COURSE OVERVIEW

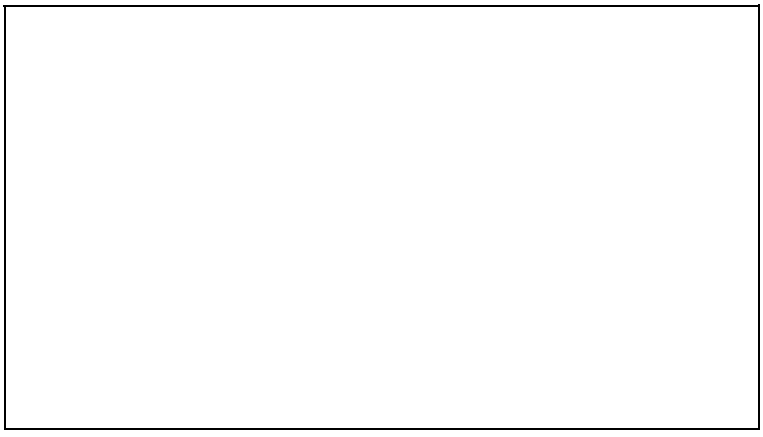
This course explores the different layers of computing technology within your smartphone. We begin at the hardware level, covering digital logic beginning with transistors and moving up to finite state machines. In the second part of the course, we build on this material and discuss how computers are organized and designed, including how the hardware and software interact. Finally, we learn the basics of programming. These three parts give a broad coverage of the technology that enables your smartphone to operate. Then, we move beyond operation into performance, exploring advanced methods to speed up computers, including pipelining, multi-threading, and multi-core processors. Finally, we close the course with an overview of actual processors used in smartphones. Assignments throughout the course are tailored to build your understanding and solve problems. Hands on work using the Jade simulation tool permits designing a small working computer that functions using the same basic computing principles as your smartphone.

LEARNING OUTCOMES

By the end of the course, you will be able to:

- Describe how a smartphone processor works.
- Explain computer system design from binary information to programming.
- Design a small working computer.
- Describe common techniques used to make computers fast.

INTRODUCTION



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Hi, I'm Dave Albonesi, and I want to welcome you to the computing

technology inside your smartphone.

Over the course of the next eight weeks, we're

going to explore the layers of computing hardware and software found

in your smartphone, the techniques that computer architects use

to make our smartphones so fast, and then we're

going to take a look inside one of the leading smartphone processors

that many of you have inside your own smartphone.

Now, I'm thrilled to have the opportunity

to offer this class, which is based on one that I

created here

at Cornell for Engineering freshmen.

And I'm excited to teach you about how this amazing little computer that we

carry around with us works.

After you've completed the course, you'll look at your smartphone

with an abundance of technical knowledge about what

is going on underneath the covers.

Now, the beauty of this course is that you don't need a technical background

to succeed, yet those of you with a technical background

will still learn a lot because we'll cover a wealth of topics

from transistors to software to performance to real smartphone chips.

And this course will also serve as a springboard

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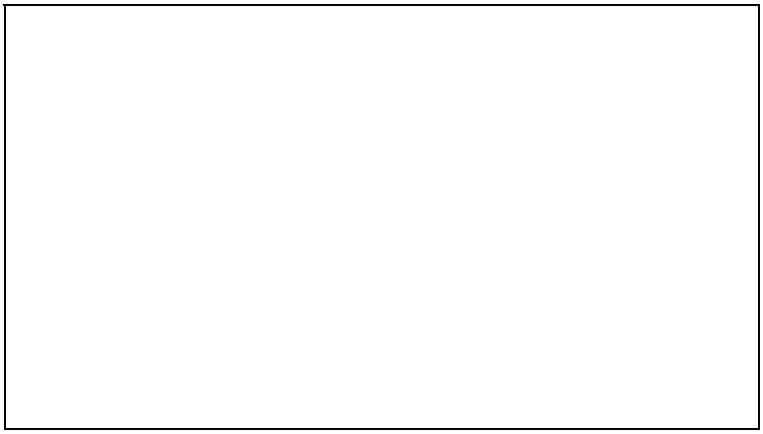
INTRODUCING SMARTPHONES



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Now let's discuss what you're going to learn in this course.

So the course is broken up into three big chunks, and in the first part

we're going to learn the operation of computer systems hardware and software

and how they interact.

Now, we're going to learn everything from transistors to logic gates

to the way computers are organized to instructions to software

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