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Smart Home

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Day Month Year

Abstract

Abstract goes here

Acknowledgements

I want to thank...

Contents

Contents	iii
List of Figures	iv
List of Tables	v
Acronym and Abbreviation	vi
1 Introduction	1
2 Background	2
2.1 Microcontroller	2
2.1.1 Theory	2
2.1.2 Microcontroller structure	2
2.1.3 Microcontroller market	3
2.2 Communication protocol	4
3 Chapter Three Title	5
4 Chapter Four Title	6
5 Conclusion	7

List of Figures

Figure 2.1	Structure of Microcontroller	3
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List of Tables

Acronym and Abbreviation

ADC	Analog to Digital Converter
ALU	Arithmetic Logic Unit
CPU	Central Processing Unit
CU	Control Unit
DAC	Digital to Analog Converter
MCU	Microcontroller Unit
RAM	Random Access Memory
ROM	Read-only Memory

Chapter 1

Introduction

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Chapter 2

Background

2.1 Microcontroller

2.1.1 Theory

Microcontroller Unit (MCU) is a small size, special purpose computer. It is small enough in order to be integrated on a small circuit in which will do specified tasks or applications. MCU itself comes with memory, input, output peripherals and processor. Program to run the MCU is stored in Read-only Memory (ROM) and usually not change in production. A microcontroller is usually designed to run in small size and at low cost, which is compatible to be embedded in other system in order to control actions of the system automatically.

Few advantages of MCU over a microprocessors can be listed as following:

- A MCU is already a standalone microcomputer.
- Because it can be considered as an independent computer, most needed components are integrated on a small size board.
- The above reason leads to the benefit that using MCU can make the system compact, highly mobile and cost efficiency.
- Time reduction because it is programed to run specified set of commands only.
- It is also easy to use and maintainance.
- MCU nowadays usually designed to be used with low power in order to last longer under energy-limited condition.

2.1.2 Microcontroller structure

Figure 2.1 demonstrates the basic structure of a microcontroller. It is easily to see the basic design of a microcontroller and its components.

- CPU: is the central unit which is assembled with Arithmetic Logic Unit (ALU) and a Control Unit (CU). Its functions are connect parts of the MCU into a single system by doing fetch, decode and execution.
- Memory: there are two types of Memory that are required, namely ROM and Random Access Memory (RAM). Each type has its own functions, in which ROM will handle the program and the written instructions and RAM can only store temporary data while the program is excuting.
- Input/Output: the single board system needs input to excute the program as well as outputs to delivery the information for further handling. The I/O peripherals are the interface of the MCU to communicate with or to control other devices.
- Bus: bus is the system of wires that used to connect the Central Processing Unit (CPU) with other peripherals, which means it plays an important role but rarely discussed.

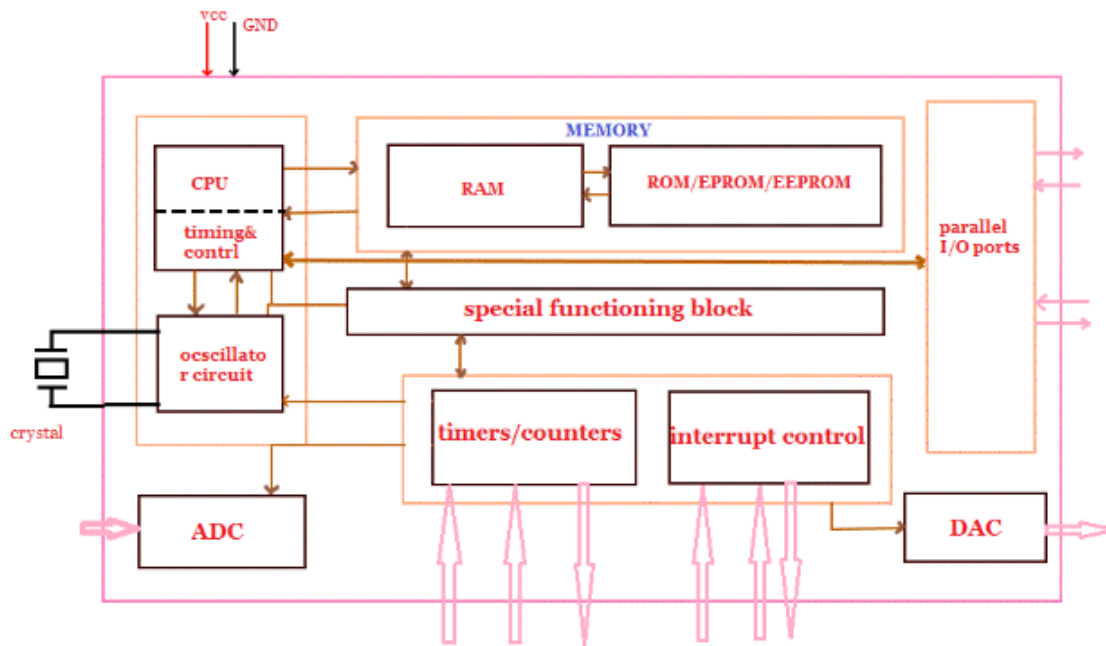


Figure 2.1: Structure of Microcontroller

- Timers/Counters: they are built-in components for microcontroller, which is used to count in order to handle external events.
- Interrupts: is used to interrupt that can be an external or internal one, which helps to execute an instruction(s) while the main program is executing.
- ADC: Analog to Digital Converter (ADC), its name says it all, which is a circuit use to convert analogs signal to digital signals. The reason to use ADC is most sensors available on the market can read only analog signal but CPU of the MCU can read digital signal only, so a ADC is necessary for them to communicate.
- DAC: Digital to Analog Converter (DAC) similar to ADC, DAC is also a circuit which convert digital signals into analog signals for further processing.

2.1.3 Microcontroller market

There exists many microcontrollers on the market which come in various sizes and capacities. The list is only contains very few popular MCU that the author knows of.

- Intel 8051
- STMicroelectronics STM8S (8-bit), ST10 (16-bit) and STM32 (32-bit)
- Atmel AVR (8-bit), AVR32 (32-bit), and AT91SAM (32-bit)
- Freescale ColdFire (32-bit) and S08 (8-bit)
- PIC (8-bit PIC16, PIC18, 16-bit dsPIC33 / PIC24)
- Renesas Electronics: RL78 16-bit MCU; RX 32-bit MCU; SuperH; V850 32-bit MCU; H8; R8C 16-bit MCU
- PSoC (Programmable System-on-Chip)
- Texas Instruments Microcontrollers MSP430 (16-bit), C2000 (32-bit), and Stellaris (32-bit)

2.2 Communication protocol

Chapter 3

Chapter Three Title

Chapter 4

Chapter Four Title

Chapter 5

Conclusion