal for
intermediate and

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experienced

Embedded

programmers, no

Systems In C An

matter what platform

Embedded

you use. Optimize

Software

your system to

Engineering

reduce cost and

Toolkit

increase

performance

Develop an

architecture that

makes your software

robust in resource-

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constrained

Embedded

environments

Systems In C An

Explore sensors,

motors, and other

I/O devices Do more

with less: reduce

RAM consumption,

code space,

processor cycles,

and power

consumption Learn

how to update

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embedded code
Embedded
directly in the
Systems In C An
processor Discover
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how to implement
Software
complex
Engineering
mathematics on
Toolkit
small processors

Understand what
interviewers look for
when you apply for
an embedded
systems job "Making

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Embedded Systems

is the book for a C
Systems In C An
programmer who

Embedded
Software
wants to enter the
fun (and lucrative)

Engineering
Toolkit
world of embedded
systems. It's very

well written—entertai
ning, even—and filled
with clear

illustrations." —Jack
Ganssle, author and

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embedded system
expert.

Practical UML
Statecharts in C/C++
Second Edition
bridges the gap
between high-level
abstract concepts of
the Unified
Modeling Language
(UML) and the
actual programming

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aspects of modern hierarchical state machines (UML statecharts). The book describes a lightweight, open source, event-driven infrastructure, called QP that enables direct manual coding UML statecharts and concurrent event-

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Engineering
Toolkit

driven applications
in C or C++ without
big tools. This book
is presented in two
parts. In Part I, you
get a practical
description of the
relevant state
machine concepts
starting from
traditional finite
state automata to

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modern UML state

machines followed

by state machine

coding techniques

and state-machine

design patterns, all

illustrated with

executable

examples. In Part II,

you find a detailed

design study of a

generic real-time

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framework

Embedded

indispensable for

Systems In C An

combining

Embedded

concurrent, event-

Software

driven state

Engineering

machines into robust

Toolkit.

applications. Part II

begins with a clear

explanation of the

key event-driven

programming

concepts such as

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inversion of control (

Hollywood Principle

), blocking versus

non-blocking code,

run-to-completion

(RTC) execution

semantics, the

importance of event

queues, dealing with

time, and the role of

state machines to

maintain the context

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from one event to

the next. This

background is

designed to help

software developers

in making the

transition from the

traditional sequential

to the modern event-

driven programming,

which can be one of

the trickiest

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paradigm shifts. The
lightweight QP event-

driven infrastructure

goes several steps

beyond the

traditional real-time

operating system

(RTOS). In the

simplest

configuration, QP

runs on bare-metal

microprocessor,

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microcontroller, or
Embedded
DSP completely
Systems In C An
replacing the RTOS.

Embedded
QP can also work
Software
with almost any
Engineering
OS/RTOS to take
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advantage of the
existing device
drivers,

communication
stacks, and other
middleware. The

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accompanying
website to this book
Systems In C An
contains complete
Embedded
open source code for
Software
QP, ports to popular
Engineering
processors and
Toolkit
operating systems,
including 80x86,
ARM Cortex-M3,
MSP430, and Linux,
as well as all
examples described

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in the book.

Embedded

Famed author Jack

Systems In C An

Ganssle has selected

Embedded

the very best

Software

embedded systems

Engineering

design material from

Toolkit

the Newnes portfolio

and compiled into

this volume. The

result is a book

covering the gamut

of embedded

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design—from

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hardware to software

Systems In C An

to integrated

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embedded

Software

systems—with a

Engineering

strong pragmatic

Toolkit.

emphasis. In

addition to specific

design techniques

and practices, this

book also discusses

various approaches

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to solving embedded design problems and how to successfully apply theory to actual design tasks.

The material has been selected for its timelessness as well as for its relevance to contemporary embedded design issues. This book

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will be an essential

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working reference

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for anyone involved

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in embedded system

Software

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Arnold S. Berger

Chapter 3. System-

Level Design –

Keith E. Curtis

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Chapter 4. Some
Example Sensor,
Actuator and Control
Applications and
Circuits (Hard
Tasks) – Lewin
ARW Edwards

Chapter 5. Installing
and Using a Version
Control System –
Chris Keydel and
Olaf Meding

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Embedded State

Machine

Implementation -

Martin Gomez

Chapter 7. Firmware

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Ganssle Chapter 8.

Hardware Musings –

Jack Ganssle

Chapter 9. Closed

Loop Controls,

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- John M. Holland

Chapter 10.

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Katz and Rick

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LaBrosse Chapter

12. Optimizing DSP

Software – Robert

Oshana Chapter 13.

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Processors – Peter

Wilson *Hand-

picked content

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luminary Jack

Ganssle *Real-world

best design practices

including chapters

on FPGAs, DSPs,

and microcontrollers

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Doing Hard Time is

Engineering

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*Covers both hardware and software aspects of embedded systems
Doing Hard Time is written to facilitate the daunting process of developing real-time systems. It presents an embedded systems programming

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methodology that
has been proven
successful in
practice. The process
outlined in this book
allows application
developers to apply
practical techniques
- garnered from the
mainstream areas of
object-oriented
software

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development - to

Embedded

meet the demanding

Systems In C An

qualifications of real-

Embedded

time programming.

Software

Bruce Douglass

Engineering

offers ideas that are

Toolkit

up-to-date with the

latest concepts and

trends in

programming. By

using the industry

standard Unified

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Patterns For
Modeling Language

(UML), as well as

the best practices

from object

technology, he

guides you through

the intricacies and

specifics of real-time

systems

development.

Important topics

such as

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Toolkit

schedulability,
behavioral patterns,
and real-time
frameworks are
demystified,
empowering you to
become a more
effective real-time
programmer.

The software
architecture of
embedded

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computing systems

Embedded

is a depiction of the

Systems In C An

system as a set of

Embedded

structures that aids

Software

in the reasoning and

Engineering

understanding of

Toolkit

how the system will

behave. Software

architecture acts as

the blueprint for the

system as well as the

project developing

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it. The architecture is the primary framework of important embedded system qualities such as performance, modifiability, and security, none of which can be achieved without a unifying architectural vision.

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Architecture is an artifact for early analysis to ensure that a design approach will lead to an acceptable system. This chapter will discuss the details of these aspects of embedded software architectures.

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Methods, Practical

Embedded
Techniques, and

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Engineering
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Real Time UML

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Pattern-oriented
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software

Software
architecture is a
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new approach to
software

development. This
book represents
the progression
and evolution of
the pattern
approach into a

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Patterns For
system of patterns
Embedded
capable of

describing and
Systems In C An
documenting large-
Embedded
scale applications.

Software
A pattern system
Engineering
provides, on one
Toolkit
level, a pool of
proven solutions to
many recurring
design problems.

On another it
shows how to
combine individual

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Patterns For

patterns into
heterogeneous

structures and as

such it can be used

to facilitate a

constructive
development of

software systems.

Uniquely, the

patterns that are

presented in this

book span several

levels of

abstraction, from

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Patterns For

high-level
architectural

patterns and C An

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design patterns to

low-level idioms.

The intention of,
and motivation for,

this book is to

support both

novices and

experts in software

development.

Novices will gain

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from the

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experience

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and modify

patterns to tailor

them to their own

needs. None of the

pattern

descriptions are

cast in stone and,

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just as they are
borne from

experience, it is

expected that

further use will

feed in and refine
individual patterns

and produce an

evolving system of

patterns. Visit our

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Architecture is a practical and technical guide to understanding the components that make up an embedded system's architecture. This book is perfect for those starting out as technical professionals such

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as engineers,
programmers and

designers of C An

embedded

systems; and also

for students of

computer science,

computer

engineering and

electrical

engineering. It

gives a much-

needed 'big

picture' for

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recently graduated
engineers

grappling with An

Understanding the

design of real-world

systems for the

first time, and

provides

professionals with

a systems-level

picture of the key

elements that can

go into an

embedded design,

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providing a firm
foundation on

which to build their

skills. Real-world

approach to the

fundamentals, as

well as the design

and architecture

process, makes

this book a popular

reference for the

daunted or the

inexperienced: if in

doubt, the answer

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is in here! Fully

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updated with new

Systems In C++
coverage of FPGAs,

Embedded
testing,

middleware and

Software
the latest

Engineering
programming

Toolkit
techniques in C,

plus complete

source code and

sample code,

reference designs

and tools online

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and updating skills:

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engineers, enabling

it to get to the

point more directly,

and cover more

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materials from

companion website

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and manufacturing

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children's toys,
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Systems is ideal for
intermediate and
experienced
programmers, no

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matter what
platform you use.

Develop an

architecture that

makes your

software robust

and maintainable

Understand how to

make your code

smaller, your

processor seem

faster, and your

system use less

power Learn how

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to explore sensors,
motors,

communications,

and other I/O

devices Explore

tasks that are

complicated on

embedded

systems, such as

updating the

software and using

fixed point math to

implement

complex algorithms

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Software Engineering

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patterns to develop

more robust

firmware faster

than traditional

embedded

development

approaches. In the

authors'

experience,

traditional

embedded

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software projects
tend towards
monolithic
applications that
are optimized for
their target
hardware
platforms. This
leads to software
that is fragile in
terms of
extensibility and
difficult to test
without fully

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integrated software
Embedded
and hardware.

Patterns in the
Systems in C An

Machine focuses on
Embedded
creating loosely
Software
coupled

Engineering
implementations
Toolkit
that embrace both
change and

testability. This
book illustrates
how implementing
continuous
integration,

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automated unit testing, platform-independent code,

and other best practices that are

not typically implemented in the embedded systems

world is not just feasible but also practical for

today's embedded projects. After

reading this book,

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Patterns For

you will have a
better idea of how

to structure your

embedded

software projects.

You will recognize

that while writing

unit tests, creating

simulators, and

implementing

continuous

integration requires

time and effort up

front, you will be

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amply rewarded at
the end of the

project in terms of

quality,

adaptability, and

maintainability of

your code. What

You Will Learn

Incorporate

automated unit

testing into an

embedded project

Design and build

functional

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simulators for an
embedded project

Write production-

quality software

when hardware is

not available Use

the Data Model

architectural

pattern to create a

highly decoupled

design and

implementation

Understand the

importance of

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defining the
software

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essential for an

embedded project

Use finite state

machines in

embedded projects

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For Mid-level or

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higher embedded
systems (firmware)

developers, C An

technical leads,
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software

architects, and

development

managers.
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A Unified

Hardware/Software

Introduction

Design Patterns

Developing Real-

time Systems with

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Embedded
Frameworks, and
Patterns In C An

Applying the ARM
Embedded

Software
Embedded RTOS
Engineering
Design
Toolkit

An Embedded
Software

Engineering Toolkit
Patterns in the
Machine

***Authored by two of
the leading***

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authorities in the field, this guide offers readers the knowledge and skills needed to achieve proficiency with embedded software.

A classic book for professional embedded system designers, now in an affordable paperback edition.

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This book distills the experience of more than 90 design reviews on real embedded systems into a set of bite-size lessons learned in the areas of software development process, requirements, architecture, design,

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***Patterns For
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Systems In C An
Embedded
Software
Engineering
Toolkit***
***implementation,
verification &
validation, and
critical system
properties. This is
a concept book
rather than a cut-
and-paste the code
book. Each chapter
describes an area
that tends to be a
problem in
embedded system
design, symptoms***

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*that tend to
indicate you need
to make changes,*

*the risks of not
fixing problems in*

*this area, and
concrete ways to*

*make your
embedded system
software better.*

*Each of the 29
chapters is self-
sufficient,*

permitting

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developers with a busy schedule to cherry-pick the best ideas to make their systems better right away. If you are relatively new to the area but have already learned the basics, this book will be an invaluable asset for taking your game to the next level. If

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Patterns For

you are

experienced, this

book provides a

way to fill in any

gaps. Once you

have mastered this

material, the book

will serve as a

source of

reminders to make

sure you haven't

forgotten anything

as you plan your

next project. This

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Systems in C++

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Amazon.

***Execution speed
and memory size
are paramount in
the development of
real-time systems.***

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"Real-Time UML"

**presents the
fundamental
concepts of the
UML and real-time
systems together.
By learning how
object technology
and the UML
effectively address
the unique
requirements of
embedded real-
time systems, the**

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*reader will be able
to apply the full
benefits of object
technology in a
new discipline--em
bedded systems
programming.*

Software Expert

Kent Beck

*Presents a Catalog
of Patterns*

*Infinitely Useful
for Everyday*

Programming

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***Great code doesn't
just function: it***

clearly and

consistently

communicates your

intentions,

allowing other

programmers to

understand your

code, rely on it,

and modify it with

confidence. But

great code doesn't

just happen. It is

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*the outcome of
hundreds of small*

but critical

decisions

programmers make

every single day.

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software innovator

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worldwide for

creating Extreme

Programming and

pioneering

software patterns

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and test-driven development—focuses on these critical decisions, unearthing powerful “implementation patterns” for writing programs that are simpler, clearer, better organized, and more cost effective. Beck

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collects 77

patterns for

handling everyday

programming tasks

and writing more

readable code. This

new collection of

patterns addresses

many aspects of

development,

including class,

state, behavior,

method,

collections,

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frameworks, and more. He uses diagrams, stories, examples, and essays to engage the reader as he illuminates the patterns. You'll find proven solutions for handling everything from naming variables to checking

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exceptions.

**Learn to design
and develop safe
and reliable
embedded systems**

**Key Features
Identify and
overcome**

**challenges in
embedded
environments**

**Understand the
steps required to
increase the**

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security of IoT

solutions Build

safety-critical and

memory-safe

parallel and

distributed

embedded systems

Book Description

Embedded systems

are self-contained

devices with a

dedicated purpose.

We come across a

variety of fields of

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***applications for
embedded systems***

in industries such

as automotive, tele

communications,

healthcare and

consumer

electronics, just to

name a few.

Embedded Systems

Architecture

begins with a bird's

eye view of

embedded

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Patterns For

*development and
how it differs from*

the other systems

that you may be

familiar with. You

will first be guided

to set up an

optimal

development

environment, then

move on to

software tools and

methodologies to

improve the work

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flow. You will explore the boot-up mechanisms and the memory management strategies typical of a real-time embedded system. Through the analysis of the programming interface of the reference microcontroller,

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***you'll look at the
implementation of
the features and
the device drivers.***

***Next, you'll learn
about the
techniques used to
reduce power
consumption. Then
you will be
introduced to the
technologies,
protocols and
security aspects***

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related to

integrating the

system into IoT

solutions. By the

end of the book,

you will have

explored various

aspects of

embedded

architecture,

including task

synchronization in

a multi-threading

environment, and

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*the safety models
adopted by modern
real-time operating
systems. What you
will learn*

*Participate in the
design and
definition phase of
an embedded
product Get to
grips with writing
code for ARM
Cortex-M
microcontrollers*

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Build an embedded development lab and optimize the workflow Write memory-safe code Understand the architecture behind the communication interfaces Understand the design and development patterns for

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***connected and
distributed devices
in the IoT Master
multitask parallel
execution patterns
and real-time
operating systems
Who this book is
for If you're a
software developer
or designer
wanting to learn
about embedded
programming, this***

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is the book for you.

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book useful if An

you're a less

experienced

embedded

programmer

willing to expand

your knowledge.

Refactoring Test

Code

Embedded System

Design

Designing

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with Arduino

A Cyber-Physical

Systems Approach

Concepts, Methods

and Principles

An Embedded

Software Primer

Developing

Efficient Objects

for Embedded

Systems

This book introduces

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a modern approach
to embedded system
design, presenting

Embedded
Systems In C. An

Embedded
Software

hardware design in a
unified manner. It

Engineering
Toolkit
covers trends and

challenges,

introduces the design

and use of single-

purpose processors

("hardware") and

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general-purpose

processors

("software"),

describes memories

and buses, illustrates

hardware/software

tradeoffs using a

digital camera

example, and

discusses advanced

computation models,

controls systems,

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chip technologies,
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and modern design
Systems In C An
tools. For courses
Embedded
found in EE, CS and
Software
other engineering
Engineering
departments.

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Fast and Effective

Embedded Systems

Design is a fast-
moving introduction
to embedded system
design, applying the

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innovative ARM
Embedded
mbed and its web-
Systems In C An
based development
Embedded
environment. Each
Software
chapter introduces a
Engineering
major topic in
Toolkit
embedded systems,
and proceeds as a
series of practical
experiments,
adopting a "learning
through doing"

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strategy. Minimal

background

knowledge is

needed. C/C++

programming is

applied, with a step-

by-step approach

which allows the

novice to get coding

quickly. Once the

basics are covered,

the book progresses

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to some "hot"

Embedded

embedded issues -

Systems In C An

intelligent

Embedded

instrumentation,

Software

networked systems,

Engineering

closed loop control,

Toolkit

and digital signal

processing. Written

by two experts in the

field, this book

reflects on the

experimental results,

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develops and

Embedded

matches theory to

Systems In C An

practice, evaluates

Embedded

the strengths and

Software

weaknesses of the

Engineering

technology or

Toolkit

technique

introduced, and

considers

applications and the

wider context.

Numerous exercises

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and end of chapter

questions are

included. A hands-

on introduction to

the field of

embedded systems,

with a focus on fast

prototyping Key

embedded system

concepts covered

through simple and

effective

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Amazing breadth of
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advanced

networking and

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and solutions to

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questions and

Embedded

exercises

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introduction to
embedding systems

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for C and C++++

Engineering

programmers

Toolkit

encompasses such

topics as testing

memory devices,

writing and erasing

Flash memory,

verifying nonvolatile

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memory contents,

and much more.

Original.

(Intermediate).

I am very pleased to

play even a small

part in the

publication of this

book on the

SIGNAL language

and its environment

POLYCHRONY. I

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am sure it will be a
significant milestone
in the development
of the SIGNAL
language, of
synchronous
computing in
general, and of the
data-flow approach to
computation. In
data-flow, the
computation takes

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place in a

producer-consumer

network of -

dependent

processing stations.

Data travels in

streams and is

transformed as these

streams pass through

the processing

stations (often called

filters). Data flow is

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an attractive model

Embedded

for many reasons,

Systems In C An

not least because it

Embedded

corresponds to the

Software

way p- duction,trans

Engineering

portation,andcommu

Toolkit

nicationare

typicallyorganizedin

the real world

(outside cyberspace).

I myself stumbled

into data?ow almost

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Systems In C An
Embedded
Software
Engineering
Toolkit

against my will. In the mid-1970s, Ed Ashcroft and I set out to design a “super” structured programming language that, we hoped, would radically simplify proving assertions about programs. In the end, we decided

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that it had to be
declarative.

Embedded

Systems In C An

Embedded

were determined that

Software

iterative algorithms

Engineering

could be expressed

Toolkit

directly, without

circumlocutions

such as the use of a

tail-recursive

function. The

language that

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resulted, which we
named LUCID, was
much less traditional
then we would have
liked. LUCID
statements are
equations in a kind
of executable
temporal logic
that specify the
(time) sequences of
variables involved in

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aniteration.

Embedded

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what C - and you -

Embedded

can do, with this

Software

high-intensity guide

Engineering

to the most advanced

Toolkit

capabilities of C Key

FeaturesMake the

most of C's low-

level control,

flexibility, and high

performanceA

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comprehensive

guide to C's most

powerful and

challenging

features A thought-

provoking guide

packed with hands-

on exercises and

examples Book

Description There's

a lot more to C than

knowing the

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language syntax.

Embedded

The industry looks
for developers with a

Systems In C An

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rigorous, scientific
understanding of the

Software

principles and

practices. Extreme C

will teach you to use

C's advanced low-

level power to write

effective, efficient

systems. This

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intensive, practical

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guide will help you

Systems In C An

become an expert C

Embedded

programmer.

Software

Building on your

Engineering

existing C

Toolkit

knowledge, you will

master preprocessor

directives, macros,

conditional

compilation,

pointers, and much

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more. You will gain new insight into algorithm design, functions, and structures. You will discover how C helps you squeeze maximum performance out of critical, resource-constrained applications. C still

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plays a critical role
in 21st-century
programming,
remaining the core
language for
precision
engineering,
aviations, space
research, and more.

This book shows
how C works with
Unix, how to

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implement OO
Embedded
principles in C, and
Systems In C An
fully covers multi-
Embedded
processing. In
Software
Extreme C, Amini
Engineering
encourages you to
Toolkit
think, question,
apply, and
experiment for
yourself. The book is
essential for
anybody who wants

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to take their C to the next level. What you will learnBuild advanced C knowledge on strong foundations, rooted in first

principlesUnderstand memory structures and compilation pipeline and how they work, and how

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to make most out of

themApply object-

oriented design

principles to your

procedural C

codeWrite low-level

code that's close to

the hardware and

squeezes maximum

performance out of a

computer

systemMaster

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concurrency,

multithreading, multi-

processing, and

integration with

other languages Unit

Testing and

debugging, build

systems, and inter-

process

communication for

C programming Who

this book is for

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Extreme C is for C
Embedded
programmers who
Systems In C An
want to dig deep into
Embedded
the language and its
Software
capabilities. It will
Engineering
help you make the
Toolkit
most of the low-
level control C gives
you.

Chapter 4. Software
Design Architecture
and Patterns for

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Software

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limit in

Concurrency, OOP,

and the most

advanced

capabilities of C

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in C and C++

Practical UML

Statecharts in C/C++

'... a very good

balance between

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the theory and
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practice of real-time
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embedded system
designs.' —Jun-
Software
ichiro itojun Hagino,
Engineering
Ph.D., Research
Laboratory, Internet
Initiative Japan Inc.,
IETF IPv6
Operations Working
Group (v6ops) co-
chair 'A cl

The demands of

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increasingly
complex embedded
systems and

associated

performance

computations have

resulted in the

development of

heterogeneous

computing

architectures that

often integrate

several types of

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processors, analog
and digital electronic
components, and

mechanical and
optical

components—all on

a single chip. As a
result, now the most
prominent challenge
for the design

automation

community is to

efficiently plan for

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Model-Based
Design for
Embedded Systems
elaborates on
related practices
and addresses the
main facets of

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heterogeneous

Embedded
model-based design
Systems In C An
for embedded

Embedded
systems, including
Software
the current state of

Engineering
the art, important

challenges, and the
latest trends.

Focusing on
computational
models as the core
design artifact, this
book presents the

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cutting-edge results

that have helped

establish model-

based design and

continue to expand

its parameters. The

book is organized

into three sections:

Real-Time and

Performance

Analysis in

Heterogeneous

Embedded

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Tools and

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Methodology for

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Multiprocessor

Software
System-on-Chip,

and Design Tools

and Methodology for

Multidomain

Embedded

Systems. The

respective

contributors share

their considerable

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expertise on the

automation of

design refinement

and how to relate

properties

throughout this

refinement while

enabling analytic

and synthetic

qualities. They focus

on multi-core

methodological

issues, real-time

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analysis, and
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Software

Engineering

Today
components often
interface. Model-

based design is
emerging as a

solution to bridge

the gap between the

availability of

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computational
Embedded
capabilities and our
Systems In C An
inability to make full
Embedded
use of them yet.

Software
This approach
enables teams to

start the design
Engineering
process using a
Toolkit
high-level model
that is gradually
refined through
abstraction levels to
ultimately yield a

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prototype. When

executed well,

model-based design

encourages

enhanced

performance and

quicker time to

market for a

product. Illustrating

a broad and diverse

spectrum of

applications such as

in the automotive

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aerospace, health
care, consumer
electronics, this

volume provides

designers with

practical, readily

adaptable modeling

solutions for their

own practice.

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you will learn how to

use Arduino – the

open-source

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hardware board for
makers, hobbyists,
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projects, create
prototypes, and
produce
professional-quality
embedded systems.
A simple step-by-
step demonstration
system

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accompanies you
from vision to reality
– and just like riding
a bike, you'll get
better at it, the more
you do it. Featuring
a wealth of detailed
diagrams and more
than 50 fully
functional examples,
this book will help
you get the most out
of this versatile tool

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and bring your
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electronic inventions
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to life.

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Software
who want to build
Engineering
their own embedded
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computer systems--
installed in
everything from cell
phones to cars to
handheld organizers
to refrigerators-- will
find this book to be

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practical, and up-to-
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Hardware carefully

steers between the

practical and

philosophical

aspects, so

developers can both

create their own

devices and

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gadgets and

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extend off-the-shelf

systems. There are

hundreds of books

to choose from if

you need to learn

programming, but

only a few are

available if you want

to learn to create

hardware.

Designing

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Hardware provides

software and

Embedded

hardware engineers

Software

with no prior

Engineering

experience in

embedded systems

with the necessary

conceptual and

design building

blocks to

understand the

architectures of

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embedded systems.

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Written to provide

the depth of

coverage and real-

world examples

Software

developers need,

Designing

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Hardware also

provides a road-

map to the pitfalls

and traps to avoid in

designing

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embedded systems.

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Hardware covers

such essential

topics as: The

principles of

developing

computer hardware

Core hardware

designs Assembly

language concepts

Parallel I/O Analog-

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Timers (internal and
external) UART

Serial Peripheral

Interface Inter-

Integrated Circuit

Bus Controller Area

Network (CAN) Data

Converter Interface

(DCI) Low-power

operation This

invaluable and

eminently useful

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Software

your own application-

specific computers.

Simon introduces

the broad range of

applications for

embedded software

and then reviews

each major issue

facing developers,

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offering practical
solutions,

techniques, and

good habits that

apply no matter

which processor,

real-time operating

systems,

methodology, or

application is used.

Robust Scalable

Architecture for Real-

time Systems

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with the SIGNAL

Programming

Language

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Foundations of

Cyber-Physical

Systems

Patterns for Time-

triggered Embedded

Systems

Software

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Design for

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A Software

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to Embedded

Development

A recent survey

stated that 52% of

embedded projects

are late by 4-5

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months. This book
can help get those
projects in on-time
with design
patterns. The
author carefully
takes into account
the special
concerns found in
designing and
developing
embedded
applications

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(Unified Modeling

Language) with

examples including

ANSI C for direct

and practical

application to C

code. A basic C

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knowledge is a prerequisite for the

book while UML

notation and

terminology is

included. General C

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do not include

discussion of the

constraints found

within embedded

system design. The

practical examples

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give the reader an understanding of the use of UML and OO (Object Oriented) designs in a resource-limited environment. Also included are two chapters on state machines. The beauty of this book is that it can help you today. . Design

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Patterns within
these pages are
immediately

applicable to your
project Addresses
embedded system
design concerns
such as

concurrency,
communication,
and memory usage

Examples contain
ANSI C for ease of

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use with C
programming code

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Master C++ “The
Qt Way” with

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“The Qt Way,”

emphasizing design

patterns and

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and simple,

reusable classes

and functions.

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Tools

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Reflection, Widgets,

Main Windows,

Models and Views,

Databases, Multi-

Threaded

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Reflection. This
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Tutorial
This edition introduces
the powerful new
Qt Creator IDE;
presents new
multimedia APIs;
and offers extended
coverage of Qt
Designer and C++
Integration. It has
been restructured
to help readers

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software

Embedded

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sooner. The authors

introduce several

new design

patterns, add many

quiz questions and

labs, and present

more efficient

solutions relying on

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new Qt features
and best practices.

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an up-to-date C++

reference section

and a complete

application case

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identifiers,

declarations, types,

and type

conversions.

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promote reuse.

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libraries are
designed, built, and
reused. Work with
QObject, the base
class underlying
much of Qt. Build
graphical user
interfaces with Qt
widgets. Use
templates to write

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Software
Model-View
Framework to
cleanly separate
data and GUI
classes. Validate
input using regular
expressions and
other techniques.

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with SAX, DOM, and
QXmlStreamReader

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patterns. Create,
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and threads. Access
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SQL classes.

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efficiently.

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QThreads and use

QtConcurrent

algorithms. Click

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Embedded and real-time systems
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embedded and real-time systems contain complex software. The complexity of embedded systems is increasing, and the amount and variety of software in the embedded products are growing. This creates a big

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challenge for
embedded and real-

time software

development

processes and

there is a need to

develop separate

metrics and

benchmarks.

“Embedded and

Real Time System

Development: A

Software

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Patterns For

Engineering
Embedded
Perspective:

Systems In C An
Embedded
Concepts, Methods
and Principles”

Software
presents practical
as well as

Engineering
Toolbox
conceptual

knowledge of the
latest tools,

techniques and
methodologies of

embedded software
engineering and

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Patterns For
real-time systems.

Each chapter
includes an in-
depth investigation
regarding the
actual or potential
role of software
engineering tools in
the context of the
embedded system
and real-time
system. The book
presents state-of-

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the art and future perspectives with industry experts, researchers, and academicians

sharing ideas and experiences

including

surrounding frontier technologies,

breakthroughs,

innovative solutions

and applications.

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Patterns For

The book is
organized into four

parts “Embedded

Software

Development

Process”, “Design

Patterns and

Development

Methodology”,

“Modelling

Framework” and

“Performance

Analysis, Power

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Patterns For
Embedded
Systems In C An
Management and
Deployment” with
altogether 12

chapters. The book
is aiming at (i)
undergraduate
students and
postgraduate
students
conducting
research in the
areas of embedded
software

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engineering and
real-time systems;

(ii) researchers at

universities and

other institutions

working in these

fields; and (iii)

practitioners in the

R&D departments

of embedded

system. It can be

used as an

advanced reference

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for a course taught
at the postgraduate

level in embedded

software

engineering and

real-time systems.

An introduction to

the engineering

principles of

embedded systems,

with a focus on

modeling, design,

and analysis of

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cyber-physical
Embedded
systems. The most
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visible use of
Embedded
computers and
Software is
Engineering
processing
Information for
human

consumption. The
vast majority of
computers in use,
however, are much
less visible. They

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run the engine,
brakes, seatbelts,
airbag, and audio
system in your car.

They digitally
encode your voice
and construct a
radio signal to send
it from your cell
phone to a base
station. They
command robots on
a factory floor,

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power generation in a power plant, processes in a chemical plant, and traffic lights in a city. These less visible computers are called embedded systems, and the software they run is called embedded software. The

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principal challenges
Embedded
in designing and
Systems In C An
analyzing
Embedded
embedded systems
Software
stem from their
Engineering
interaction with
Toy
physical processes.
This book takes a
cyber-physical
approach to
embedded systems,
introducing the
engineering

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Software
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concepts underlying
embedded systems
as a technology and
as a subject of
study. The focus is
on modeling,
design, and
analysis of cyber-
physical systems,
which integrate
computation,
networking, and
physical processes.

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The second edition offers two new chapters, several new exercises, and other

improvements. The book can be used as a textbook at the advanced undergraduate or introductory graduate level and as a professional

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reference for
practicing
engineers and
computer scientists.

Readers should

have some

familiarity with
machine structures,
computer
programming, basic
discrete
mathematics and
algorithms, and

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signals and
systems.

The book is

designed to serve

as a textbook for

courses offered to

graduate and

undergraduate

students enrolled in

electronics and

electrical

engineering and

computer science.

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Engineering

Topic

This book attempts to bridge the gap between electronics and computer science students, providing complementary knowledge that is essential for designing an embedded system. The book covers key concepts

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Patterns For

tailored for
embedded system
design in one place.

The topics covered
in this book are

models and

architectures,

Executable Specific
Languages -

SystemC, Unified
Modeling Language,
real-time systems,
real-time operating

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systems, networked
embedded systems,

Systems In C An
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Processor

Software
architectures, and

platforms that are

secured and energy-

efficient. A major

segment of

embedded systems

needs hard real-

time requirements.

This textbook

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Patterns For Embedded Systems In C An Embedded Software Engineering

includes real-time concepts including algorithms and real-time operating system standards like POSIX threads.

Embedded systems are mostly distributed and networked for deterministic responses. The book covers how to

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Patterns For
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Systems In C An
Embedded
Software
design networked
embedded systems
with appropriate
protocols for real-
time requirements.

Each chapter
contains 2-3 solved
case studies and 10
real-world problems
as exercises to
provide detailed
coverage and
essential

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pedagogical tools
that make this an
ideal textbook for
students enrolled in
electrical and
electronics
engineering and
computer science
programs.

Design Patterns for
Great Software
Synchronous,
Reactive

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Software Systems

Exploring

architectural

concepts,

pragmatic design

patterns, and best

practices to

produce robust

systems

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Design Principles

Embedded

for Embedded

Systems In C An

Systems

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Real-Time

Software
Embedded Systems

This Expert Guide

gives you the

techniques and

technologies in

software

engineering to

optimally design

and implement

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system. Written by**

experts with a

solutions focus,

this encyclopedic

reference gives

you an

indispensable aid

to tackling the day-

to-day problems

when using

software

engineering

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develop your**

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systems. With this

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**principles of good
architecture for an
embedded system**

Design practices

**to help make your
embedded project**

successful Details

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**on principles that
are often a part of
embedded**

**systems, including
digital signal**

**processing, safety-
critical principles,**

**and development
processes**

**Techniques for
setting up a**

**performance
engineering**

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interfaces for

Software

embedded

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systems

Strategies for

testing and

deploying your

embedded system,

and ensuring

quality

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memory, and

power Advanced
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developing

multicore software

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software for

networking,

storage, and

automotive

segments How to

manage the

embedded

development

process Includes

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Whit Waldo, Inga
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Robert Oshana.

Road map of key
problems/issues
and references to
their solution in
the text Review of
core methods in

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**the context of how
to apply them
Examples
demonstrating
timeless**

**implementation
details Short and
to- the- point case
studies show how
key ideas can be
implemented, the
rationale for
choices made, and**

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examples --

Evaluation version
of the industry-
standard Keil 'C'
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hardware
simulator.

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**integrates new
ideas and topics
from real time
systems,
embedded
systems, and
software
engineering to
give a complete
picture of the
whole process of
developing
software for real-**

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time embedded applications. You will not only gain a thorough

understanding of concepts related to

microprocessors, interrupts, and system boot process,

appreciating the importance of real-

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practices such as

model

documentation,

model analysis,

design patterns,

and standard

conformance. This

book is split into

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Software; Part one

introduces the

development

process, and

includes two

chapters on

microprocessors

and interrupts---fu

ndamental topics

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for software

Embedded

engineers; Part

Systems In C An

two is dedicated to

Embedded

modeling

Software

techniques for real-

time systems; Part

three looks at the

design of software

architectures and

Part four covers

software

implementations,

with a focus on

software

implementations,

with a focus on

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and cons of
different
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systems POSIX
real-time
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Tutorial**

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real time
applications How
to use real-time
UML to document
system designs
with timing
constraints The
challenges and
concepts related
to cross-
development
Multitasking**

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**design and inter-
task**

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techniques

(shared memory

objects, message

queues, pipes,

signals) How to

use kernel objects

(e.g. Semaphores,

Mutex, Condition

variables) to

address resource

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**sharing issues in
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The philosophy

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using a resource

manager The key

principles of real-

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operating system
widely adopted in**

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**Implementation
combines**

**explanations of
RTOS concepts**

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with detailed,
practical

implementation. It

gives a detailed

description of the

implementation of

a basic real-time

kernel designed to

be limited in scope

and simple to

understand, which

could be used for

a real design of

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modest

complexity. The

kernel features up

ward-compatibility

to a commercial

real-time operating

system: Nucleus

RTOS. Code is

provided which

can be used

without restriction.

Gain practical

information on:

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**Scheduling,
preemption, and**

interrupts

Information flow

(queues,

semaphores, etc.)

and how they work

Signaling between

tasks (signals,

events, etc.)

Memory

management

(Where does each

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**task get its stack
from? What
happens if the
stack overflows?)**

**The CPU context:
storage and
retrieval after a
context switch**

**With this book you
will be able to:**

**Utilize a basic real-
time kernel to
develop your own**

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RTOS features

Systems In C An
Understand the

Embedded
facilities of a

Software
commercial RTOS

Explains the

principles of RTOS

and shows their

practical

implementation

**Demonstrates how
to prototype a real-**

time design Code

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reflects the most
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and offers

substantially

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Extreme C

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**high-performance
real-time digital
systems based on
FPGAs and
custom circuits**

Real-time UML

**Insights and
Implementation
Implementation**

Patterns

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systems based on field-programmable gate arrays (FPGAs), including the design of electronic circuits and the construction and debugging of prototype embedded devices

Key

Features

Learn the basics of embedded systems and real-time

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operating

systems Understand

how FPGAs

implement

processing algorithms

in hardware Design,

construct, and debug

custom digital

systems from scratch

using KiCadBook

Description Modern

digital devices used in

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homes, cars, and wearables contain highly sophisticated computing capabilities composed of embedded systems that generate, receive, and process digital data streams at rates up to multiple gigabits per second.

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for FPGA design and electronic circuit design, you'll learn how to design, build, test, and debug high-performance FPGA-based IoT devices.

The book will also help you get up to speed with embedded system design, circuit design, hardware

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construction,
firmware

development, and

debugging to

produce a high-

performance

embedded device —

a network-based

digital oscilloscope.

You'll explore

techniques such as

designing four-layer

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printed circuit boards
with high-speed
differential signal
pairs and assembling
the board using
surface-mount
components. By the
end of the book,
you'll have a solid
understanding of the
concepts underlying
embedded systems

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and FPGAs and will be able to design and construct your own sophisticated digital devices. What you will learn Understand the fundamentals of real-time embedded systems and sensors Discover the capabilities of FPGAs and how to use

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tools Learn the

principles of digital

circuit design and

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KiCad Construct high-

speed circuit board

prototypes at low

cost Design and

develop high-

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algorithms for

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FPGAs Develop
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robust, reliable, and
Systems In C An
efficient firmware in
Embedded
C Thoroughly test
Software
and debug embedded
Engineering
device hardware and
Toolkit
firmware Who this
book is for This book
is for software
developers, IoT
engineers, and
anyone who wants to

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understand the
process of developing
high-performance
embedded systems.
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book useful if you
want to learn about
the fundamentals of
FPGA development
and all aspects of
firmware
development in C

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and C++. Familiarity with the C language, digital circuits, and electronic soldering is necessary to get started.

Design Patterns for
Embedded Systems
in C

Doing Hard Time
Embedded Systems
Architecture

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Design Principles and
Engineering Practices
With C and GNU
Development Tools
Programming
Embedded Systems
A Handbook of Agile
Software
Craftsmanship