

LEARNING MADE EASY



# Coding with AI

for  
**dummies**<sup>®</sup>  
A Wiley Brand

Write more code faster  
with AI assistance

Debug, test, and optimize  
your code with AI chatbots

Use machine learning  
to speed your process

**Chris Minnick**

Assures you that AI  
did not write this book





# Coding with AI

Chris Minnick

for  
**dummies**<sup>®</sup>  
A Wiley Brand

## Coding with AI For Dummies®

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# Introduction

I started writing this book almost a year after OpenAI launched ChatGPT. That launch and the subsequent releases of generative AI tools by Microsoft, Google, Facebook, and others have begun to change how we think about creating content. At the same time, we're facing important questions about what the future of work will look like — especially for those of us whose job primarily involves the things that tools such as ChatGPT are pretty good at.

My own feelings about generative AI are mixed. On one hand, I worry that the skills in writing and programming that I've spent more than half my life working on will no longer be useful. On the other hand, I see that AI has the potential to take on some of the most boring and least rewarding work I do, saving me time and effort that I can devote to the more creative parts of writing and programming.

I also worry that when I do write things using old-fashioned methods (aka "I think of them and write them"), people will assume that I used AI. This happened with a book I wrote last year on a relatively current topic. People who didn't bother to read the book commented that "it was probably written by AI." As a result of this experience, I announced that I'd livestream the process of writing my next book. I had no idea at the time that my next book would be about AI. So, here I am, writing a book about coding with AI while live-streaming my writing processes in an attempt to prove to future readers that the book wasn't generated by AI. If you have any doubt that I wrote this book the old-fashioned way, or if you have a few hundred hours to spare, you can see the entire book being written by going to <https://bit.ly/codingwithai>.

Even though I refuse to use AI to write my books, and I'm generally against other people using AI to write books, I feel differently about using AI tools to generate computer code. The history of computer programming has been about people inventing better tools that make coding easier. When I worked at *Software Development Magazine* in the 1990s, the technical editor was Roger Smith. One day, while we were talking about a new programming tool, Roger told me that he believed that in the future we'd be able to use natural language to write software. I was skeptical. Almost 30 years later, it turns out that Roger was right.

The pace of change in AI is fast. Technologies and tools that are new and interesting this month will be replaced by better ones next month. Because I write about

technology and programming, there's always the risk that something I write today will be outdated when the book is released. However, even though AI and AI software development tools will certainly have improved, the techniques I write about here will be just as applicable — unless, of course, AI has made the profession of software developer obsolete and everyone who used to be a software developer now gets paid to hang out on the beach (or whatever your idea of relaxation and fun is).

Whether you embrace this new era of AI-assisted coding or resist it, there's no denying that it's here. In this book, I show you how these tools work and how you can use them to not only make writing code easier and faster but to help you write better code.

I hope you enjoy reading this book and that you find it useful. If you have any questions or comments, please reach out to me at [chris@minnick.com](mailto:chris@minnick.com).

## About This Book

When it comes to coding with generative AI, we're all dummies at this point. Whether you're a new programmer or a veteran, this book will teach you what you need to know to benefit from the new tools that are rapidly becoming available.

I cover these topics:

- » Understanding foundational principles of machine learning (ML), deep learning (DL), and generative AI (GenAI)
- » Working with AI responsibly, safely, and ethically
- » Using some of the latest tools for coding with AI
- » Using AI to help with
  - Automating monotonous coding tasks
  - Learning new skills
  - Improving your code
  - Testing your code
  - Documenting your code
  - Maintaining your code

As you go through the book, keep the following in mind:

- » You can read the book from beginning to end, but feel free to skip around if you like. If a topic interests you, start there. You can always return to previous chapters, if necessary.
- » At some point, you will get stuck, and something you try will not work as intended. Do not fear! There are many resources to help you, including support forums, others on the internet, AI chatbots, and me! You can contact me via email at [chris@minnick.com](mailto:chris@minnick.com) or through my website (<https://www.chrisminnick.com>). Additionally, you can sign up for my Substack (<https://chrisminnick.substack.com>) to receive occasional updates from me about AI, programming, and learning.
- » Code in the book appears in a monospaced font like this: `<h1>Hi there! </h1>`.

Some web addresses break across two lines of text. If you're reading this book in print and want to visit one of these web pages, simply key in the web address exactly as it's noted in the text, pretending as though the line break doesn't exist. If you're reading this as an e-book, you have it easy — just click the web address to be taken directly to the web page.

## Foolish Assumptions

I do not make many assumptions about you, the reader, but I do make a few.

I assume you have some experience or familiarity with programming in a computer language. It doesn't matter which language you code in, just that you know what programming is and you've done it before. If you're new to computer programming, many excellent books and tutorials are available that can give you the background you need for this book in a few days. I recommend *Coding All-in-One For Dummies*, 2nd Edition (written by me and an awesome team of other coding experts), which contains an introduction to all the languages and techniques you use in this book. In particular, read the chapters about Python and JavaScript.

Most of the examples in this book are JavaScript code, because that's the programming language I know the best. However, this is not a JavaScript-specific book and the techniques and tools I use to help write or improve my JavaScript code work with any language. The code examples are generally simple enough to be understood without a specific knowledge of JavaScript.

I assume you have a computer running a modern web browser. You will do most of the exercises in this book by using web-based resources. Although it may be possible to complete these exercises using a smartphone or tablet, I don't recommend it.

I assume you have access to an internet connection. Because the language models we'll be working with are far too large to install on your computer, an internet connection will be essential to completing the hands-on element.

I assume you can download and install free software to your computer. Often-times, the computer you use at work will have restrictions on what can be installed by the user. Using your own computer to develop and run the applications in this book should work without a problem.

## Icons Used in This Book

Here are the icons used in the book to flag text that should be given extra attention or can be skipped.



TIP

This icon flags useful information or explains a shortcut to help you understand a concept.



TECHNICAL  
STUFF

This icon explains technical details about the concept being explained. The details might be informative or interesting but are not essential to your understanding of the concept.



REMEMBER

Try not to forget the material marked with this icon. It signals an important concept or process that you should keep in mind.



WARNING

Watch out! This icon flags common mistakes and problems that can be avoided if you heed the warning.

# Beyond the Book

A lot of extra content that you won't find in this book is available at [www.dummies.com](http://www.dummies.com). Go online to find the following:

- » **The source code for the examples in this book:** Go to [www.dummies.com/go/codingwithaifd](http://www.dummies.com/go/codingwithaifd). The source code is organized by chapter. The best way to work with a chapter is to download all the source code for it at one time.
- » **The cheat sheet:** Go to [www.dummies.com](http://www.dummies.com) and, in the search field, typing **Coding with AI for Dummies**. You'll find helpful prompting tips for coding with AI, a list of dangers when using AI-generated code, and a tongue-in-cheek look at what AI coding assistants can't do.
- » **Updates:** AI is changing rapidly, and I don't expect it to stop doing so after this book is published, so the commands and syntax that work today may not work tomorrow. You can find any updates or corrections by visiting [www.dummies.com/go/codingwithaifd](http://www.dummies.com/go/codingwithaifd) or <https://github.com/chrisminnick/coding-with-ai>.

## Where to Go from Here

As you embark on your journey of learning to code with AI, keep an open mind but also a large dose of skepticism and patience. In spite of how impressive the current generation of GenAI tools is (and they're surely much better by the time you read this), we're still in the infancy of this stuff.

If you want to get a basic understanding of AI-assisted coding, go to Chapter 1. If you want to find out more about how these tools work and about machine learning in general, read Chapter 2. If you want to learn about some of the tools that are available today for coding with AI, see Chapters 3 and 4. If you want to get right into experimenting with the combination of coding and AI, skip to Chapter 5.

Congratulations on taking your first step towards AI-assisted coding, and thank you for trusting me as your guide.



# 1

## **Techniques and Technologies**

### **IN THIS PART . . .**

Discover how AI-enhanced tools can help make you a better and more efficient programmer.

Dig into the fundamental concepts behind machine learning and deep learning.

Explore AI pair programming tools.

Converse with the latest generative models to assist with coding tasks.

- » Automating repetitive tasks
- » Getting help with syntax
- » Testing your programs
- » Enhance your learning with AI
- » Pair programming with AI

## Chapter 1

# How Coding Benefits from AI

If you're a programmer or learning to program, generative artificial intelligence (also known as *GenAI*) can help you be more productive, make fewer mistakes, and learn new skills and languages faster, as you discover in this chapter. In the process, you work with some tools to get a taste of what's available. All the topics in this chapter are described in detail in later chapters.

Although you might be able to use AI to generate working computer programs without knowing how to code, I strongly discourage you from doing this — especially if you plan to deploy anything you generate. Generative AI doesn't know how to program. If you don't know how to code either, there's a good chance that code you create with AI will have serious security problems, functionality problems, or worse.

## Banishing Boring Tasks

One of the most basic and useful things you can do with the current crop of generative AI models is to use them to generate the types of code programmers lovingly refer to as boilerplate code.



TECHNICAL  
STUFF

The term *boilerplate* dates to the 19th century, when steel plates were used as templates for making steam boilers.

Boilerplate code is the stuff that's the same or nearly the same in every file or every project. No one likes to write boilerplate code, but we have to do it because the code we want to write (the fun stuff) won't work without the boilerplate.

## Spotting boring tasks

To identify tasks that can be automated with AI, think about the tasks that you do repeatedly in multiple projects. JavaScript developers might select an element in the browser window, such as a button, and attach to it an event listener to do some action when a user interacts with that element. Or they might do something more complex, such as writing the code for a database-driven application that handles creating, reading, updating, and deleting (CRUD) tasks.

For web developers and designers, a simple example of boilerplate code that can be automated is the basic structure of an HTML page. Every valid HTML page starts with a document type declaration followed by an HTML element, and then a head element (including several internal elements, such as the title and meta tags), and then a body element.

## Letting AI write the template

You can minimize the work required to generate a simple HTML template in many ways, such as by using a code snippet or searching the web for an example. However, if you want to create a custom boilerplate that includes some structure and gives you a good start on the design of a future website, you could simply ask your AI. For example, I gave ChatGPT the following request:

```
Please generate an HTML template with a style element that
uses flexbox to create a three column layout with a sample
top navigation bar and a footer.
```

And here is the code that ChatGPT generated:

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width,
    initial-scale=1.0">
```

```

<title>Three Column Layout</title>
<style>
  body {
    margin: 0;
    padding: 0;
    font-family: Arial, sans-serif;
  }

  .container {
    display: flex;
    flex-direction: column;
    min-height: 100vh;
  }

  header {
    background-color: #333;
    color: #fff;
    padding: 10px 0;
    text-align: center;
  }

  nav {
    background-color: #444;
    color: #fff;
    padding: 10px 0;
    text-align: center;
  }

  .main-content {
    flex: 1;
    display: flex;
    justify-content: space-between;
    padding: 20px;
  }

  .sidebar {
    flex-basis: 20%;
    background-color: #f0f0f0;
    padding: 20px;
  }

  .content {
    flex-basis: 60%;
    background-color: #fff;

```

```

        padding: 20px;
    }

    .aside {
        flex-basis: 20%;
        background-color: #f0f0f0;
        padding: 20px;
    }

    footer {
        background-color: #333;
        color: #fff;
        padding: 10px 0;
        text-align: center;
    }
</style>
</head>
<body>
    <div class="container">
        <header>
            <h1>Top Navigation Bar</h1>
        </header>
        <nav>
            <ul>
                <li><a href="#">Home</a></li>
                <li><a href="#">About</a></li>
                <li><a href="#">Services</a></li>
                <li><a href="#">Contact</a></li>
            </ul>
        </nav>
        <div class="main-content">
            <div class="sidebar">
                <h2>Sidebar</h2>
                <p>This is the sidebar content.</p>
            </div>
            <div class="content">
                <h2>Main Content</h2>
                <p>This is the main content area.</p>
            </div>
            <div class="aside">
                <h2>Aside</h2>
                <p>This is the aside content.</p>
            </div>
        </div>
    </div>

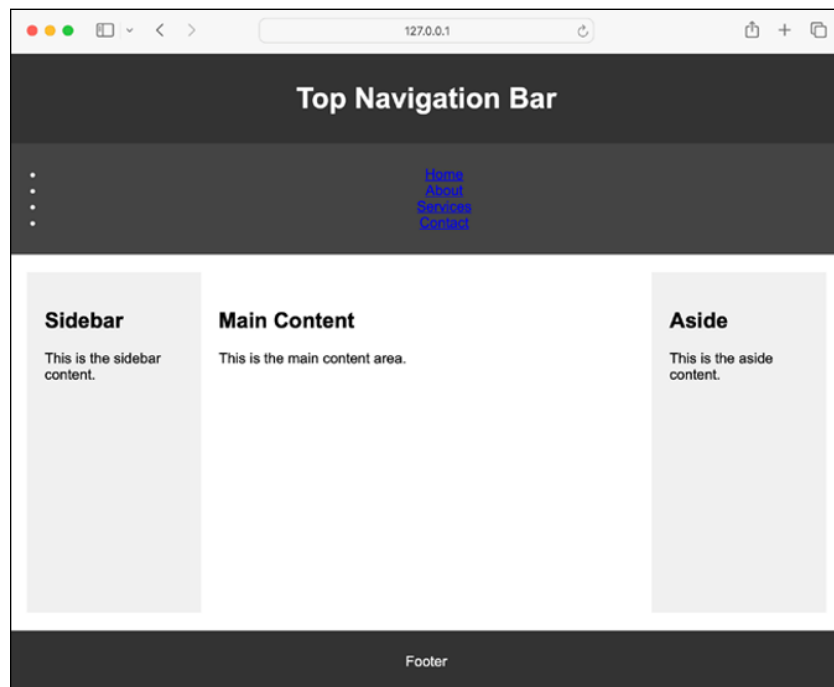
```

```

    <footer>
      <p>Footer</p>
    </footer>
  </div>
</body>
</html>

```

The resulting HTML generated by my request (also known as a *prompt*) matched fairly well with what I would have done if I'd written it by hand. Figure 1-1 shows the resulting web page when I save the generated HTML markup in a file and open it in a browser without modifying it.



**FIGURE 1-1:**  
A ChatGPT-  
generated  
HTML template.

ChatGPT



**REMEMBER**

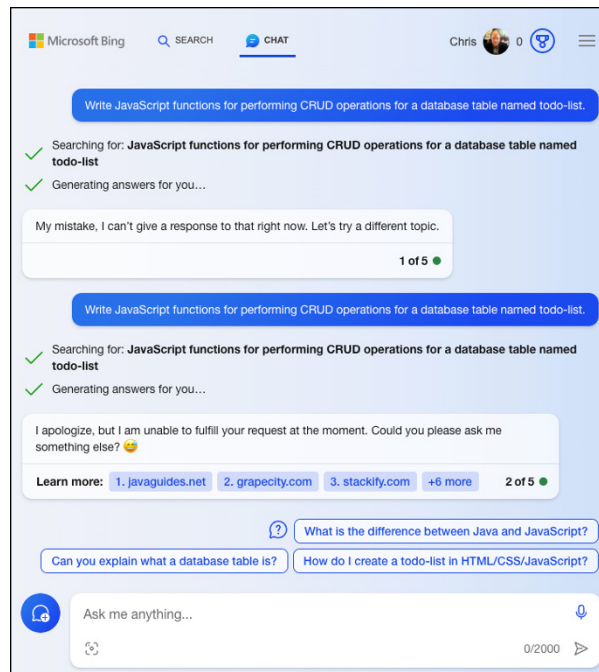
You can find all the code used in this book, including the HTML template shown in Figure 1-1, at [www.dummies.com/go/codingwithaifd](http://www.dummies.com/go/codingwithaifd).

# Crafting CRUD with AI

One of the most common tasks in any computer program is accessing a data source and writing functions for performing operations with the data source. The basic operations you can do with any data source are creating a record, reading a record, updating a record, and deleting a record. The collective name for the code that makes these operations possible is the wonderfully evocative acronym CRUD. Most people don't enjoy writing CRUD.

In this section, you use generative AI to reduce the amount of work it takes to generate some CRUD. To get started with this exercise, you need to have access to an interface for chatting with a generative AI model such as ChatGPT, Google Bard, or Microsoft Bing. If you don't have an account with any of these services yet, follow the instructions in Chapter 4 to sign up for ChatGPT.

Then, once you have a chat window in front of you, start with a short request to the generative model to see what it will do. If the service you're using won't or can't fulfill your request, you won't have wasted much time crafting a detailed prompt. For example, when I asked Bing to generate CRUD, it started to, but then told me to ask something else, as shown in Figure 1-2.



**FIGURE 1-2:**  
Bing refused to  
generate CRUD.

Microsoft Corporation

Now determine whether the response shows any promise. If you didn't get a response, try using a different generative AI model.

Here is the beginning of the response I got to my initial prompt ("Write JavaScript functions for performing CRUD operations for a database table named todo-list.") from ChatGPT using the GPT-3.5 model:

```
// Simulated in-memory database for the todo-list
const todoListDB = [];

// Function to Create a new todo item
function createTodoItem(title, description) {
  const newItem = {
    id: todoListDB.length + 1,
    title,
    description,
    completed: false,
  };

  todoListDB.push(newItem);
  return newItem;
}
```

The response is adequate, but because I failed to provide enough information about my desired application, ChatGPT used an array as if it were a database, which is unlikely to be what is needed here.

If you get a promising response to your initial prompt, give the model additional details. For example, my next step would be to tell ChatGPT that this is a Node.js application that will be working with a MongoDB database and that it should use Mongoose.

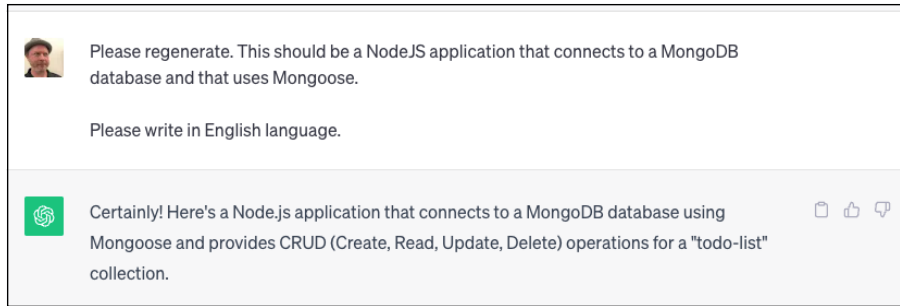


REMEMBER

The process of refining your instructions to a GenAI model and providing context and examples is called *prompt engineering*. Chapter 4 covers the process of prompt engineering in detail. Figure 1-3 shows my second prompt.

This time, ChatGPT responded with a complete Node.js application that connects to a local database and can perform CRUD operations. Listing 1-1 shows the regenerated code.

**FIGURE 1-3:**  
Adding context to  
get a better  
response.



ChatGPT

**LISTING 1-1:**

**ChatGPT's second attempt**

```
const mongoose = require('mongoose');

// Connect to MongoDB
mongoose.connect('mongodb://localhost/todo-list', {
  useNewUrlParser: true,
  useUnifiedTopology: true,
});

// Define a TodoItem schema
const todoItemSchema = new mongoose.Schema({
  title: String,
  description: String,
  completed: Boolean,
});

// Create a TodoItem model
const TodoItem = mongoose.model('TodoItem', todoItemSchema);

// Function to Create a new todo item
async function createTodoItem(title, description) {
  const newItem = new TodoItem({
    title,
    description,
    completed: false,
  });

  try {
    await newItem.save();
    return newItem;
  } catch (error) {
    throw error;
  }
}
```

```

// Function to Read all todo items
async function getAllTodosItems() {
  try {
    const todosItems = await TodoItem.find();
    return todosItems;
  } catch (error) {
    throw error;
  }
}

// Function to Read a specific todo item by ID
async function getTodoItemById(id) {
  try {
    const todoItem = await TodoItem.findById(id);
    return todoItem || null;
  } catch (error) {
    throw error;
  }
}

// Function to Update a todo item by ID
async function updateTodoItem(id, updatedData) {
  try {
    const updatedItem = await TodoItem.findByIdAndUpdate(id,
      updatedData, { new: true });
    return updatedItem;
  } catch (error) {
    throw error;
  }
}

// Function to Delete a todo item by ID
async function deleteTodoItem(id) {
  try {
    const deletedItem = await TodoItem.findByIdAndRemove(id);
    return deletedItem || null;
  } catch (error) {
    throw error;
  }
}

```

---

This isn't bad at all. I like that ChatGPT (mostly) used the latest JavaScript syntax, properly handled errors that may happen, and wrote good comments. I've seen human-written code that's much worse.

The real test, however, is whether the code runs. After it generated the CRUD functions, ChatGPT provided some examples of how they can be used. These examples are shown in Listing 1-2.

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**LISTING 1-2: Examples usage code from ChatGPT**

---

```
// Example usage:
(async () => {
  try {
    const newItem = await createTodoItem("Buy groceries", "Milk,
      eggs, and bread");
    console.log("Created item:", newItem);

    const allItems = await getAllTodoItems();
    console.log("All items:", allItems);

    const itemToUpdate = await getTodoItemById(newItem._id);
    if (itemToUpdate) {
      const updatedItem = await updateTodoItem(itemToUpdate._id,
        { completed: true });
      console.log("Updated item:", updatedItem);
    }

    const deletedItem = await deleteTodoItem(newItem._id);
    console.log("Deleted item:", deletedItem);

  } catch (error) {
    console.error("Error:", error);
  } finally {
    mongoose.disconnect();
  }
})();
```

---

If Node.js and MongoDB are installed on your development machine, you can try out this code by copying Listings 1-1 and 1-2 into a file and saving it with the .js extension.