Introduction

Logic Circuit Laboratory

Outline

1. Lecturer
2. Course Introduction
3. Assessment
4. Motivation
5. Introduction to Logic circuit Laboratory
6. Rules / Safety for Laboratory
7. Devices

Logic Circuit

Laboratory

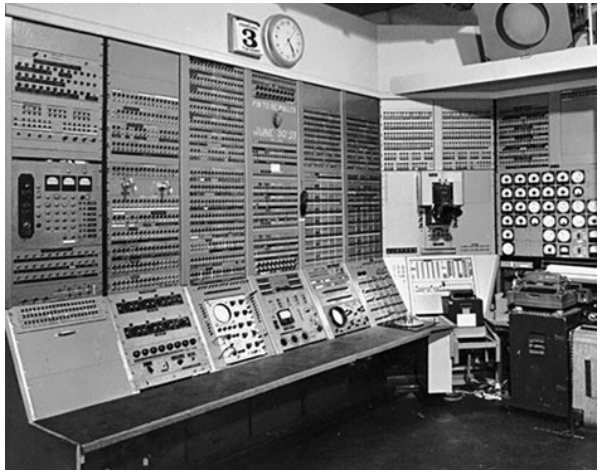
Analog device

source: http://www.onlyinyourstate.com

Digital Device

source: http://www.dmnews.com/

Computer -> Analog/ Digital



source: https://www.computerhope.com

Base number

1048576 4096 16

... 65536 256 1

... 16^5 16^4 16^3 16^2 16^1 16^0

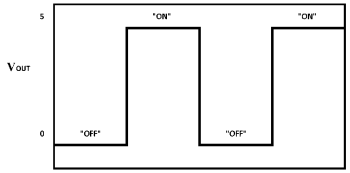
...FEDCBA9876543210

... Sixth digit Fourt digit Second digit Fifth digit Third digit First digit

value of digit in "Hexadecimal numeral system"

source: https://en.wikiversity.org/wiki/Numeral_systems

Logic computer status



source: https://www.computerhope.com

กำเนิด Logic

1. Intro to circuit analysis for CPE

2. Electronic for CPE

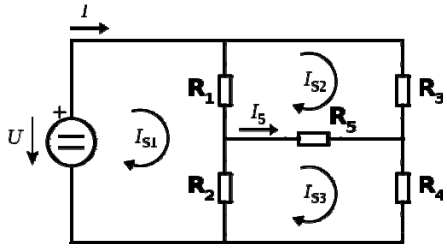
3. Digital circuit design

1. Intro to circuit analysis for CPE

R – Resistor

L – Inductor

C - Capacitor



Analog circuit

CPE -> Direct current circuit design

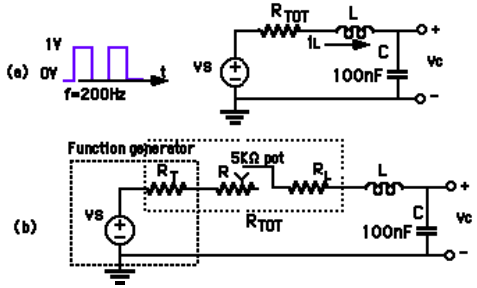
RLC = Passive component

1. Intro to circuit analysis for CPE

R – Resistor

L – Inductor

C - Capacitor



Analog circuit

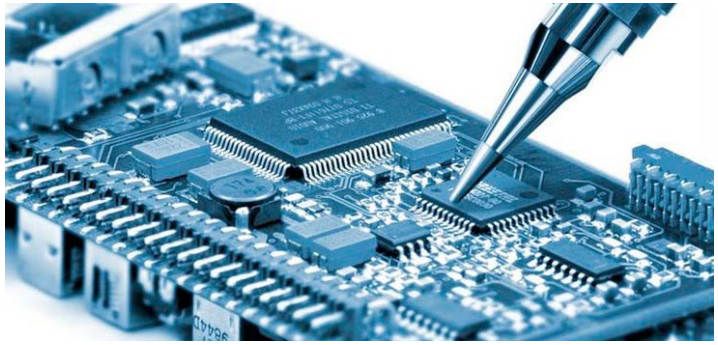
CPE -> Alternating current circuit design

Frequency response + Filter circuit

Digital?

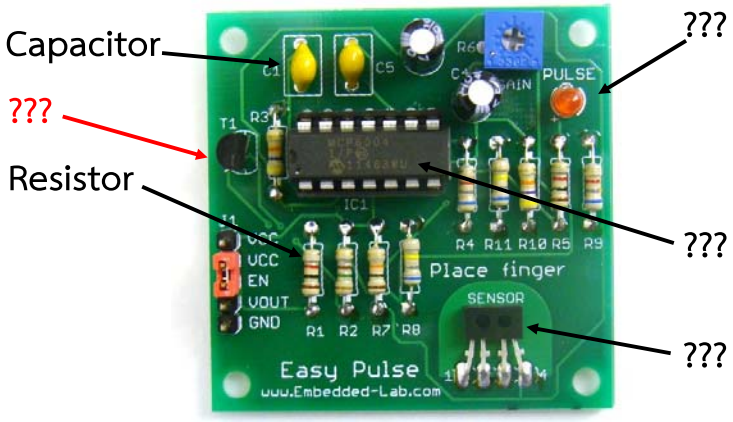
2. Electronic for CPE

Electronic ?



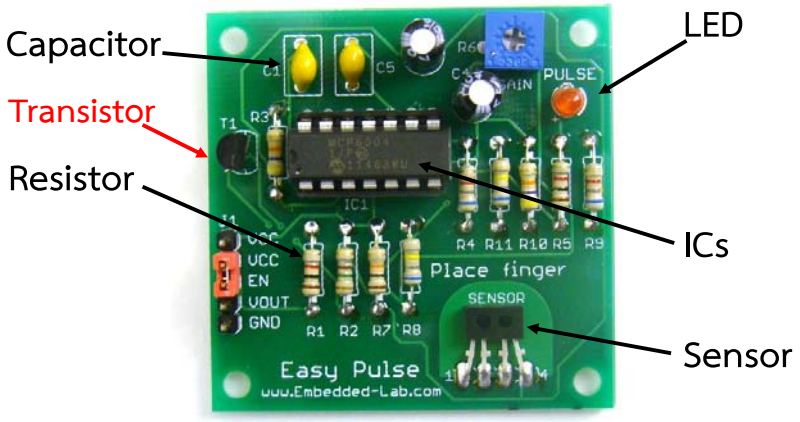
Electronic = Semiconductor + Passive component

2. Electronic for CPE



Electronic = Semiconductor + Passive component

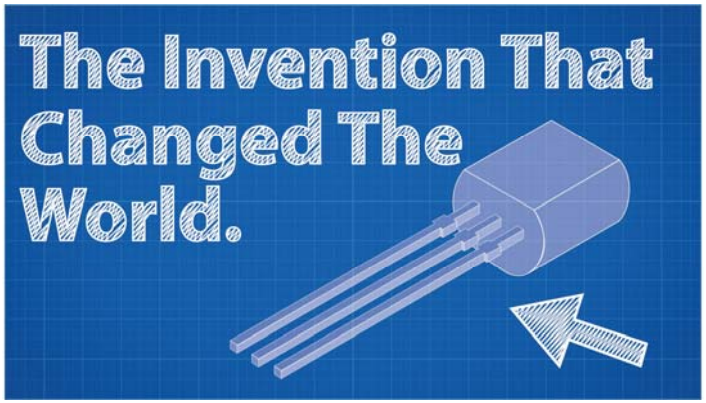
2. Electronic for CPE



Electronic = Semiconductor + Passive component

2. Electronic for CPE

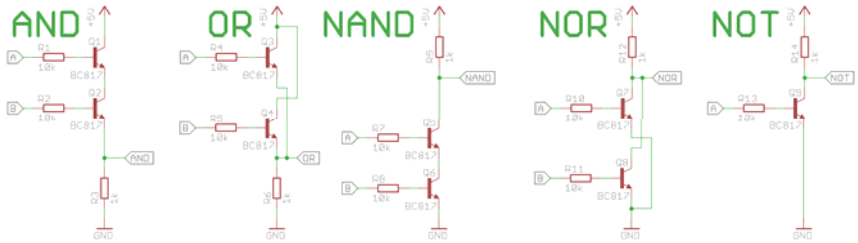
Transistor change the world



Electronic = Semiconductor + Passive component

Transistor change the world

2. Electronic for CPE



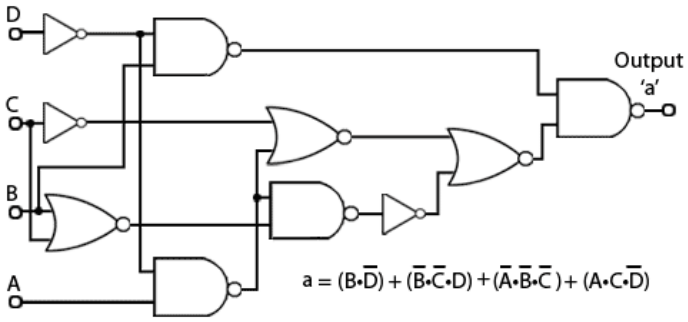
Digital?

3. Digital circuit design

INPUT			OUTPUT
x_1	x_2	x_3	S
1	1	1	1
1	1	0	1
1	0	1	1
1	0	0	0
0	1	1	0
0	1	0	0
0	0	1	0
0	0	0	1

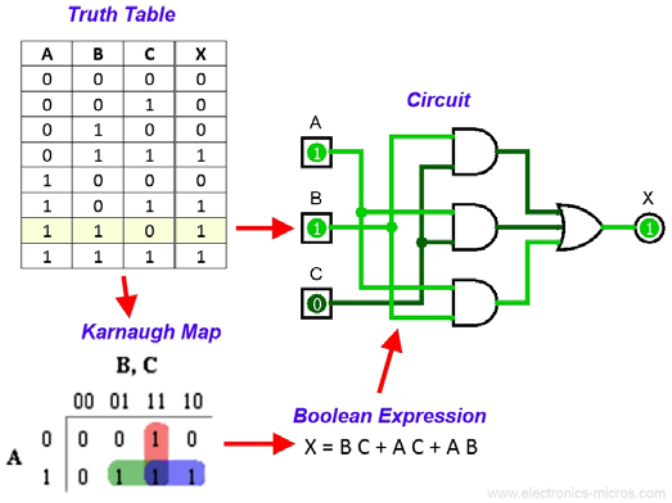
BOOLEAN ALGEBRA

3. Digital circuit design



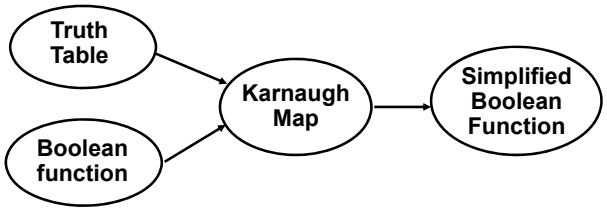
EQUIVALENT CIRCUITS

3. Digital circuit design

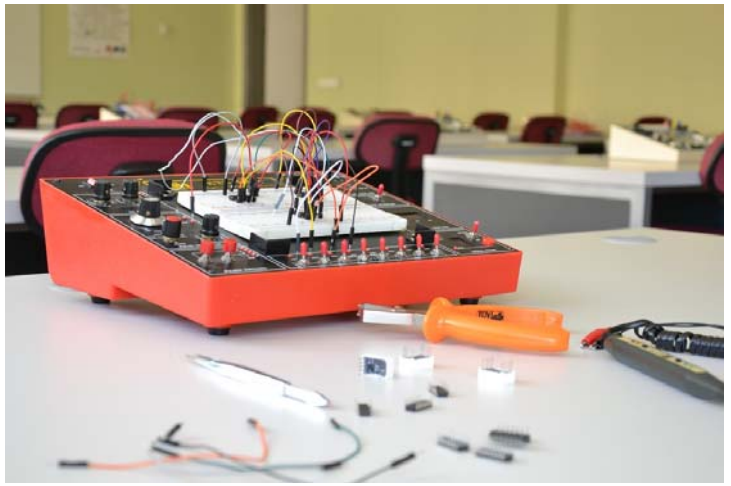


KARNAUGH MAP

3. Digital circuit design



Logic Circuit Laboratory



Course Outline

1. Introduction
2. Logic Gats & Related Devices
3. Combination Circuits I
4. Combination Circuits II
5. Combination Circuits III
6. Sequential Circuit I
7. Sequential Circuit II
8. Sequential Circuit III
9. Sequential Circuit IV
10. FPGA I
11. FPGA II
12. Logic circuit project I
13. Logic circuit project II
14. Lab Exam

Digital + Lab logic Motivation

Combination Circuits I - III

Adder circuit

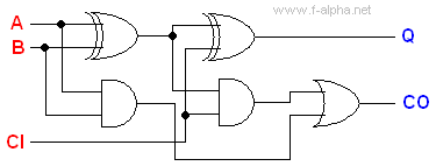
Subtractor circuit

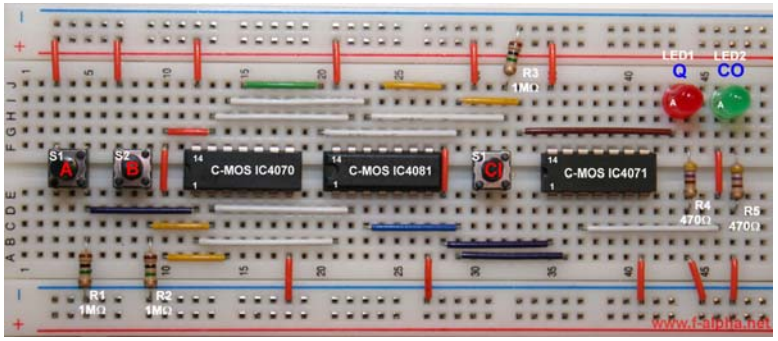
Multiplier circuit

Divider circuit

Digital + Lab logic Motivation

The Full Adder Circuit





Digital + Lab logic Motivation

Sequential Circuit I - IV

Clock / Timer

Storage elements (Latches, Flip-Flops, Register)

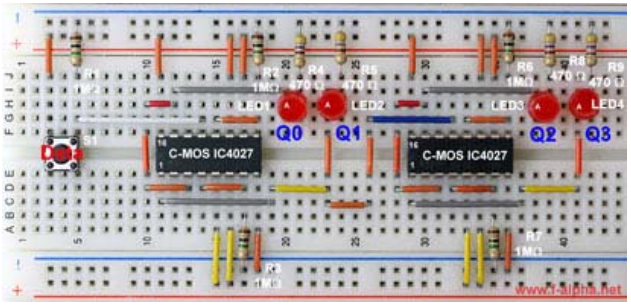
Shift registers

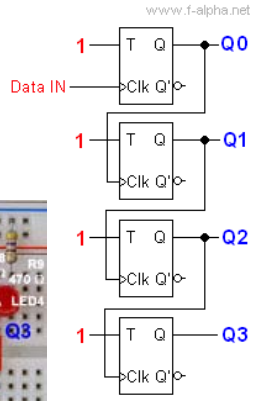
Counters

RAM/ROM

Digital + Lab logic Motivation

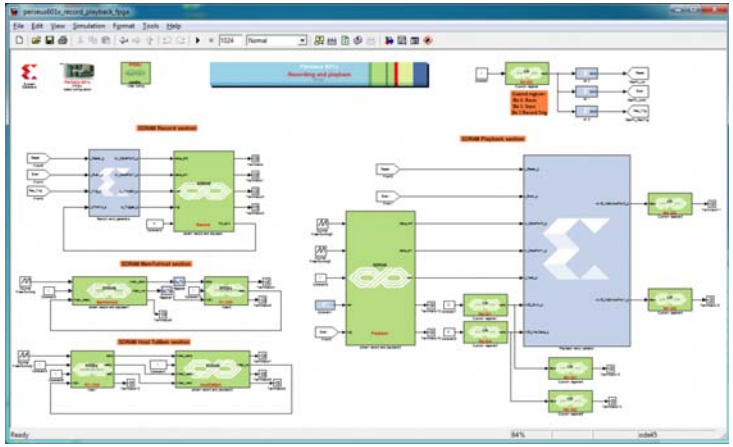
4-bit Down Counter





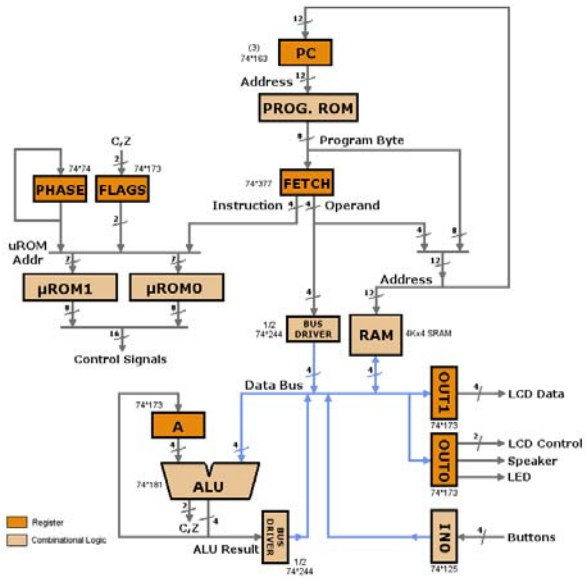
Digital + Lab logic Motivation

FPGA - Model Base design



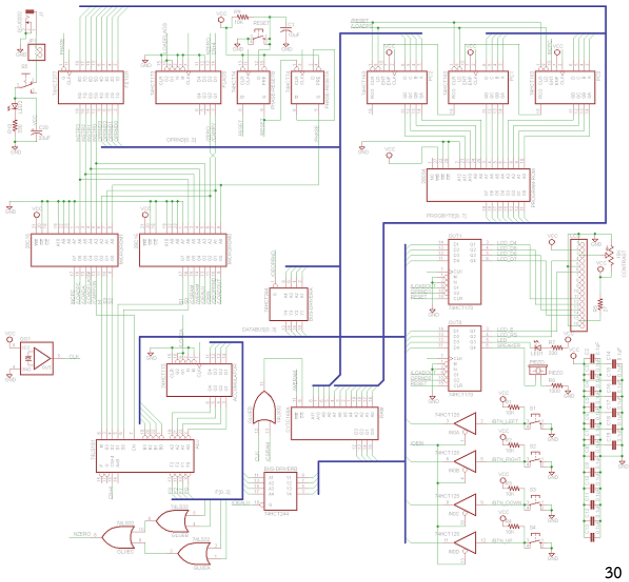
Digital + Lab logic Motivation

Basic CPU



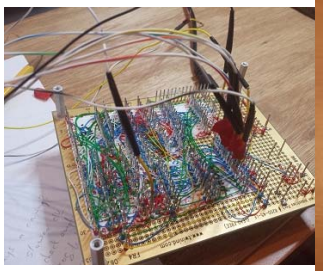
Digital + Lab logic Motivation

Basic CPU



Digital + Lab logic Motivation

Basic CPU



source: https://www.bigmessowires.com/nibbler/

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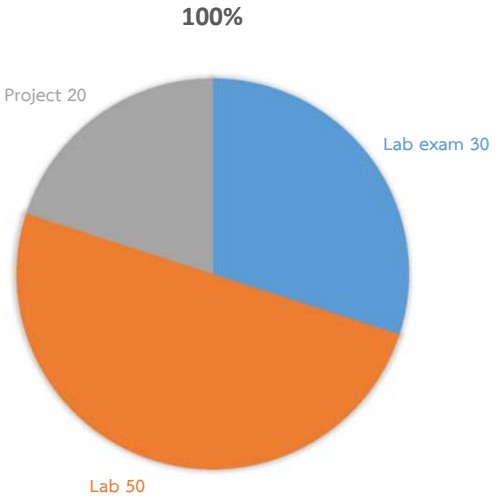
Assessment



Assessment

- Project Lab logic ทำกลุ่ม จะแจ้งขั้นตอนอีกครั้งหนึ่ง
- Lab exam ทำการสอบครั้งเดียว
- การเข้าแลป <=80%, หมดสิทธิ์สอบ
- คะแนน lab 50% จะแบ่งอัตราส่วนคะแนนจาก
  - ความสนใจเรียน
  - ใบงานในการเรียนแลป
  - การส่งงานภายในเวลาที่กำหนด

Group FB

- ไว้ติดต่อสื่อสาร
- Download Sheet Lab
- ประกาศคะแนน