

EMBEDDED SYSTEM INTERNSHIP REPORT AT CODE BIND TECHNOLOGIES

Submitted in partial fulfillment of the requirements for the completion of

PROFESSIONAL TRAINING

By

SATYA PRAKASH (Reg. No. 41140704)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS
ENGINEERING**

SCHOOL OF ELECTRICAL AND ELECTRONICS

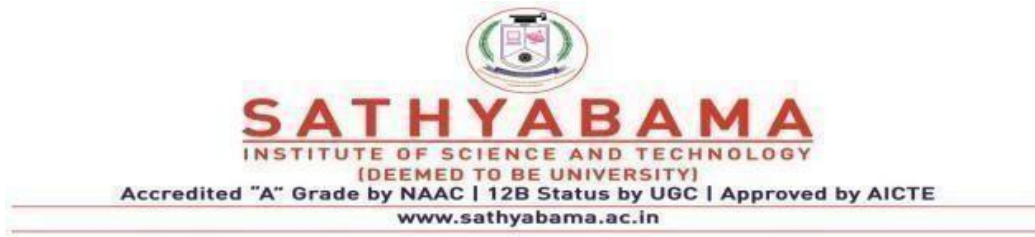
SATHYABAMA

**INSTITUTE OF SCIENCE AND
TECHNOLOGY (DEEMED TO BE
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JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI – 600119

OCTOBER 2023



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS
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BONAFIDE CERTIFICATE

This is to certify that this Internship Report submitted for EPICS is the bonafide work of **SATYA PRAKASH (41140704)** who carried out the **EMBEDDED SYSTEM** Internship during the period May 2023 to June 2023.

A handwritten signature in black ink, appearing to be "Chh", with a horizontal line underneath.

EXTERNAL GUIDE

A handwritten signature in blue ink, appearing to be "S. Radhika", with a horizontal line underneath.

HEAD OF THE DEPARTMENT

Dr. S . Radhika, M.E., (Ph.D.)

Submitted for Professional Training held on 03 October 2023

A handwritten signature in black ink, appearing to be "S. Annalakshmi", with a horizontal line underneath.

Internal Examiner

A handwritten signature in black ink, appearing to be "Chh", with a horizontal line underneath.

External Examiner

DECLARATION

I **SATYA PRAKASH** hereby declare that the Internship Report Entitled **EMBEDDED SYSTEM** done by me **AT CODE BIND TECHNOLOGIES,CHENNAI** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in ELECTRICAL AND ELECTRONICS ENGINEERING.

DATE: 15 May 23 - 19 May 23

PLACE: CHENNAI

A handwritten signature in blue ink, appearing to read 'Satya', is written over a horizontal blue line.

SIGNATURE OF THECANDIDATE

SATYA PRAKASH

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CHAPTER 1

INTRODUCTION ABOUT THE COMPANY

1.1 INTRODUCTION

CodeBind Technologies is a certified (ISO 9001:2015), IAF, DAC, which is accredited in the software development, industrial seminars, technical training oriented programs. We are extending the relationship with our clients and make familiar in the world around your customers through the digital marketing sectors. Our support is also providing in the optimizing your website in popular search engines that we are certified by the “**Google**”.

A CodeBind Technologies is one of the development infrastructures in various platforms. We are striving to stand the superior position in competitive world. In which, we mainly focusing our infrastructure in the platforms of Website development, Mobile application development, Digital marketing and Embedded Products requirements for all business enterprises on globally.

We believe on teamwork among our clients to make a tremendous success that associated with different fields of clients in the development sectors like as banking, educational, automation, production, manufacturing fields.

Especially, we are collaborating with 180+ clients and 2000+ projects on across the world like Japan, Singapore, China, and Germany.

1.2 Company Profile

CodeBind Technologies is a computer software company based out of Usman Road, Chennai, Tamil Nadu, India.

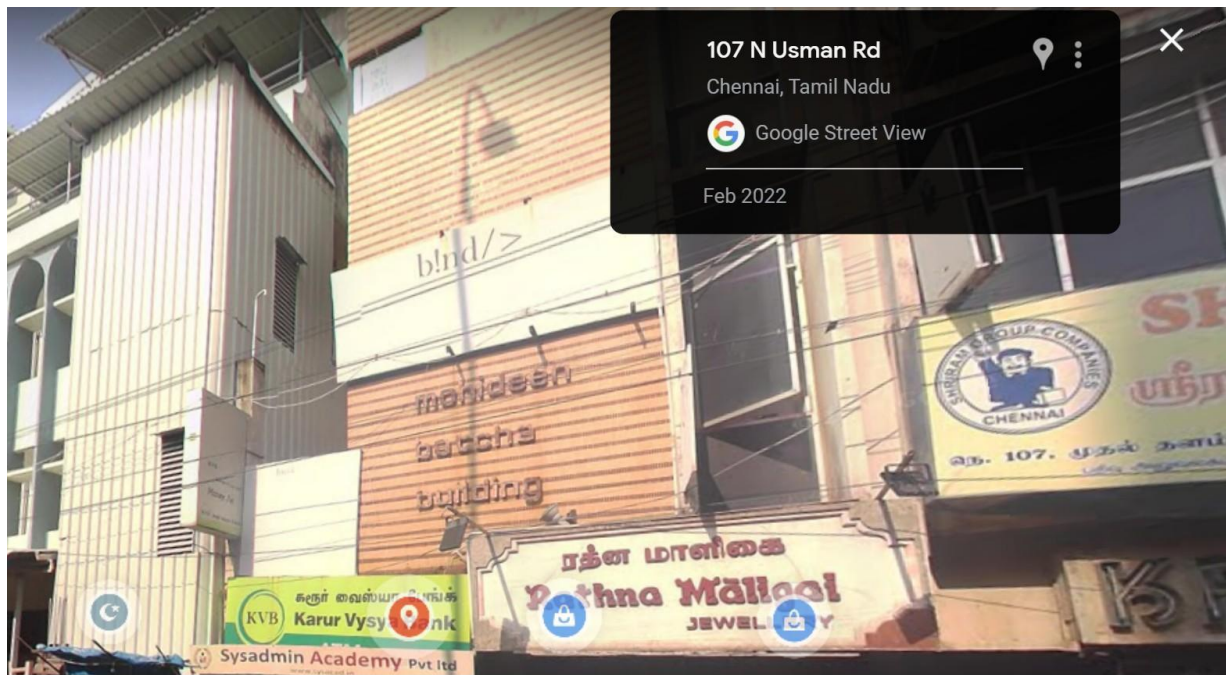


Fig. No. 1 Company View

1.3 Background

The company was founded in Stockholm , Sweden , in 1997 by Lars Liljeryd . A German subsidiary was formed in 2000 as Coding Technologies GmbH (later renamed Dolby Germany GmbH) with support form the research organization Fraunhofer IIS. The company also had offices in the United States and China.

- Code Bind Technologies is a new evolution to supporting the enterprises across the world through designing and developing the websites , application development in different platforms with fulfilling the other marketing requirements.
- We are providing In plant training and Internship for CSE , IT , ECE , EEE , EIE,
ICE , CIVIL , MECH , BSE , MCA etc., with free workshop and free placement training.



Fig. No.:-2 (a)



Fig. No.:-2 (b)

1.4 Highlights

- They love to design and pay great attention to every detail to make Perfect end Product.
- They Provide support for all of their Themes.
- Every section is commented for easier Understanding.
- There is a large scale of layouts you can choose from which are made to be useful and professional.
- We initiate with strong technical resources and passionate entrepreneurs.

CHAPTER 2

TRAINING ATTENDED

2.1. INTRODUCTION

An Embedded system is any electronic device that incorporates a computer in its implementation. The user of an embedded device is often not even aware that a computer is present in the device. The computer is used primarily to provide flexibility and to simplify the system design. Unlike a PC, program code is usually stored in ROM and not a hard disk drive. Typically, the end user does not develop new software for the embedded device. With advances in VLSI technology, embedded system have become so inexpensive that they are found in most of today's electronic devises.

Aircraft & Military Systems	Aircraft autopilots, avionics and navigation systems, automatic landing systems, guidance systems, engine controls.
Biomedical Systems	CT scan and Ultrasound imaging systems, patient monitors, heart pacers.
Cars	Engine control, anti-lock braking systems, traction control systems, air bag controls, heating and air conditioning controls, GPS mapping, Satellite Radio, On-board Diagnostics.
Communications	Communication Satellites, network routers, switches, hubs.
Consumer Electronics	TVs, ovens, dishwashers, DVD players, stereos, security systems, lawn sprinkler controls, thermostats, cameras, clock radios, answering machines, set top boxes, other appliances.
Computer Input Output Devices	Keyboards, mice, printers, scanners, displays, modems, hard disk drives, DVD drives, graphics cards, USB devices.
Electronic Instrumentaion	Data acquisition systems, oscilloscopes, voltmeters, signal generators, logic analyzers.
Industrial Devices	Elevator controls, surveillance systems, robots, CNC machines, Programmable Logic Controllers, industrial automation and control systems.
Office Machines	FAX machines, copiers, telephones, calculators, cash registers.
Personal Devices	Cell phones, portable MP3 players, Video players, Personal Digital Assistants (PDAs), electronic wrist watches, handheld video games, digital cameras, GPS systems.
Robots	Industrial robots, autonomous vehicles, space exploration robots (i.e. Mars robots)
Toys	Video Game systems, "Aibo", "Furby", and "Elmo" type robot toys.

Table 1. Embedded System Scope

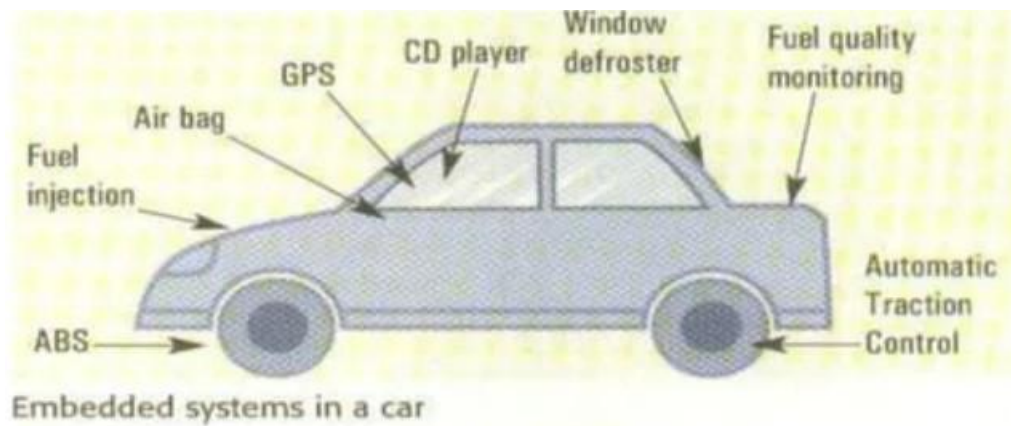


Fig. No.:-3 Real-life example of example of Embedded System

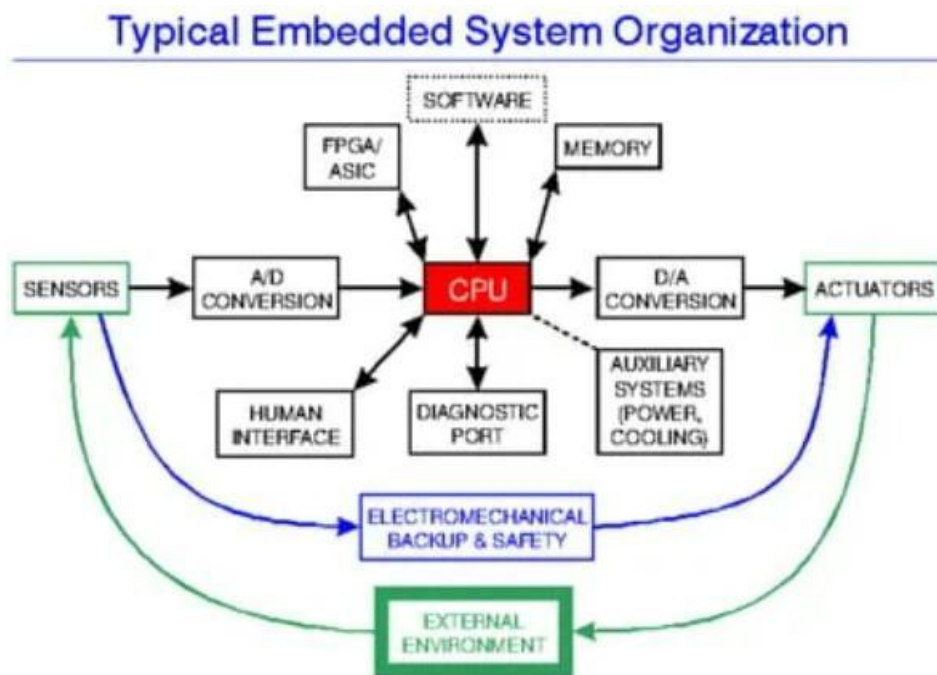


Fig. No.:-4 Embedded System Organization

2.2 Microcontroller v/s Microprocessor

A Microcontroller is a single-chip computer. Micro suggests that the device is small, and controller suggests that it is used in control applications. Another term for microcontroller is embedded controller, since most of the microcontrollers are built into (or embedded in) the devices they control.

A microprocessor differs from a microcontroller in a number of ways. The main distinction is that a microprocessor requires several other components for its operation, such as program memory and data memory, input-output devices, and an external clock circuit. A microcontroller, on the other hand, has all the support chips incorporated inside its signal chip.

2.3 TYPES OF

MICROCONTROLLERS First

microcontroller is “8031”

FEATURES:

- It is Intel's product. Neither a microprocessor nor a microcontroller.
- It is a 8-bit controller.
- Internally no ROM is provided i.e. code is outside the chip.

Second microcontroller is “8051”

FEATURES:

- It is a first complete 8-bit microcontroller.
- It is a name of a family in which the instruction set, pin configuration, architecture are same, only memory storage capacity is different.
- Internally PROM(programmable read only memory) is provided so it called one time programmable(OTP).

Third microcontroller is

“AT89C51” FEATURES:

- IT is ATMEL's product. It is a similar to 8051 microcontroller i.e., having same instruction set , pin configuration, architecture.

In “AT89C51” , c“ stands for CMOS technology used in the manufacturing of the I.C.

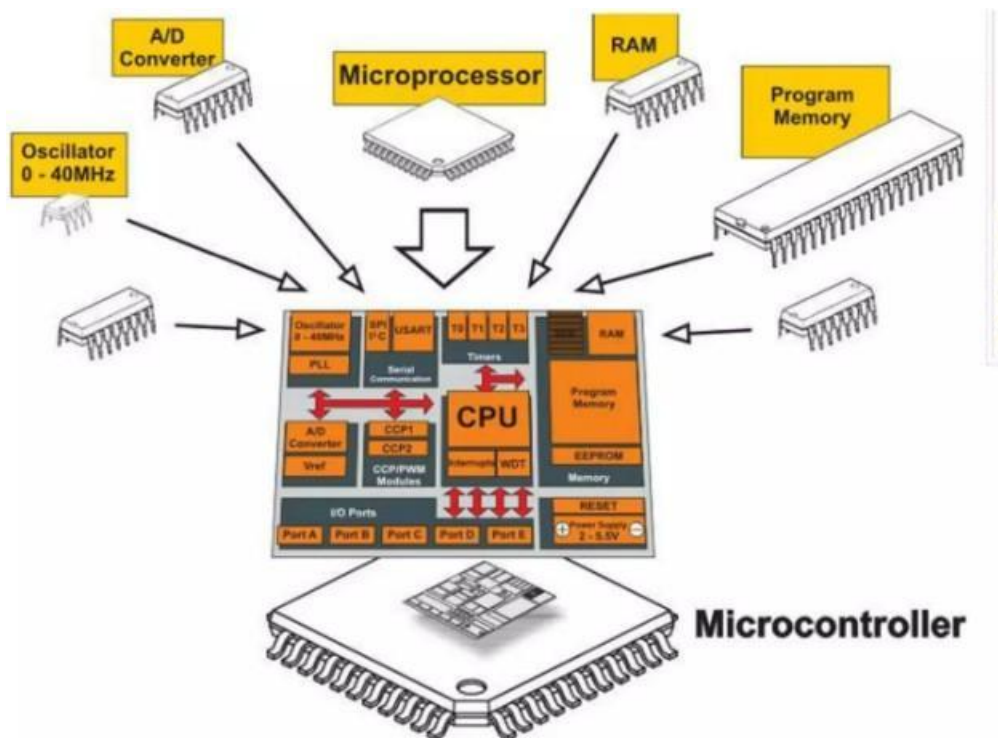


Fig. No.:-5 Organization of Microprocessor

CHAPTER 3

The Embedded Environment

Microcontrollers used in development projects have very limited resources. We are working close to our target machine and we must be familiar with our target hardware construction and operation.

A good quality C development environment incorporates tools which allow us to concentrate primarily on our application and not on the hardware which runs them. However, we cannot ignore low-level details of our target hardware. The better we understand our run-time environment, the better we can take advantage of its limited capabilities and resources.

3.1 The Embedded Difference:

There are many aspects of embedded system developments which must be considered. These are:

Reliability:

Embedded systems must be reliable. Personal computer programs such as word processors and games do not need to achieve the same standard of reliability that a microcontroller application must. Errors in programs such as word processors may result in errors in a document or loss of data. An error in a microcontroller application such as a television remote control or compact disc player will result in a product that does not work and consequently does not sell.

Efficiency:

Issues of efficiency must be considered in real time applications. A real time application is one in which must be able to act at a speed corresponding with the occurrence of an actual process.

Cost:

Many embedded systems must compete in a consumer market and cost is an

3.2 Fabrication Techniques:

CMOS:

Complementary Metal Oxide Semiconductor (CMOS) is a technique commonly used to fabricate microcontrollers. CMOS requires less power and CMOS chips can be static which allows the implementation of a sleep mode. CMOS microcontrollers must have all inputs connected to something.

PMP:

Post Metal Programming (PMP) allows ROM to be programmed after final metallization. This allows ROM to be programmed very late in the production cycle.

3.3 Memory Addressing and Types:

Each microcontroller has a specific addressing range. An addressing range is the number of addresses a microcontroller can access. The addressing scheme used to access these spaces varies from processor to processor, but the underlying hardware is similar.

3.3.1 RAM:

Random access memory or RAM consists of memory addresses. The CPU can both read from and write to RAM is used for data memory and allows the CPU to create and modify data as it executes the application program. RAM is volatile, it holds its contents only as long as it has a constant power supply. If power to the chip is turned off, the contents of RAM are lost. This does not mean that RAM contents are lost during a chip reset. Vital state information or other data can be recorded in data memory and recovered after an interrupt or reset.

3.3.2 ROM:

ROM, read only memory, is typically used for program instructions. The ROM in a microcontroller usually holds the final application program. Maskable ROM memory space that must be burned in by the manufacturer of the chip as is constructed.

3.3.3 PROM:

Programmable ROM, or PROM, started as an expensive means to prototype and test application code before burning ROM. In recent years PROM has gained popularity to the point where many developers consider it a superior alternative to burning ROM. As microcontroller applications become more specialized and complex, needs for maintenance and support rise

3.3.4 EPROM:

EPROM (erasable programmable ROM) is not volatile and is read only. Chips with EPROM have a quartz window on the chip. Direct exposure to ultra-violet radiation will erase the EPROM contents. EPROM devices typically ship with a shutter to cover the quartz window and prevent ambient UV from affecting the memory. Often the shutter is a sticker placed on the window.

3.3.5 EEPROM:

EEPROM (electrically erasable programmable ROM) devices have a significant advantage over EPROM devices as they allow selective erasing of memory sections. EEPROM devices use high voltage to erase and re-program each memory block. Some devices require an external power source to provide the voltage necessary for erasing and writing and some have an onboard pump which the chip can use to build up a charge of the required voltage.

3.3.6 Flash Memory:

Flash memory is an economical compromise between EEPROM and EPROM technology. As with EEPROM high voltage is applied to erase and rewrite flash memory. However, unlike EEPROM, you can not selectively erase portions of flash memory- you must erase the entire block as with EPROM devices. Many

special hardware and being inexpensive enough to use in quantity. Manufacturers often provide customers with microcontroller products whose ROM is loaded with a boot or configuration kernel where the application code is written into flash memory.

3.3.7 Registers:

The CPU maintains a set of registers which it uses to store information. Registers are used to control program execution and maintain intermediate values needed to perform required calculations. Some microcontrollers provide access to CPU registers for temporary storage purposes. This can be extremely dangerous as the CPU can at any time overwrite a register being used for its designated purpose. 8 bit microcontrollers do not often provide resources for register memory outside the CPU.

3.4 AT89C51 Description:

The AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash Programmable and Erasable Read Only Memory (PEROM). The device is manufactured using Atmel's high density nonvolatile memory technology and is compatible with the industry standard MCS-51™ instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer.

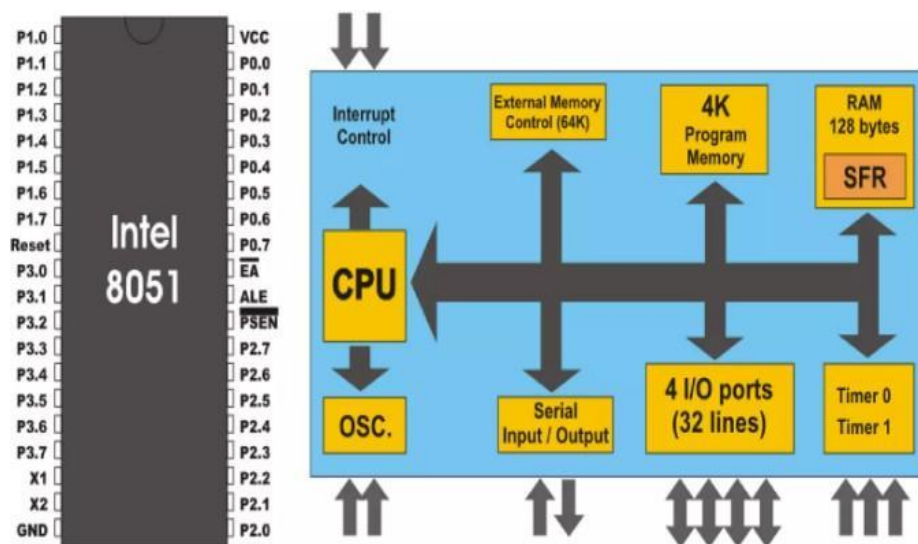


Fig. No.: -6 Pin Diagram and architecture of AT89C5

PIN DESCRIPTION

VCC

Supply voltage.

GND Ground.

Port 0

Port 0 is an 8-bit open drain bidirectional I/O port. As an output port each pin can sink eight TTL inputs. When 1s are written to port 0 pins, the pins can be used as high impedance inputs.

Port 0 may also be configured to be the multiplexed low order address/data bus during accesses to external program and data memory. In this mode PO has internal pull ups. Port 0 also receives the code bytes during Flash programming, and outputs the code bytes during program verification. External pull ups are required during program verification.

Port 1

Port 1 is an 8-bit bidirectional I/O port with internal pull ups. The Port 1 output buffers can sink/source four TTL inputs. When 1s are written to Port 1 pins they are pulled high by the internal pull ups and can be used as inputs. As inputs, Port 1 pins that are externally being pulled low will source current (IIL) because of the internal pull ups. Port 1 also receives the low-order address bytes low-order address bytes during Flash programming and verification.

Port 2

Port 2 is an 8-bit bidirectional I/O port with internal pull ups. The Port 2 output buffers can sink/source four TTL inputs. When 1s are written to Port 2 pins they are pulled high by the internal pull ups and can be used as inputs. As inputs, Port 2 pins that

ups. Port 2 emits the high-order address byte during fetches from external program memory and during accesses to external data memory that use 16-bit addresses (MOVX @DPTR). In this application it uses strong internal pull ups when emitting 1s. During accesses to external data memory that use 8-bit addresses (MOVX @RI), Port 2 emits the contents of the P2 Special Function Register. Port 2 also receives the high-order address bits and some control signals during Flash programming and verification.

Port 3

Port 3 is an 8-bit bidirectional I/O port with internal pull ups. The Port 3 output buffers can sink/source four TTL inputs. When 1s are written to Port 3 pins they are pulled high by the internal pull ups and can be used as inputs. As inputs, Port 3 pins that are externally being pulled low will source current (IIL) because of the pull ups. Port 3 also serves the functions of various special features of the AT89C51 as listed below:

RST

Reset input. A high on this pin for two machine cycles while the oscillator is running resets the device.

ALE/PROG

Address Latch Enable output pulse for latching the low byte of the address during accesses to external memory. This pin is also the program pulse input (PROG) during Flash programming. In normal operation ALE is emitted at a constant rate of 1/6 the oscillator frequency, and may be used for external timing or clocking purposes. Note, however, that one ALE pulse is skipped during each access to external Data Memory. If desired, ALE operation can be disabled by setting bit 0 of SFR location 8EH. With the bit set, ALE is active only during a MOVX or MOVC instruction. Otherwise, the pin is weakly pulled high. Setting the ALE-disable bit has no effect if the microcontroller is in external execution mode.

PSEN

Program Store Enable is the read strobe to external program memory. When the AT89C51 is executing code from external program memory, PSEN is activated twice each machine cycle, except that two PSEN activations are skipped during each access to external data memory.

EA/VPP

External Access Enable. EA must be strapped to GND in order to enable the device to fetch code from external program memory locations starting at 0000H up to FFFFH. Note, however, that if lock bit 1 is programmed, EA will be internally latched on reset. EA should be strapped to VCC for internal program executions. This pin also receives the 12-volt programming enable voltage (VPP) during Flash programming, for parts that require 12-volt VPP.

XTALI

Input to the inverting oscillator amplifier and input to the internal clock operating circuit.

XTAL2

Output from the inverting oscillator amplifier.

MEMORY SPACE ALLOCATION:

The 8051 has three very general types of memory. To effectively program the 8051 it is necessary to have a basic understanding of these memory types. The memory types are illustrated in the following graphic. They are: On-Chip Memory, External Code Memory, and External RAM.

On-chip ROM

The 89C51 has a 4K bytes of on-chip ROM. This 4K bytes ROM memory has memory addresses of 0000 to 0FFFh. Program addresses higher than 0FFFh,

automatically fetch code bytes from external memory, Code bytes can also be fetched exclusively from an external memory, addresses 0000h to FFFFh, by connecting the external access pin to ground. The program counter doesn't care where the code is: the circuit designer decides whether the code is found totally in internal ROM, totally in external ROM or in a combination of internal and external ROM.

On-chip RAM

The 1289 bytes of RAM inside the 8051 are assigned addresses 00 to 7Fh. These 128 bytes can be divided into three different groups as follows:

A total of 32 bytes from locations 00 to 1Fh are set aside for register banks and the stack.

A total of 16 bytes from locations 20h to 2Fh are set aside for bit addressable read/write memory and instructions.

A total of 80 bytes from locations 30h to 7Fh are used for read and write storage, or what is normally called a scratch pad. These 80 locations of RAM are widely used for the purpose of storing data and parameters by 8051 programmers.

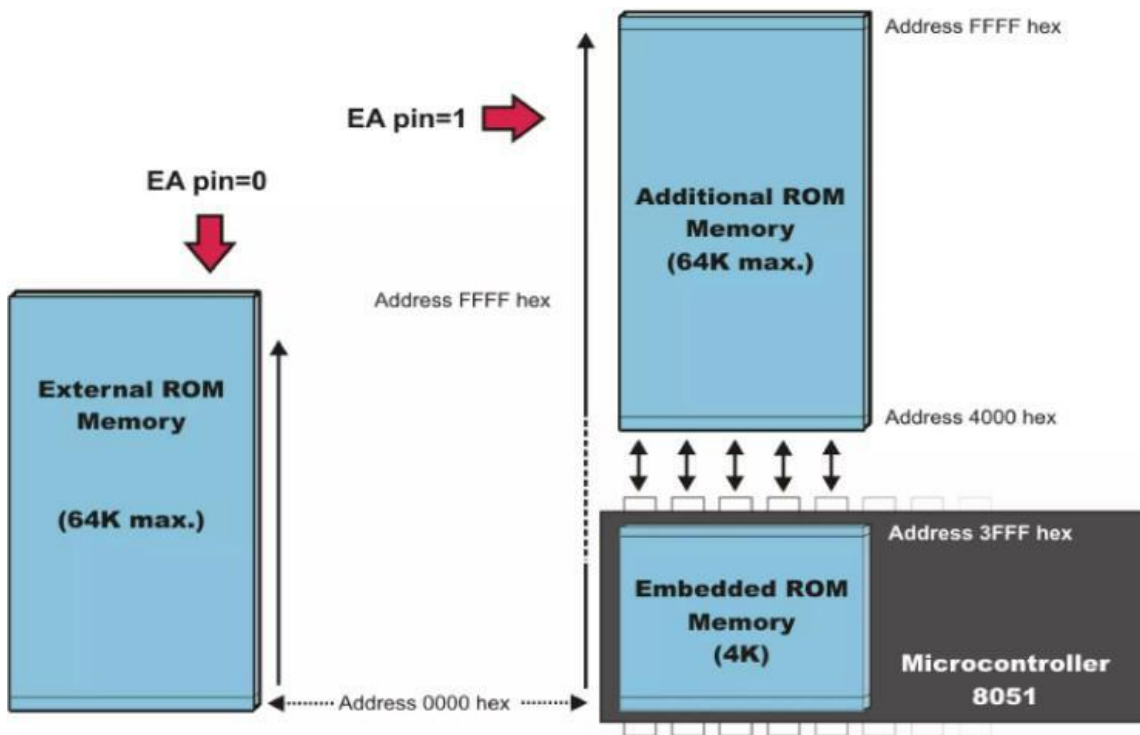


Fig. No.:7 ROM & RAM Memory is 8051 Microcontroller

External Code Memory:

External Code Memory is code (or program) memory that resides off-chip. This is often in the form of an external EPROM.

External RAM:

External RAM is RAM memory that resides off-chip. This is often in the form of standard static RAM or flash. Memory (Code, RAM, or other) that physically exists on the microcontroller itself. On-chip memory can be of several types, but we'll get into that shortly. External RAM As an obvious opposite of Internal RAM, the 8051 also supports what is called External RAM. As the name suggests, External RAM is any random access memory which is found off-chip. Since the memory is off-chip it is not as flexible in terms of accessing, and is also slower. For example, to increment an Internal RAM location by 1 requires only 1 instruction and 1 instruction cycle. To increment a 1-byte value stored in External RAM requires 4 instructions and 7 instruction cycles. In this case, external memory is 7 times slower!

Code Memory:

Code memory is the memory that holds the actual 8051 program that is to be run. This memory is limited to 64K and comes in many shapes and sizes: Code memory may be found on-chip, either burned into the microcontroller as ROM or EPROM. Code may also be stored completely off-chip in an external ROM or, more commonly, an external EPROM. Flash RAM is also another popular method of storing a program. Various combinations of these memory types may also be used--that is to say, it is possible to have 4K of code memory on-chip and 64k of code memory off-chip in an EPROM.

Registers:

In the CPU, registers are used to store information temporarily. That information could be a byte of data to be processed, or an address pointing to the data to be fetched. In the 8051 there is only one data type: 8 bits. With an 8-bit data type, any data larger than 8 bits has to be broken into 8-bit chunks before it is processed.

The most commonly used registers of the 8051 are A(accumulator), B, R0, R1, R2, R3, R4, R5, R6, R7, DPTR (data pointer) and PC (program counter). All the above registers are 8-bit registers except DPTR and the program counter. The accumulator A is used for all arithmetic and logic instructions.

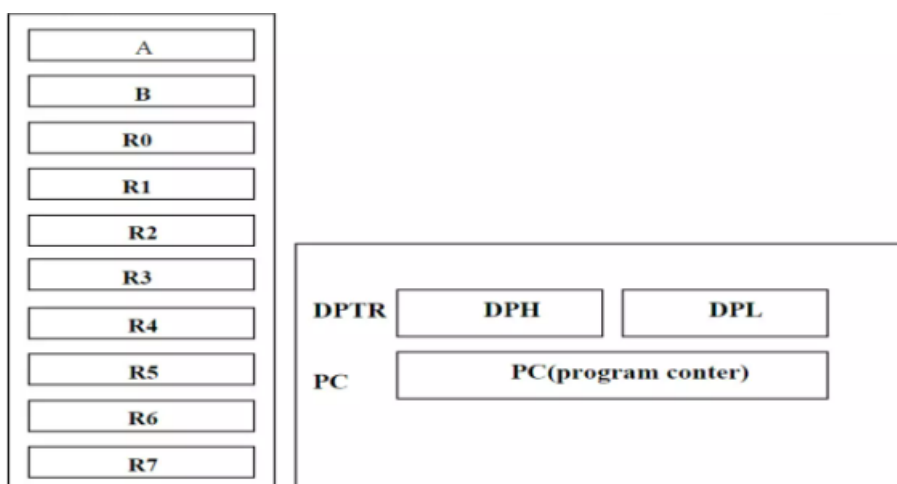


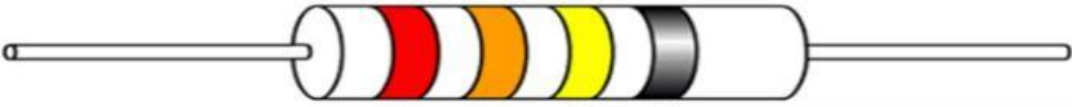
Fig. No.:-8 Some 8-bit registers & 16-bit registers

CHAPTER 4

COMPONENT DESCRIPTION

4.1 RESISTOR:

Resistors restrict the flow of electric current, for example a resistor is placed in series with a light emitting diode(LED) to limit the current passing through the LED.

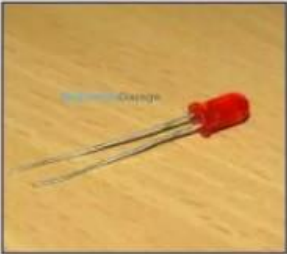


	1st Digit	2nd Digit	Multiplier	Tolerance
Black	0	0	x1	
Brown	1	1	x10	
Red	2	2	x100	
Orange	3	3	x1,000	
Yellow	4	4	x10,000	
Green	5	5	x100,000	
Blue	6	6	x1,000,000	
Violet	7	7	x10,000,000	
Gray	8	8	x100,000,000	
White	9	9	-	

Gold=5%
Silver=10%
None=20%

Fig. No.:-9 Resistor Color Coding

4.2 LED, Infrared LED,BC547,&7-Segment Display



[LED](#)

Light emitting diodes (LEDs) are semiconductor light sources.

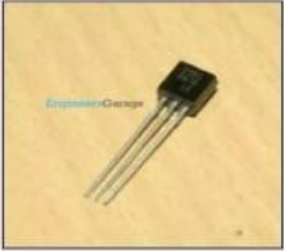
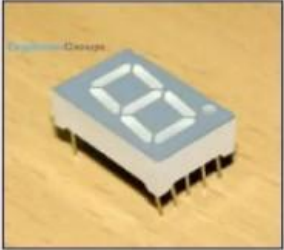
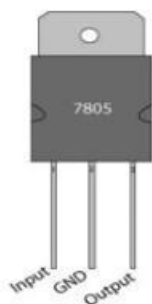
	<u>Infrared LED</u> An IR LED, also known as IR transmitter, is a special purpose <u>LED</u> that transmits infrared rays in the range of 760 nm wavelength.
	<u>Transistor BC547</u> BC547 is an NPN bi-polar junction transistor. A transistor, stands for transfer of resistance, is commonly used to amplify current.
	<u>Seven Segment Display</u> A seven segment display is the most basic electronic display device that can display digits from 0-9. They find wide application in devices that display numeric information like digital clocks, radio, microwave ovens etc.

Fig .No.:-10 LED , Infrared LED, BC547,7-Segment Display

4.3 IC 7805 (Voltage Regulator IC)

7805 is a **voltage regulator** integrated circuit. It is a member of 78xx series of fixed linear voltage regulator ICs. The voltage source in a circuit may have fluctuations and would not give the fixed voltage output. The **voltage regulator IC** maintains the output voltage at a constant value. The xx in 78xx indicates the fixed output voltage it is designed to provide. 7805 provides +5V regulated power supply. Capacitors of suitable values can be connected at input and output pins depending upon the respective voltage levels.

Pin Description:



Pin No	Function	Name
1	Input voltage (5V-18V)	Input
2	Ground (0V)	Ground
3	Regulated output; 5V (4.8V-5.2V)	Output

Fig.11 7805 IC

Table 2.Pin Description of 7805

CHAPTER 5

BIDIRECTIONAL VISITOR COUNTER & HOME AUTOMATION

5.1 PROJECT OVERVIEW

This Project "Bi-directional Visitor Counter and Home Automation" using Microcontroller is a reliable circuit that takes over the task of controlling the room lights as well as counting number of persons/ visitors in the room very accurately. When somebody enters into the room then the counter is incremented by one and the light in the room will be switched ON and when any one leaves the room then the counter is decremented by one. The light will be only switched OFF until all the persons in the room go out. The total number of persons inside the room is also displayed on the seven segment displays.

The microcontroller does the above job. It receives the signals from the sensors, and this signal is operated under the control of software which is stored in ROM. Microcontroller AT89S52 continuously monitor the Infrared Receivers, When any object pass through the IR Receiver's then the IR Rays falling on the receiver are obstructed, this obstruction is sensed by the Microcontroller.

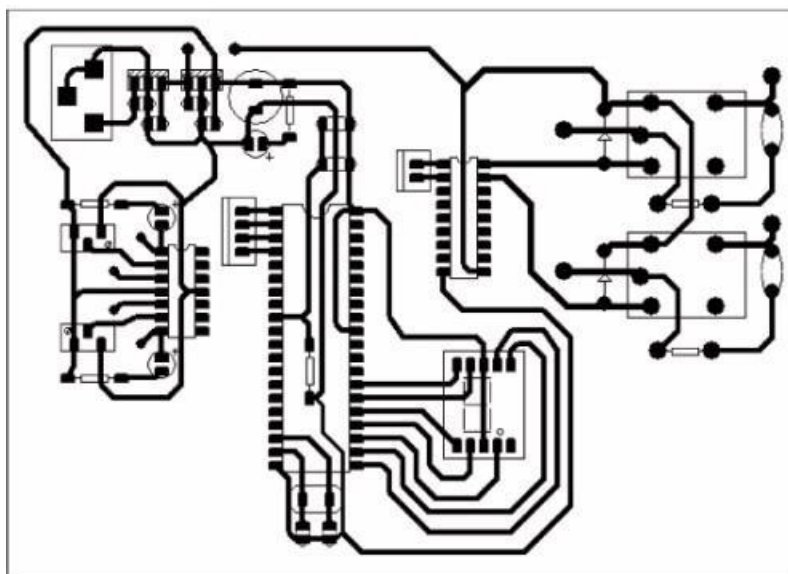


Fig. No.:-12 PCB Layout Of BDVC



Fig. No.:-13 Circuit Description

5.2 Circuit Components:

- 5 Resistor of 330 ohms
- Variable Resistor of 20 Kohms
- Variable Resistor of 50Kohms
- Electrolytic Capacitor
- 4 Ceramic Capacitor 104
- Ceramic Capacitor 33 p
- 11.0592 MHz crystal Oscillator
- AT89552
- 7805
- 7812
- LED
- Reset Key
- Relay
- ULN2803 Relay Driver IC
- LM324 IC
- IR LED
- IR Phototransistor

5.3 Circuit Design:

The heart of the circuit design lies in designing the microcontroller interface. Here we use the microcontroller AT89552. The microcontroller ATX9S52 is interfaced to the IR sensor pairs at two ports pins-P1.0 and P1.1 respectively. The 7 segment display is interfaced to the microcontroller at port P2. Another important aspect of the design involves designing the oscillator circuit and the reset circuit. The oscillator circuit is designed by selecting a 11.0592MHz quartz crystal and two ceramic capacitors- each 33pF.

5.4 Operation:

When the system is powered, the compiler initially initializes the stack pointer and all other variables. It then scans the input ports (PortP10 first). In the meantime, when there is no interruption between the IR LED and the phototransistor of the first sensor pair, the output of the phototransistor is always at low voltage. In other words port P10 is at logic low level. Now when a tramite takes place, a logic high level is received at port P10, the compiler sees this as an interruption to sense the presence of a person or an object between the IR LED and the phototransistor. As per the program, the count value is increased and this value is displayed on the Counter. Now the compiler starts scanning the other input pins-P1.1. Similar to the first sensor pair, for this sensor pair also the phototransistor conducts in absence of any interruption and P1.1 is at logic low level. In case of an interruption, the pin P1.1 goes high and this interruption is perceived by decreasing the value of count. The program ensures that the scanning of both the port pins is done at certain delays so as to avoid confusion of reading. For instance port P1.0 is scanned for two or three interruptions so as to ensure the count value is above 1 or 2.

5.5 Applications:

1. This circuit can be used domestically to get an indication of number of persons entering a party.
2. It can be used at official meetings.
3. It can be used at homes and other places to keep a check on the number of

5.6 Limitations:

1. It is a theoretical circuit and may require few changes in practical implementation.
2. It is a low range circuit and cannot be implemented at large areas.
3. With frequent change in the count value, after a certain time the output may look confusing.

CHAPTER 6

CONCLUSION

Introduction:

This part of the report describe the overall result and conclusion made during the training period.

6.1 Lessons Learned:

- Basics of Embedded System
- Medium Level circuit designing involving microcontroller
- Fault Diagnosis in circuit
- PCB designing and embedded C programming
- Introduction of various electronics component

6.2 Key Learning:

- Enhancement in technical knowledge
- Work experience with professional
- . Industrial Exposure

6.3 Knowledge Gained:

The training at CMC Academy, Jaipur provided me an insight on embedded system technology and recent trends in industry. This training also helped me in my overall personality development by interaction with many trainees and the staff members. It provided me Industrial Exposure, and the working experience with real life professionals which will certainly help me in my career ahead.

Suitability of Organization:

The organization is suitable for any product based on an embedded system. The whole staff is very co- operative. This organization provides a healthy environment for trines that help them to develop a sense of professionalism in relation to job skills and performance.

6.4 INTERNSHIP COMPLETION CERTIFICATE

info@codebindtechnologies.com
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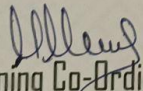
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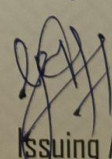
This certificate is awarded to **Mr/Ms. SATYA PRAKASH**, for the successful completion of **Internship in Embedded Systems** at **CodeBind Technologies, Chennai** from **15th May 2023** to **19th May 2023**.

During the course of the internship **Mr/Ms. SATYA PRAKASH**, exhibited an enthusiastic attitude for learning in addition to being quite industrious and dependable.

We are extremely satisfied with the candidate's performance and would like to wish them very success in their future endeavors.


Training Co-Ordinator




Issuing Authority



★★★★★

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