

数字逻辑基础

2013秋

Video Image Processing (VIP)
Research Group @ Fudan
<http://soc.fudan.edu.cn/vip/>

范益波

2013.9

逻辑

人类语言逻辑

明天早上7点闹钟

机械逻辑

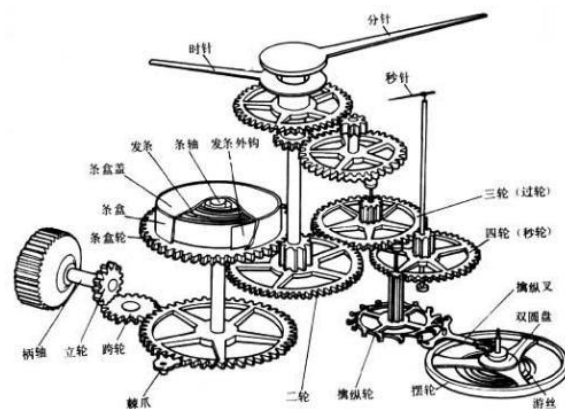


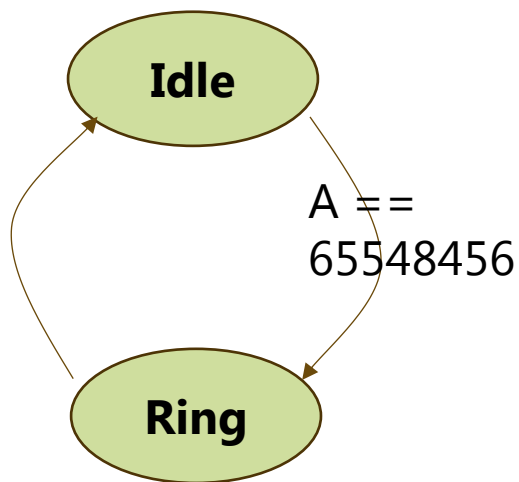
图4 机械手表结构图

程序逻辑

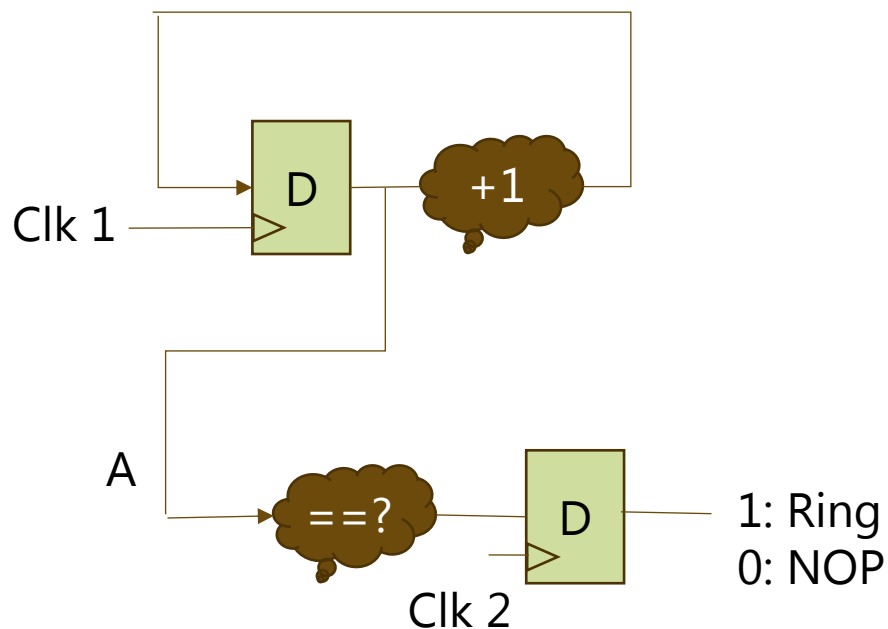
```
While (1) {  
    If (Time == 7:00 )  
        Then Ring;  
    Else  
        Nop;  
}
```

数字逻辑

状态



电路



数字逻辑：如何让电路帮我们解决各类事务

数字时代

Apps

Adobe Design Premium CS5.5



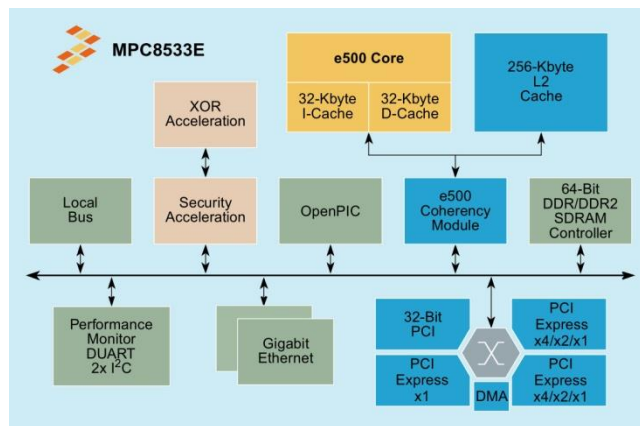
Microsoft Office



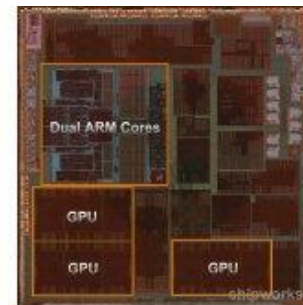
表象的背后



系统、软件
{Hello, World}



架构、接口
{ 数字逻辑 }
Design !



ASIC
{制造、工艺}

学有所用 – Steve Jobs



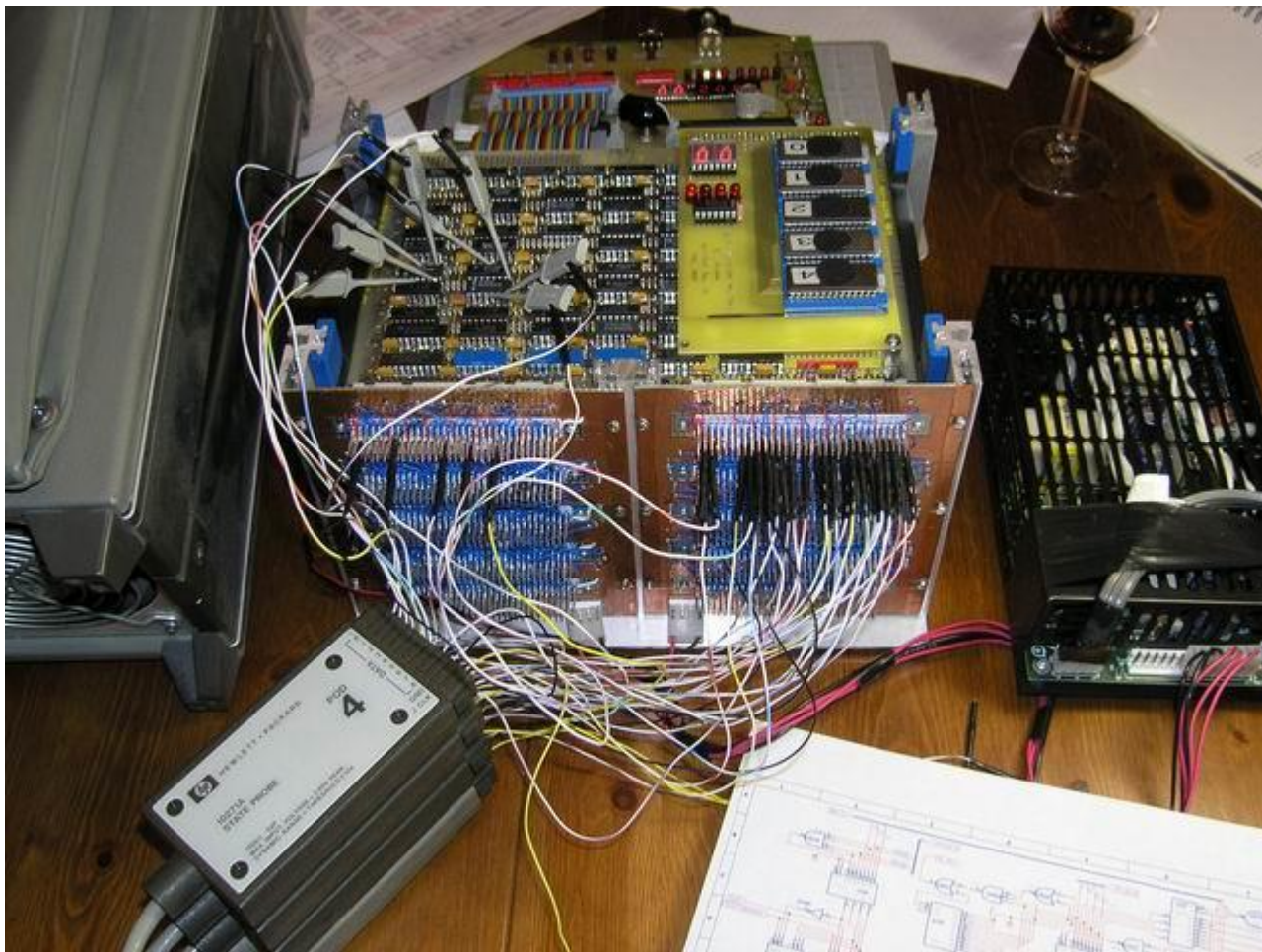
佳士得拍卖行 67.14万美元

“Home-Build” 计算机 – Bill Buzbee

<http://www.homebrewcpu.com/>

Magic-1 (2001~2005)

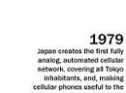
- ~200块74系列数字逻辑芯片，>4000根连线
- 主频“高达”4.09MHz
- 4M内存
- 8位总线
- 20M硬盘
- 运行了一个Web服务器 **magic-1.org**
- 新闻系毕业



KEY MOMENTS IN CONSUMER ELECTRONICS: A TIMELINE



1972
Pong becomes the first commercially successful arcade video game, sparking massive growth in the video game industry. The two dimensional tennis-like game manufactured by Atari becomes available for home use at the end of 1975. The home version receives the illustrious title of "Home Pong."



1977
Apple II is introduced becoming the first highly successful personal computer. It is mass-produced and widely distributed in schools throughout the US, making Apple a household name.



1979
Japan creates the first fully analog, automated cellular network, covering all Tokyo suburbs, including cellular phones useful to the ordinary consumer. Networks immediately begin to pop up in metropolitan regions around the globe.



1983
Sony releases the first consumer "hand-held" camcorder called the Betamovie BMC-100P. It is so large that it is unusable with one hand.



1984
The Motorola DynaTAC 8000X is first released in 1984. This "brick phone" weighed two lbs., offered a half hour of talk time per charge, and retailed for \$3995.



1989
The Nintendo Game Boy is released in Japan and North America. It allows users to bring video game entertainment away from home.



1989
With the Sega Genesis, the portable console finally gains popularity at a small price point, the portable console finally starts to pick up steam. Various manufacturers release their version of the portable including Apple, Zenith Data Systems, Compaq and IBM.



1995
The first Sony PlayStation video game system is released in North America in December. The system, which used discs instead of cartridges, would go on to sell over 102 million units.



1997
The Digital Video Disc (or DVD) is invented. The optical disc is primarily used for video and data storage. Following its 1997 release it becomes the industry standard for video viewing.



2001
Apple releases the first iPod, a portable media player. Originally used for music, it eventually will support photos, video and more. Through 2009 the iPod will have gone on to sell approximately 250 million units.



2004
The Nintendo DS is released. It would go on to become the most popular handheld console, selling over 123 million units by 2010.

2007
Introduced in June, the iPhone revolutionizes handheld phone and multimedia capabilities. Time Magazine names it the "invention of the year."

2009
Released in November 2009, the iPad 7th generation at 3.4 x 4.4" weighs just over five ounces, and has a 3.5 inch capacitive touch screen. Industry offered at select retailers for \$249. It has a relatively long battery life, offering five hours of viewing time and 300 hours on standby.

2006
Blu-ray, a new optical disc storage medium is released. Although the dimensions of a Blu-ray disc are the same as a DVD, it is capable of storing almost 10 times the data.

2002
The Microsoft Xbox brings big success following its global release. It makes the PlayStation 2, Sega Dreamcast and Nintendo Game Boy Advance Live (launched in 2002) would enable users to play against each other online, connecting via high-speed internet. By mid-2009, Microsoft announced that Xbox Live have over 17 million users.

1996
The Kodak DC-25 is released, the first point-and-shoot digital camera to record still images. It would probably retail for \$499.

1993
Intel introduces the Pentium microprocessor. Making personal computers faster and more energy efficient.

1985
Nintendo releases the Family Computer, or Famicom, in the US under the moniker "Nintendo Entertainment System" (NES). The NES puts Nintendo on the map, making it one of the wealthiest companies in Japan.

1982
The Compact Disc, or CD, becomes the first digital storage format commercially available to the public. The CD, being primarily used for physical storage of digital music, remains the standard format thru 2009.

1984
Sony releases The Discman, a portable CD player, sparking widespread public interest in the better sound quality found in this new digital format.

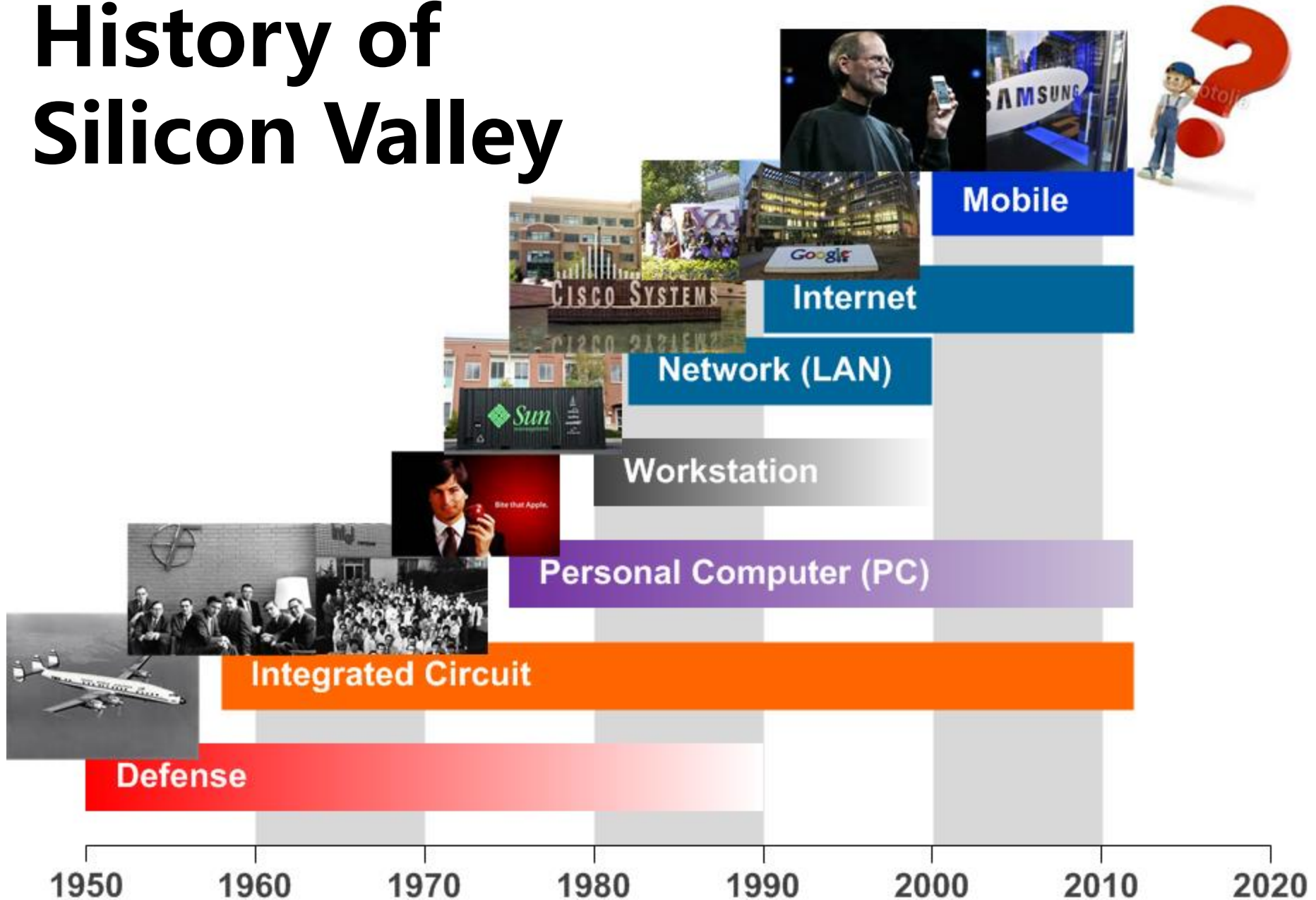
1979
The portable autocamcorder player is patented in Brazil but doesn't gain popularity until Sony releases The Walkman in 1979.

1972
Pong becomes the first commercially successful arcade video game, sparking massive growth in the video game industry. The two dimensional tennis-like game manufactured by Atari becomes available for home use at the end of 1975. The home version receives the illustrious title of "Home Pong."

The figure is a detailed map of the Silicon Valley region, spanning from San Francisco in the north to Los Gatos in the south, and from the San Francisco Bay Area in the west to Morgan Hill in the east. The map is overlaid with a grid of company logos, representing the density and diversity of the tech industry in the area. Major cities and towns labeled on the map include San Francisco, San Jose, Palo Alto, San Mateo, Foster City, Hayward, Fremont, Milpitas, Sunnyvale, Cupertino, Scotts Valley, Los Gatos, and Morgan Hill. The map also shows major highways like I-580, I-880, I-680, and I-805. The logos are placed in a way that suggests the location of each company's headquarters or a significant office. Notable logos include Apple, Google, Facebook, Microsoft, Amazon, Intel, Oracle, Cisco, and many others. The map is a visual representation of the concentration of high-tech companies in the Silicon Valley region.

PERMUTO

History of Silicon Valley



时间安排

教学时间：1~17周

总课时：4x17=68

节假日：2x1=2

实际课时：66

第一学期

2013年9月1日至2014年1月18日

	日	一	二	三	四	五	六	备 注
0	9/1	2	3	4	5	6	7	1. 2013级本科新生9月1日报到, 9月2日至9月6日入学教育, 9月9日上课。
1	8	9	10	11	12	13	14	
2	15	16	17	18	19	20	21	2. 2013级研究生9月2日报到, 9月3日至6日入学教育, 9月9日上课。
3	22	23	24	25	26	27	28	
4	29	30	10/1	2	3	4	5	3. 本科生老生9月3日申请补考, 9月4日至7日补考, 9月8日注册, 9月9日上课。
5	6	7	8	9	10	11	12	
6	13	14	15	16	17	18	19	4. 研究生老生9月3日申请补考, 9月4日至6日补考, 9月6日注册, 9月9日上课。
7	20	21	22	23	24	25	26	
8	27	28	29	30	31	11/1	2	
9	3	4	5	6	7	8	9	5. 2013级本专科生、研究生开学典礼于9月6日举行。
10	10	11	12	13	14	15	16	
11	17	18	19	20	21	22	23	6. 中秋节、国庆节、元旦节放假以校办通知为准。
12	24	25	26	27	28	29	30	
13	12/1	2	3	4	5	6	7	7. 第二专业/第二学位课程考试安排在第16周, 通识教育课程考试安排在第16、17周; 第18、19周为停课考试周。
14	8	9	10	11	12	13	14	
15	15	16	17	18	19	20	21	
16	22	23	24	25	26	27	28	
17	29	30	31	1/1	2	3	4	
18	5	6	7	8	9	10	11	8. 第一学期于2014年1月18日结束, 共计19教学周(包括考试)。
19	12	13	14	15	16	17	18	

教学内容

绪论

- 介绍数字电路的任务和作用，数字电路的发展史。

第一章 逻辑代数基础 (教材第一章)

- 1.1 逻辑代数概述
- 1.2 逻辑代数的基本定律
- 1.3 逻辑函数的标准表达式和卡诺图
- 1.4 逻辑函数的化简

第二章 逻辑门电路 (补充讲义第一章)

- 2.1 逻辑门电路 简介
- 2.2 半导体开关器件的开关特性
- 2.3 分立器件逻辑门电路
- 2.4 TTL集成逻辑门电路
- 2.5 CMOS门电路
- 2.6 电流模式逻辑门电路

第三章 组合逻辑电路的分析和设计 (教材第二章)

- 3.1 组合逻辑电路的一般分析方法
- 3.2 组合逻辑电路的一般设计过程
- 3.3 组合逻辑电路中的竞争-冒险 (教材中2.4)

第四章 触发器及其简单应用电路 (教材第三章)

- 4.1 触发器的基本类型及其状态的描写
- 4.2 触发器的结构与工作原理
- 4.3 集成触发器 (补充讲义第2章)
- 4.4 触发器的简单应用(教材3.3)

第五章 同步时序电路的分析和设计 (教材第四章)

- 5.1 时序电路的描述
- 5.2同步时序电路的分析方法
- 5.3同步时序电路的设计方法
- 5.4时序电路的状态化简

第六章 异步时序电路的分析和设计 (教材第五章)

- 6.1 基本型异步时序电路的分析方法
- 6.2 基本型异步时序电路中的竞争与冒险
- 6.3 脉冲型异步时序电路的设计 (讲异步计数器的设计,教材5.4.2)

第七章 存储器与可编程逻辑器件(补充讲义第三章)

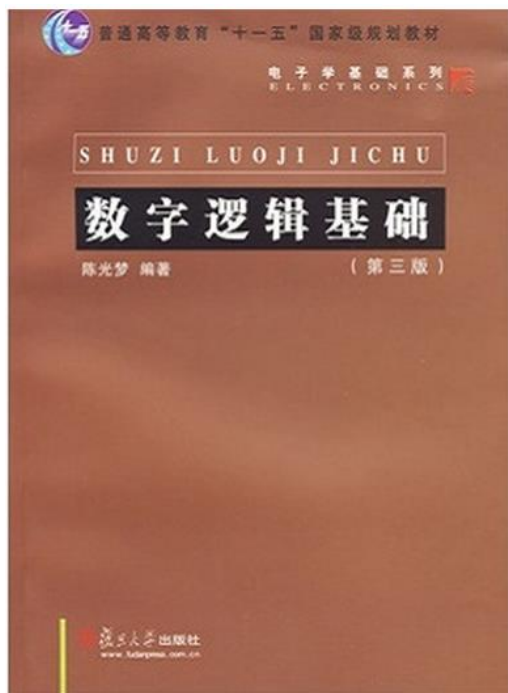
第八章 数模转换器和模数转换器(补充讲义第四章)

课时分配

课堂教学课时安排(初步)

- 绪论+第一章 逻辑代数基础 10
- 第二章逻辑门电路 10
- 第三章组合逻辑电路的分析和设计 10
- 第四章触发器及其简单应用电路 10
- 第五章同步时序电路的分析和设计 16
- 第六章异步时序电路的分析和设计 6
- 第七章 存储器与可编程逻辑器件 2
- 第八章 数模转换器和模数转换器 2

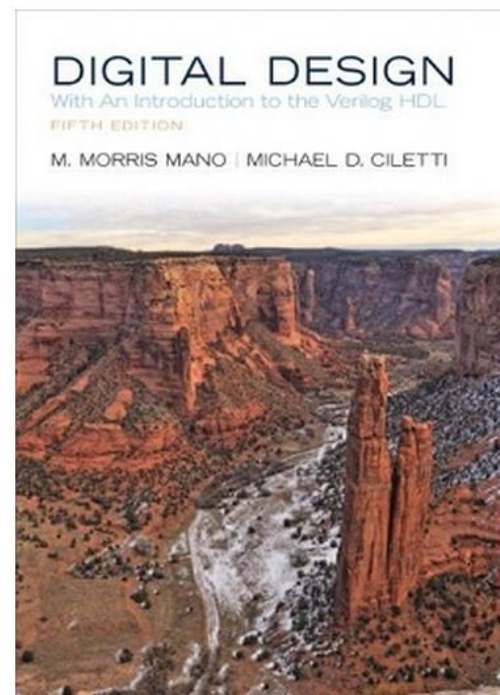
教材、参考书



复旦大学

数字逻辑基础课程 补充讲义

[键入文档副标题]



教师、助教

教师：范益波

- 办公室：微电子楼203
- Email：fanyibo@fudan.edu.cn
- Tel：51355216

助教：每周一次习题课，负责习题解答（每周交一次作业）

- 沈蔚炜：10110720024@fudan.edu.cn
- 白宇峰：12212020001@fudan.edu.cn

成绩

考试：65%

实验：25%

作业及平时：10%

信息发布：elearning

本学期“数字逻辑基础平台实验”将于第4周的周五开始（10月4日，核技术专业除外）。核技术专业学生从第6周的周五开始（10月18日）

VIP

Video Image Processing

Research Group @ Fudan

<http://soc.fudan.edu.cn/vip/>

Thank you !