JOURNAL OF MADENAT ALELEM COLLEGE

REFEREED SCIENTIFIC JOURNAL Published
by the University College of Madenat al-elem , Iraq , Baghdad , AlKadmyia

Vol:3 No:2 year: 2011 ISSN: 2073-2295

كلية مدينة العلم الجامعة

Madenat Alel em Uni versity College

مجلة كلية مدينة العلم

العراق - بغداد - الكاظمية المقدسة

Journal of Madenat Al-elem College
(JMAC)

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Articles need to contain the following items:

- Abstract in English and Arabic not more than 300 words.
- Article includes the following items: Introduction, Materials and Methods, Results and Discussion, Conclusion and References.
- References should be numbered in the text according to the sequence appeared in the text and listed in order.
- Tables and figures should be appropriately titled with size not exceed an A4 page.

The editor reserve the right to refuse or accept any article submitted.

Contents

Design a Programmable Sequence Controller Utilizing I2C BUS

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Abstract

New technology makes possible to manufacturing a better type of programmable micro-system. Recently, Chip with the CPU, RAM, ROM, TIMERS, UARTS, and PORTS is available, these type of chip called microcontroller. Microcontroller/ Microprocessor is a programmable device, that means the device execute a loaded program sequentially from top to down (End of program). This type of controller suffering from non retain last state problem, At any time the electrical power is turned off , the Microcontroller/Microprocessor will start from initial state after power is turned on, losing all intermediate states. If this problem will be solved, it might be the Microcontroller/Microprocessor used as programmable sequence controller efficiently.

This paper provides a design of sequence controller based on a microcontroller utilizing Serial Electrical Erasable Read Only Memory (SEEPROM) to save the status of process event sequentially . Serial EEPROM is interfaced to the microcontroller via I2C serial BUS, which is a two wire bus using special protocol to transfer data between microcontroller and serial memory. The sequencer will provided with MINI keypad to select the pre-defined time interval through scrolling UP and DOWN the interval values which is monitor in LCD display. This design had been manufactured and tested by controlling the medical syringe process for long time without serious problem.

1.0- Introduction

Single- chip microcontrollers are devices designed for use in products that usually are not considered computers, but that require the sophisticated and flexible control that a computer can provide. An example of such product is an automatic washing machine. In contrast to microprocessor, microcontrollers typically integrated RAM, ROM, and I/O, logic circuits designed to do specific tasks such as **U**niversal **A**synchronous **R**eceiver **T**ransmitter (UART), Serial port RS232 and square-wave oscillator (clock), as well as the CPU, onto the same chip. A microcontroller is a computer with most of the necessary support chips onboard.

There are a number of other common characteristics that define microcontrollers. If a micro system matches a majority of these characteristics, then it can be classified as a 'Microcontroller'. Microcontrollers may be: 'Embedded' inside some other device (often a consumer product) so that they can control the features or actions of the product. Another name for a microcontroller is therefore an '*Embedded controller'*. Dedicated to one task and run one specific program. The program is stored in ROM and generally does not change. A microcontroller may take an input from the device it is controlling and controls the device by sending signals to different components in the device. Most microcontroller circuits are small and low cost compared with microprocessor circuits, the components may be chosen to minimize size and to be as inexpensive as possible. The actual processor used to implement a microcontroller can vary widely. In many products, such as microwave ovens, the demand on the CPU is fairly low and price is an important consideration. In these cases, manufacturers turn to dedicated microcontroller chips – devices that were originally designed to be low-cost, small, low-power, embedded CPUs. The Motorola 6811 and Intel 8051 are both good examples of such chips [1].

The predominant family of microcontrollers is 8-bit types since this word size has proved popular for the vast majority of tasks the devices have been required to perform. The single byte word is regarded as sufficient for most purposes and has the advantage of easy to interface with the variety of IC memories and logic circuitry currently available. The microcontroller family would have a common instruction subset but family members differ in the amount, and type, of memory, timer facility, port options, etc. possessed, thus producing cost-effective devices suitable for particular manufacturing requirements. Memory expansion is possible with off chip RAM and/or ROM; for some family members there is no on-chip ROM, or the ROM is either electrically programmable ROM (EPROM) or electrically erasable

PROM (EEPROM) known as flash EEPROM which allows for the program to be erased and rewritten many times. Additional on-chip facilities could include analogue-to-digital conversion (ADC), digital-to-analogue conversion (DAC) and analogue comparators. Some family members include versions with lower pin count for more basic applications to minimize costs. Since the microcontroller 8051 could not support I2C devices, software has been written to enable the microcontroller to handle this type of communication.[2]

1.1- Hardware Overview

The AT89C52 is a low-power, high-performance **C**omplement **M**etal **O**xide **S**emiconductor (CMOS) 8-bit microcomputer with 8K bytes of Flash electrical erasable and programmable read only memory (EEPROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 and 80C52 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C52 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.

The AT89C52 provides the following standard features: 8Kbytes of Flash, 256 bytes of RAM, 32 I/O lines, three 16-bits timer/counters, a six-vector two-level interrupt architecture, a full-duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89C52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions
until the next hardware reset. The AT89C52 has four bi-directional ports designated as P0, P1, P2, and P3 The block diagram of 8052 microcontroller architecture is shown in Figure1. The 8051 could not support I2C devices like serial memories SEEPROM [3].

1.2 Inter integrated circuit (IIC or I2C) Bus

Commonly referred to as I squared C, the I2C bus or IIC bus was originally developed as a control bus for linking microcontroller and peripheral ICs. The simplicity of a 2-wire bus that combined both address and data bus functions was quickly adopted in many applications such as :

- Telecommunications
- Automotive dashboards
- Energy management systems

- Control and measurement products
- Medical equipment

This method of serial data transmission uses two lines, one for a serial clock (SCL) and the other for serial data (SDA). The SDA line is bi-directional, i.e. data can go up it or down it [4].

1.2.1 The Physical I2C Bus

As mentioned earlier, I2C bus is two wires, called SCL and SDA. SCL is the clock line. It is used to synchronize all data transfers over the I2C bus. SDA is the data line. The SCL & SDA lines are connected to all devices on the I2C bus. There needs to be a third wire which is just the ground or 0 volts. There may also be a 5volt wire is power is being distributed to the devices.

SCL and SDA lines are "open drain/ collector" drivers. What this means is that the chip can drive its output low, but it cannot drive it high. For the line to be able to go high you must provide pull-up resistors to the 5v supply. There should be a resistor from the SCL line to the 5v line and another from the SDA line to the 5v line. One set of pull-up resistors for the whole I2C bus is the only that need, not for each device, as illustrated in Figure2 shown below. The value of the resistors is not critical. It is range from 1k8 (1800 ohms) to 4k7 (47000 ohms) used. 1k8, 4k7 and 10k are common values, but anything in this range should work OK. It is recommended 1k8 as this gives you the best performance. If the resistors are missing, the SCL and SDA lines will always be low - nearly 0 volts - and the I2C bus will not work.

The devices on the I2C bus are either masters or slaves. The master is always the device that drives the SCL clock line. The slaves are the devices that respond to the master. A slave cannot initiate a transfer over the I2C bus, only a master can do that. There can be, and usually are, multiple slaves on the I2C bus, however there is normally only one master. It is possible to have multiple masters. Slaves will never initiate a transfer. Both master and slave can transfer data over the I2C bus, but that transfer is always controlled by the master[5].

1.2.2 TheI2C Protocol

When the master (your controller) wishes to talk to a slave (our Serial EEPROM in this case) it begins by issuing a start sequence on the I2C bus. A start sequence is one of two special sequences defined for the I2C bus, the other being the stop sequence. The start sequence and stop sequence are special in that these are the only places where the SDA (data line) is allowed to change while the SCL (clock line) is high. When data is being transferred, SDA must remain stable and not change whilst SCL is high as shown in Figure

3. The start and stop sequences mark the beginning and end of a transaction with the slave device.

Data is transferred in sequences of 8 bits. The bits are placed on the SDA line starting with the MSB (Most Significant Bit). The SCL line is then pulsed high, then low. For every 8 bits transferred, the device receiving the data sends back an acknowledge bit, so there are actually 9 SCL clock pulses to transfer each 8 bit byte of data. If the receiving device sends back a low ACK bit, then it has received the data and is ready to accept another byte. If it sends back a high then it is indicating it cannot accept any further data and the master should terminate the transfer by sending a stop sequence [4].

The standard clock (SCL) speed for I2C up to 100KHz. Philips do define faster speeds: Fast mode, which is up to 400KHz and High Speed mode which is up to 3.4MHz. All of our modules are designed to work at up to 100 KHz. We have tested our modules up to 1MHz but this needs a small delay of a few µsec between each byte transferred.

1.2.3 I2C Device Addressing

All I2C addresses are either 7 bits or 10 bits. The use of 10 bit addresses is rare and is not covered here. All of our modules and the common chips will have 7 bit addresses. This means that up to 128 devices can be connected on the I2C bus, since a 7bit number can be from 0 to 127. When sending out the 7 bit address, it still always needs to send 8 bits. The extra bit is used to inform the slave if the master is writing to or reading from it. If the bit is zero, the master is writing to the slave. If the bit is 1 the master is reading from the slave. The 7 bit address is placed in the upper 7 bits of the byte and the Read/Write (R/W) bit is in the LSB (Least Significant Bit). The placement of the 7 bit address in the upper 7 bits of the byte is a source of confusion for the newcomer. For example, to write to address 21, must actually send out 42 which is 21 moved over by 1 bit left. It is probably easier to think of the I2C bus addresses as 8 bit addresses, with even addresses as write only, and the odd addresses as the read address for the same device. Figure 4a shows the format of device address [5].

1.2.4- Data transfer sequence

A basic Master to slave read or write sequence for I2C follows the following order:

1. Send the START bit (S).
2. Send the slave address (ADDR).
3. Send the Read(R)-1 / Write (W)-0 bit.
4. Wait for/Send an acknowledge bit (A).
5. Send/Receive the data byte (8 bits) (DATA).
6. Expect/Send acknowledge bit (A).
7. Send STOP bit (P).

Note: It could be use 7 bit or 10 bit addresses.

The sequence 5 and 6 can be repeated so that a multi byte block can be read or written.

1.2.5- Data Transfer from master to slave

A master device sends the sequence of signal with START, ADDRESS, and WRITE protocol , then waits for an acknowledge bit (A) from the slave which the slave will only generate if its internal address matches the value sent by the master. If this happens then the master sends DATA and waits for acknowledge (A) from the slave. The master completes the byte transfer by generating a stop bit (P) (or repeated start).

Figure 4b shows the protocol of data transfer from master [4].

1.2.6-Data transfer from slave to master

A similar process happens when a master reads from the slave but in this case, instead of W, R is sent. After the data is transmitted from the slave to the master, the **master** sends the acknowledge signal (A). If instead the master does not want any more data it must send a not-acknowledge which indicates to the slave that it should release the bus. This lets the master send the STOP or repeated START signal. Figure4c shows the protocol of data transfer to master [4]

2 -Materials and Methods

The serial EEPROM supports a bidirectional two wire bus and data transmission protocol. A device that send data onto the bus is defined as transmitter, and a device receiving data as receiver. The bus has to be controlled by a master device which generates the serial clock (SCL), controls the bus access, and generates the START and STOP conditions, while the serial EEPROM works as slave. Both master and slave can operate as transmitter or receiver but the master device determines which mode is activated, up to eight 1Kb/2Kb serial EEPROM can be connected to the bus, selected by the A0, A1 and A2 chip address inputs.

The interfacing of 2K byte serial EEPROM with microcontroller is shown in Figure5. The memory chip address inputs A0, A1 and A2 of serial EEPROM must be externally connected to either VCC or ground (VSS), assigning to each 24C01A/02A/04A a unique programmable address. Up to eight 24C01A or 24C02A devices and up to four 24C04A devices may be connected to the bus. Chip selection is then accomplished through software by setting the bits A0, A1 and A2 of the programmable slave address to the corresponding hard-wired logic levels of the selected 24C01A/02A/04A. After generating a START condition, the bus master transmits the slave fixed address consisting of a 4-bit device code (1010) for the 24C01A/02A/04A, followed by the programmable chip address bits A0, A1 and A2. SDA and SCL lines are

connected to port0.0 and port0.1 via a pull up resistor 5KΩ [6].

2.1-Controller Design[ ]

The design of programmable system normally is consisting of two parts. The first part is concerning with the hardware design, while the second part is concerning with the software design. The complexity and cost of each part are the factors that the designer will decide in which way where have to emphasis. In this project it is emphasized on software since the 8051 microcontroller is not I2C support [7].

2.1.1 Hardware Design

Many of the applications of microcontroller fall into two categories: Open-Loop or Closed-Loop control systems. Open loop, often called sequential control, is used in applications where the process or device being controlled is characterized by a sequence of state. That is, the application is ***event- driven***. An example is a automatic washing machine or vending machine that accept various value coins, recognizes product, selection, vends the product, finds the price, and returns the correct change.

Closed-loop control is characterized by the use of real-time monitoring of process to achieve effectively continuous control. The output of the process is monitored using various transducers and A/D converters and the process is modified continuously [7].

In this application, an event sequential controller is designed; ten sequential external events are controlled according to verification of 8 conditions as shown in Figure 6 below. Port 0 is configured as output port and is used to drive 8 different processes; port 2 is used to display the status of above process. Port 1 and p3.0 – p3.2 and p3.7 are configured as input port that is used to monitor the process conditions. Logic 0 is considered as active logic of port 0 to avoid the glitches (jitter) on this port during RESET or after turn the controller ON. Octal inverter (open collector type) is used to drive a relay bank driver. Serial EPROM of 2 Kb is used to save the last state which has been served before the Electrical power is off. This memory chip is interfaced to microcontroller through ports P2.0 and P2.1 via pull up resistors, Serial **D**ata (SDA)**,** which is a bidirectional signal, and **C**lock (SCL) signal are connected to P2.1 and P2.0 respectively [8].

2.1.2 - Software Design

The function of main program is to read the content of serial EEPROM to find the status of the controller was before power shutdown or system reset by reading state number, then the program execute the pre-fetching state. Before transferring to execute next state, the program updates the serial EEPROM by writing the executing state number. When the jumper switch throws to maintenance position, then the program check the all state sequentially from state 1 up to state 10 each time pressing the push button at P3.6 pin [9].

Event sequential process controller is a process variable dependent. This type of process is performing the specific function continuously until the process variable is true, at this case the controller enforce the process to jump to and execute a next state and so on up to the end of all process state. The second type is time sequential process, which is time depending process. This means that the execution of process is depending on a pre-defined time period until time reach zero. At this point, the controller enforces the process to jump and execute next state and so on up to the end of all state. The first type of sequential controller is taken into consideration during this research. The software have not been used the interrupt feature of microcontroller, so it is not necessary to enable the interrupt system of microcontroller [10]. The software is designed in module structure, which is a main program and many subroutines are invoked by it. The flow chart of main program is shown in Figure 7.

The following is the subroutine that are invoked by main program, all subroutines have a common feature that are returned a carry flag CY which indicate the statues of writing into or readings from serial memory SEEPROM.

READ STAGE NO:

Read from a specific serial EEPROM location with stage number. Return CY=1 to indicate write time over. **REDBYT** subroutine is invoked by this routine. This routine is repeated 5 times to insure correct reading of serial EEPROM Registers A and B are destroyed. The flow chart is shown in figure 8

REDBYT: Serial EEPROM Random Read Function**,** called with programmable address in A. Byte address in R2 return data in A. Return CY, if CY=1, it indicates that the bus is not available or that the addressed device failed to acknowledge. Three **s**ubroutines, **SHOUT, REDCRNT,** and **START,** are invoked by this routine . Registers A,B and R2 are used . The flow chart is shown in figure 8**.**

WRITE STAGE NO:

Write into a specific serial EEPROM location with stage number. Return CY=1 to indicate write time over. **WRITBYT** subroutine is invoked by this routine . This routine is repeated 5 times to

insure correct writing into serial EEPROM. Registers A and B are destroyed. The flow chart is shown in figure 9

WRITBYT: Serial EEPROM Byte Write function. Call with programmable address in A, Data in register R1. Return CY =1, it indicates that the bus is not available or the addressed device failed to acknowledge. Two subroutines, **START and SHOUT,** are invoked by this routine.
A is destroyed. The flow chart is shown in figure 9.

START: This routine is recalled in REDBYT and WRITBYT routines. It is sending a START signal, define as high – to – low SDA with SCL high. Return with SCL, SDA low. CY=1, the bus is not available. Non of registers are used The flow chart is shown in figure 11.

SHOUT: This routine is recalled in REDBYT and WRITBYT routines. Its function is to shift out a byte to the serial EEPROM, most significant bit **MSB** first. SCL and SDA expected low on entry. Return with SCL low, A is holding data . A reg. will destroy. The flow chart is shown in figure 10

REDCRNT: This routine is recalled in REDBYT routine. The function of this subroutine is to read programmable address, call with programmable address in A. Return data in A and CY. If CY=1, then it indicates that the bus is not available or the addressed device failed to acknowledge. **SHIN** subroutine is invoked. The flow chart is shown in figure 10

SHIN: This subroutine is recalled in REDCRNT routine**.** The function of this subroutine is to shift in a byte from the SEEPROM, most significant bit **MSB** first. SCL expected low on entry. Return with SCL low. Returns received data byte in A. The flow chart is shown in figure 11

3.0 – Conclusion and Discussion

A microcontroller with serial EEPROM and suitable program had been constructed as PCB card as shown in photograph (Figure12) and put into real

test. A medical syringe manufacturing plant had been controlled by this controller. It was running for more than 6 months without any malfunction or snakes.

A microcontroller is a specialized form of microprocessor that is designed to be self-sufficient and cost-effective, where a microprocessor is typically designed to be general purpose (the kind used in a PC). Microcontrollers are frequently found in automobiles, office machines, toys, and appliances. Also, a microcontroller is part of an embedded system, which is essentially the whole circuit board. The difference is that microcontroller incorporates features of microprocessor (CPU, ALU, Registers) along with the presence of added features like presence of RAM,ROM,I\O ports, counter etc. Here microcontroller control the operation of machine using fixed program stored in ROM that doesn't change with lifetime. The advantages of microcontroller over microprocessor are low cost to manufacture, easy to implement, and fast compare with microprocessor. Atmel 89S52 microcontroller has a substantial advantage over Atmel 89C52 in term of programming. 89S52 chip has in circuit programming features, so it is not need to an external programmer. Unfortunately, this chip is not available in our local market, so 89C52 microcontroller has been used as a fait accomplice.

A programmable sequential controller card as shown in Figure10 based on 89c52 microcontroller was built and tested. This card was substituted a big size control board which contain a huge number of relays and rotary sequencer. This controller had been put into real operation in sterilization of medical injection process for more than year without any serious problem, only one malfunction of the controller happened during this period due to spike happened in electrical power supply network. This causes to damage the serial EEPROM. This controller could be used in many home appliances such as washing machine both for dishes or clothing. Cooling / heating system and etc.

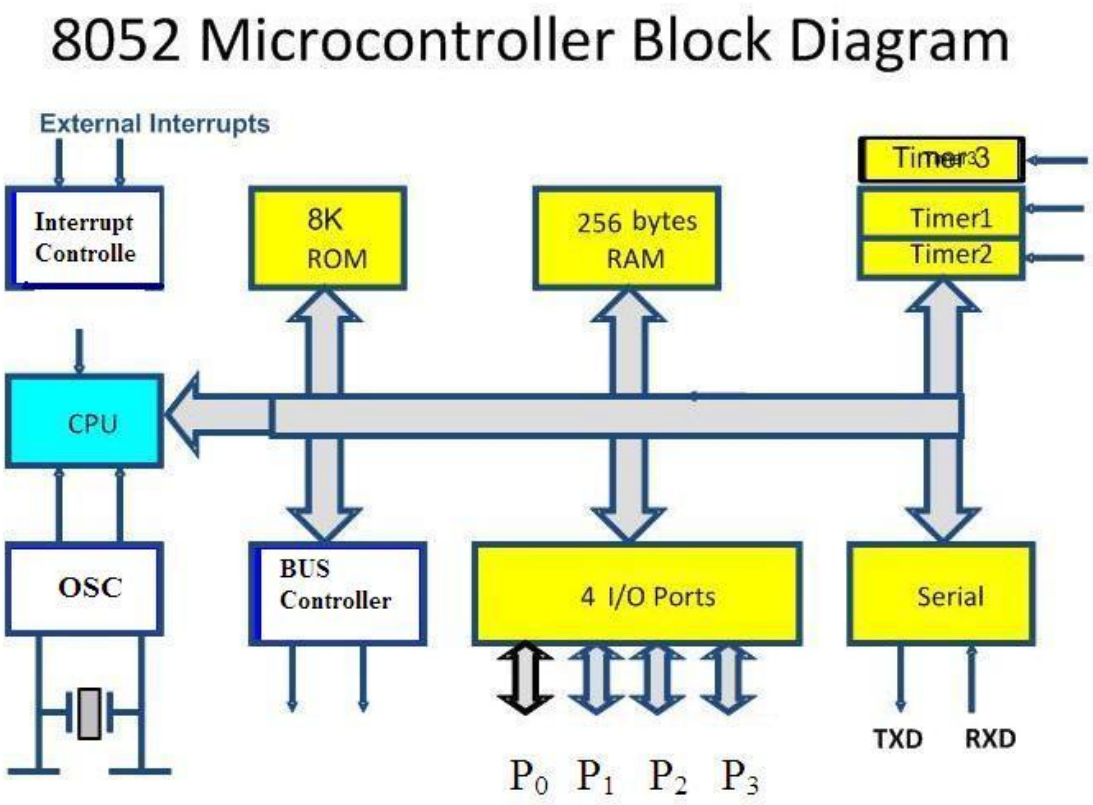


Figure 1 Block diagram of 8052 Hardware Architecture

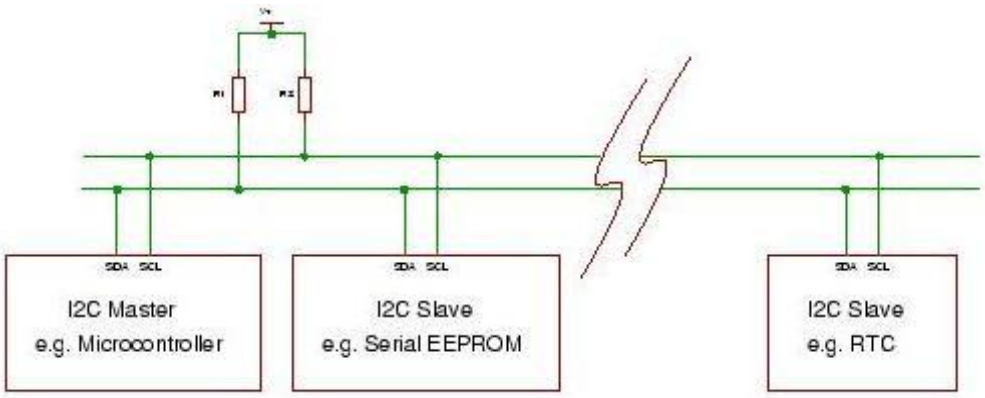


Figure 2 Interfacing Serial EEPROM withI2C

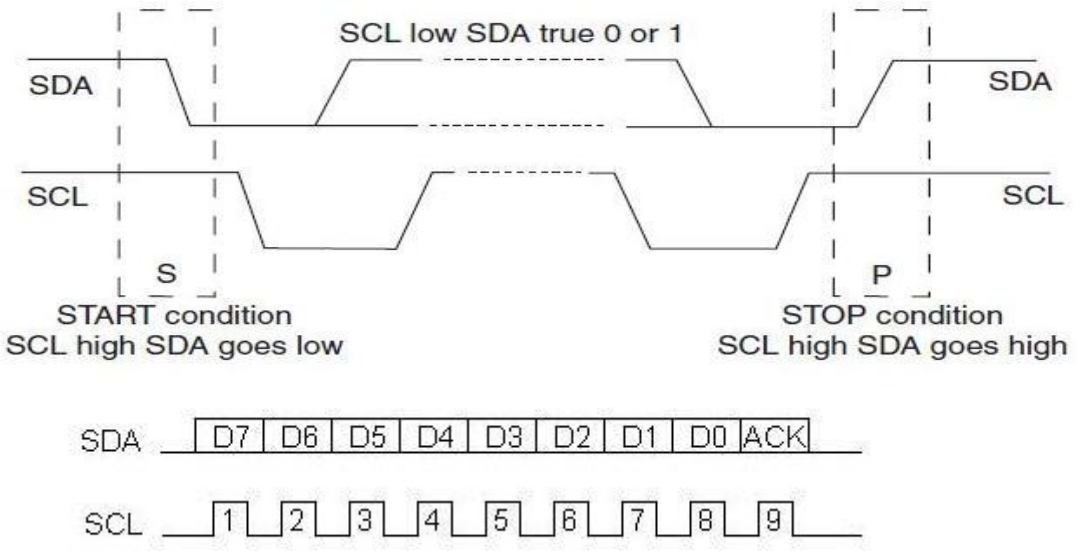
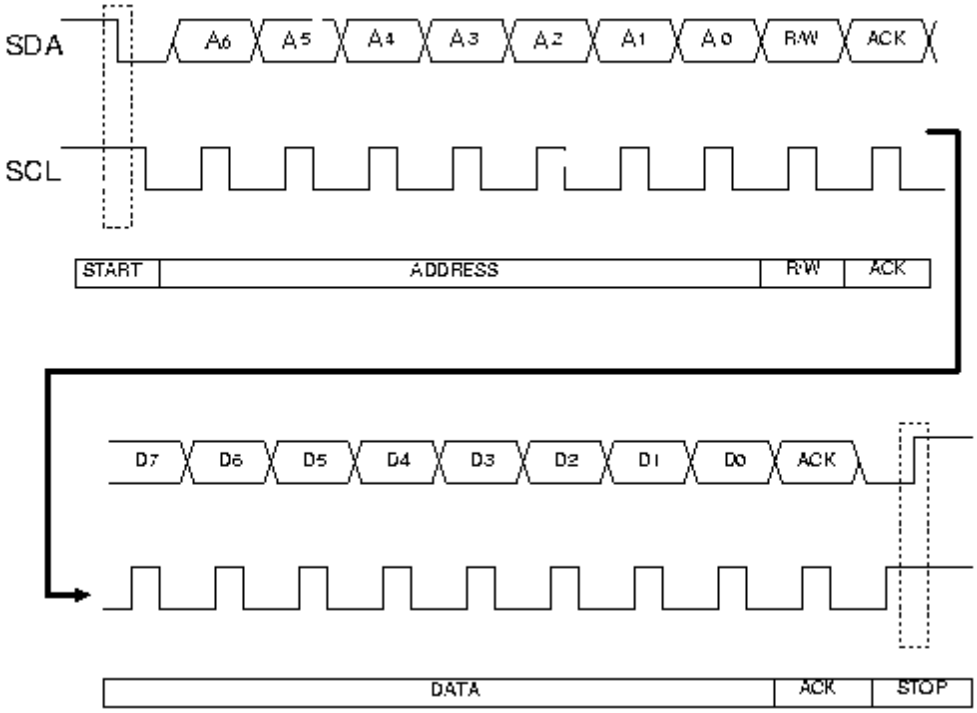
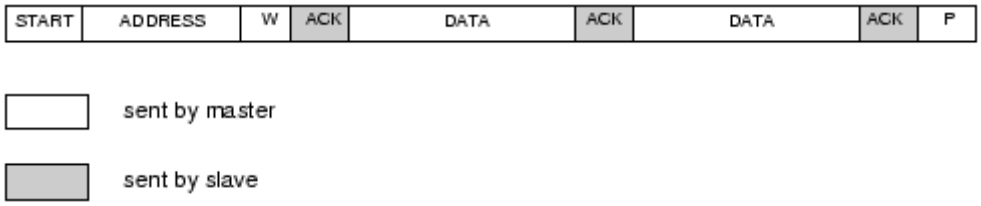


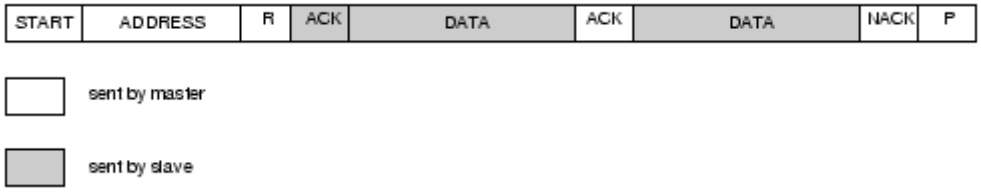
Figure 3 Timing diagram of I2C



(a) Typical SDA and SCL Signals and address format



(b) Data transfer from master protocol



(c) Data transfer to master protocol

Figure 4

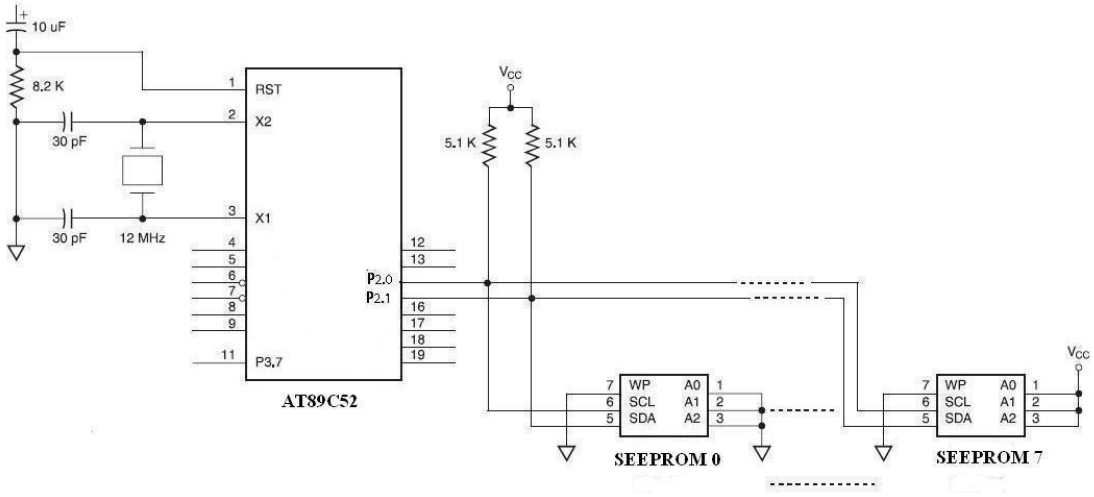


Figure 5 Multi Serial EEPROM(SEEPROM) interfacing

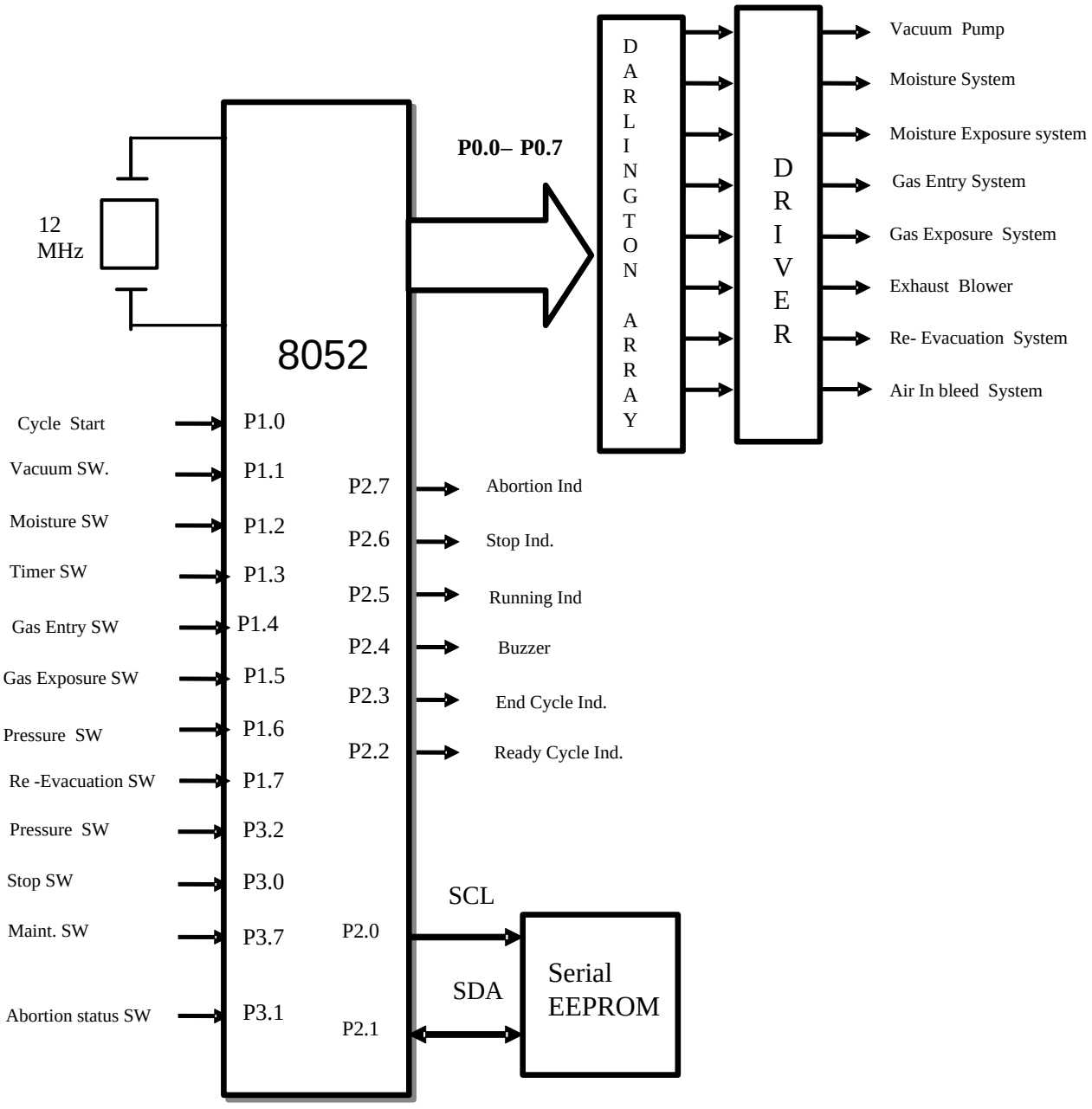


Figure 6 Event sequential controller

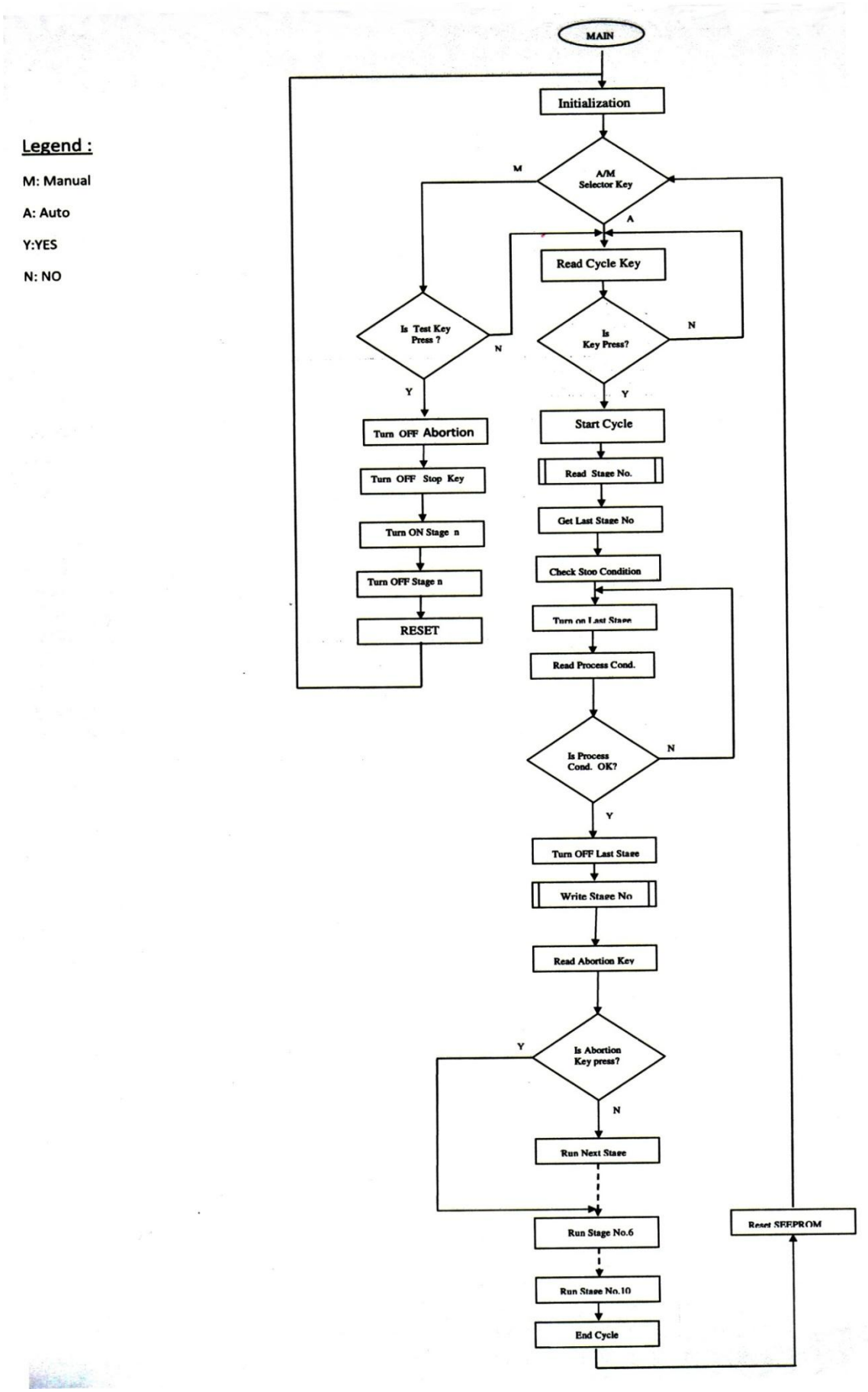

Legend :
M: Manual
A: Auto
Y:YES
N: NO
MAIN
Initialization
A/M Selector Key
M
A
Read Cycle Key
Is Test Key Press ?
N
Y
Turn OFF Abortion
Turn OFF Stop Key
Turn ON Stage n
Turn OFF Stage n
RESET
Is Key Press?
N
Y
Start Cycle
Read Stage No.
Get Last Stage No
Check Stop Condition
Turn on Last Stage
Read Process Cond.
Is Process Cond. OK?
N
Y
Turn OFF Last Stage
Write Stage No
Read Abortion Key
Is Abortion Key press?
Y
N
Run Next Stage
Run Stage No.6
Run Stage No.10
End Cycle
Reset SEEPROM

Figure 7

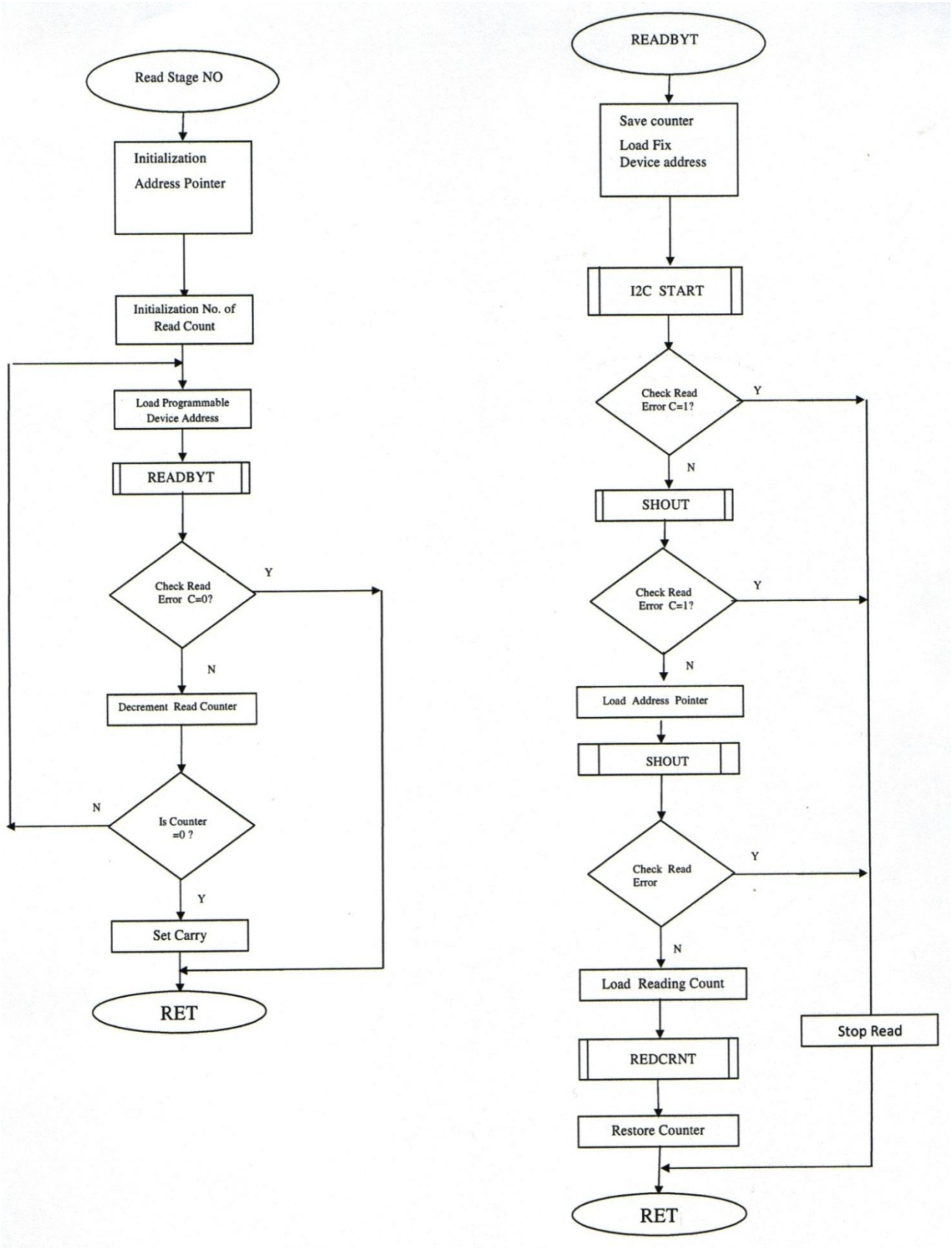

Read Stage NO
Initialization
Address Pointer
Initialization No. of
Read Count
Load Programmable
Device Address
READBYT
Check Read
Error C=0?
Y
N
Decrement Read Counter
Is Counter
=0 ?
N
Y
Set Carry
RET
READBYT
Save counter
Load Fix
Device address
I2C START
Check Read
Error C=1?
Y
N
SHOUT
Check Read
Error C=1?
Y
N
Load Address Pointer
SHOUT
Check Read
Error
Y
N
Load Reading Count
REDCRNT
Restore Counter
Stop Read
RET

Figure 8

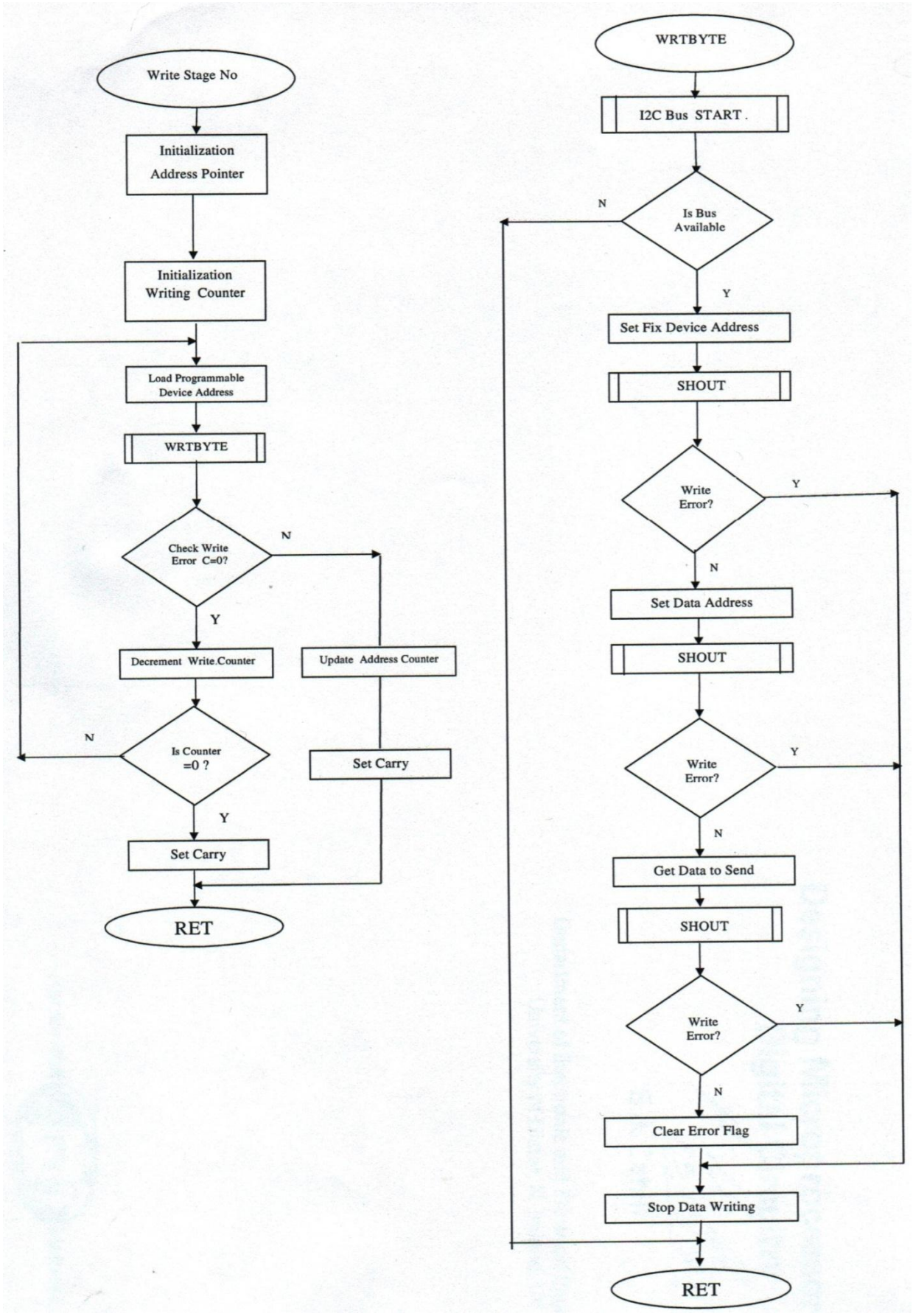
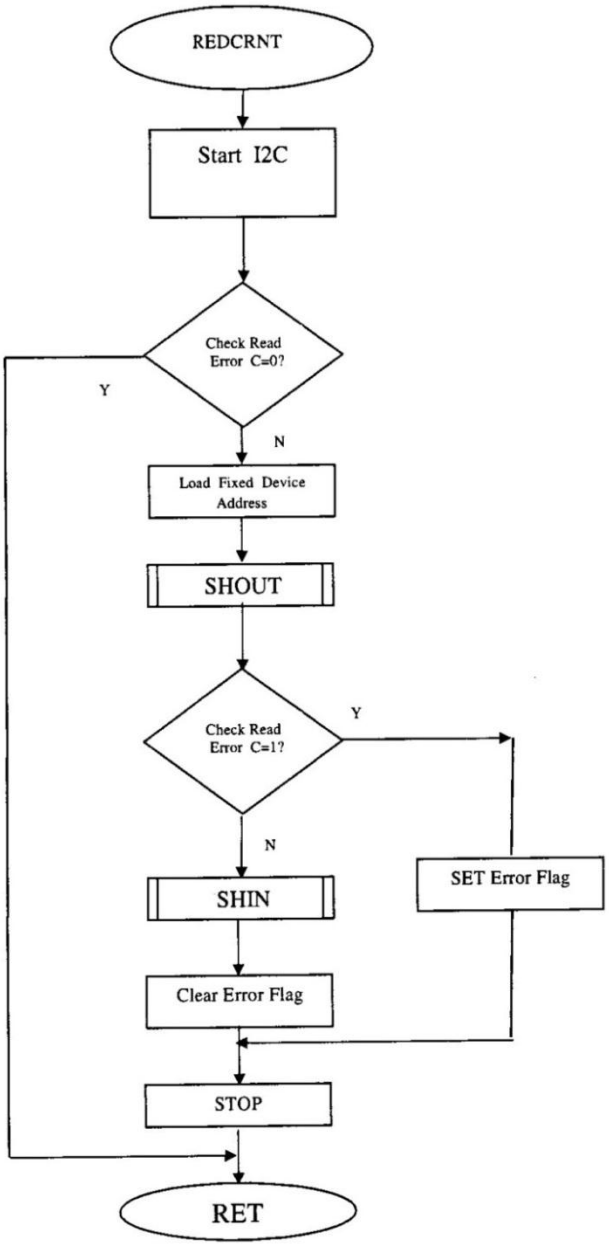

Write Stage No
Initialization
Address Pointer
Initialization
Writing Counter
Load Programmable
Device Address
WRTBYTE
Check Write
Error C=0?
N
Y
Decrement Write.Counter
Update Address Counter
Is Counter
=0 ?
N
Y
Set Carry
Set Carry
RET
WRTBYTE
I2C Bus START .
Is Bus
Available
N
Y
Set Fix Device Address
SHOUT
Write
Error?
Y
N
Set Data Address
SHOUT
Write
Error?
Y
N
Get Data to Send
SHOUT
Write
Error?
Y
N
Clear Error Flag
Stop Data Writing
RET

Figure 9


REDCRNT
Start I2C
Check Read Error C=0?
Y
N
Load Fixed Device Address
SHOUT
Check Read Error C=1?
Y
N
SET Error Flag
SHIN
Clear Error Flag
STOP
RET

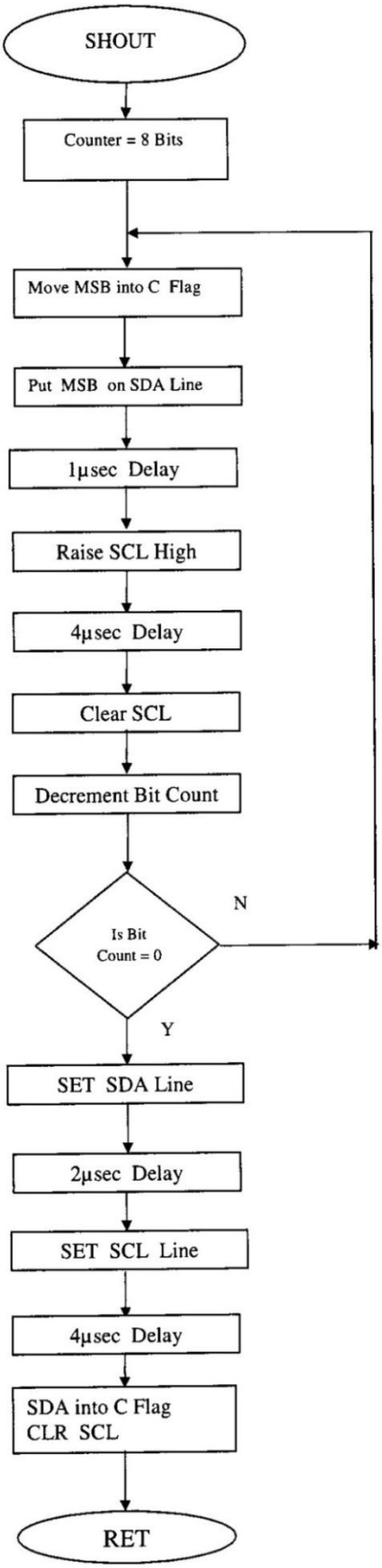

SHOUT
Counter = 8 Bits
Move MSB into C Flag
Put MSB on SDA Line
1µsec Delay
Raise SCL High
4µsec Delay
Clear SCL
Decrement Bit Count
Is Bit Count = 0
N
Y
SET SDA Line
2µsec Delay
SET SCL Line
4µsec Delay
SDA into C Flag
CLR SCL
RET

Figure 10

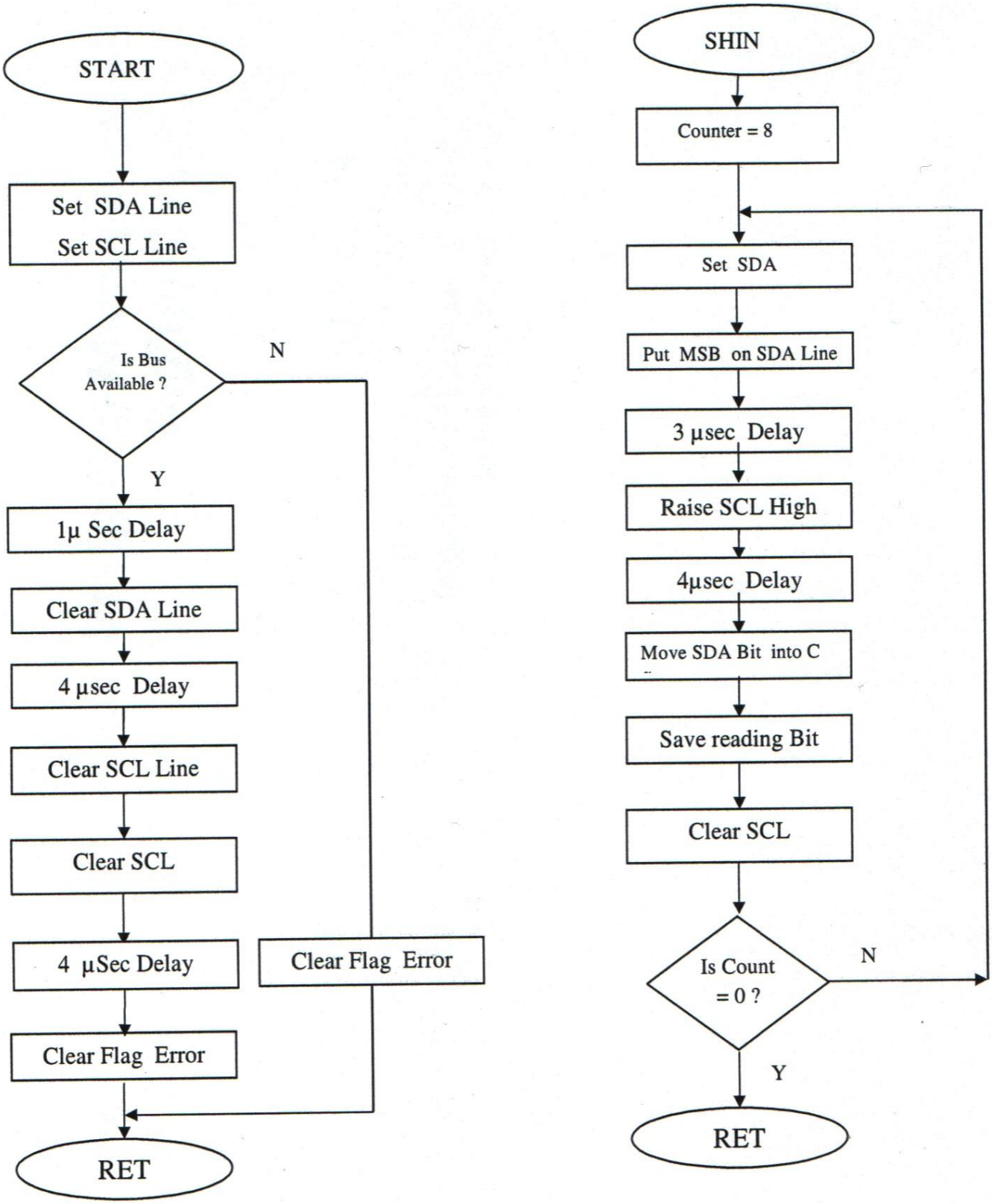

START
Set SDA Line
Set SCL Line
Is Bus Available ?
N
Y
1µ Sec Delay
Clear SDA Line
4 µsec Delay
Clear SCL Line
Clear SCL
4 µSec Delay
Clear Flag Error
Clear Flag Error
RET
SHIN
Counter = 8
Set SDA
Put MSB on SDA Line
3 µsec Delay
Raise SCL High
4µsec Delay
Move SDA Bit into C
Save reading Bit
Clear SCL
Is Count = 0 ?
N
Y
RET

Figure 11

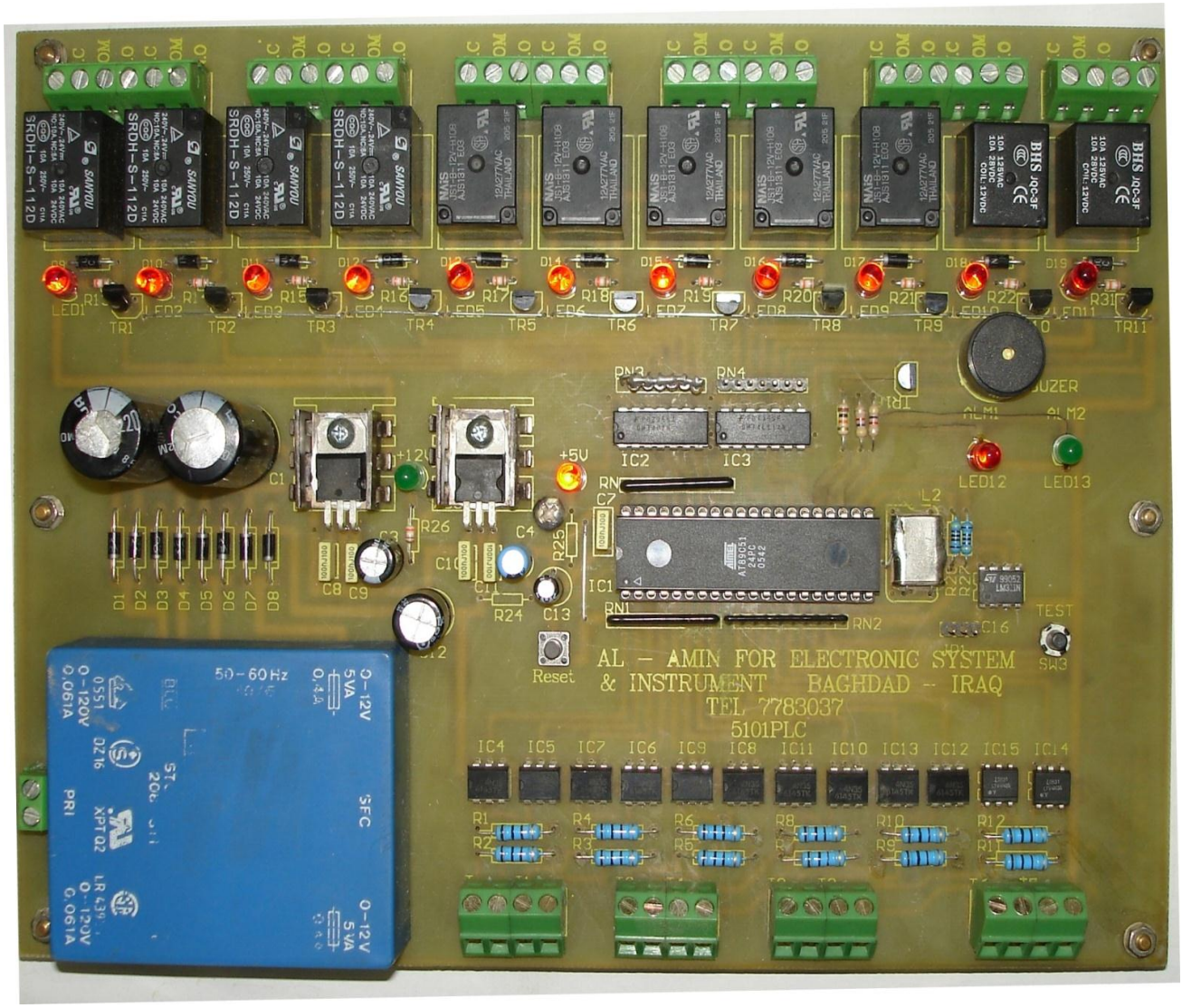


Figure 12 controller card

تصميم مسيطر تعاقبي مبرمج بأستخدام ناقل I2C

رأفت صفاء الدين حبيب

قسم الهندسة الكهربائية والحاسبات

جامعة دهوك

الخلاصة

المسيطر التعاقبي من وجهة نظر هندسة السيطرة يعتبر مسيطر ذو الحلقة المفتوحة Open Loop وغالبا يدعى بالمتعاقب . المتعاقب يعمل بطريقة الزمن المحدد مسبقا او عن طريق حصول حدث ما خلال فترة زمنية قصيرة Discrete Event وبصورة متكررة ودقيقة. أن أساس تصميم المسيطر التعاقبي التقليدي من النوع الكهروميكانيكي يعتمد على أستخدام الكامة الدوارة لتحديد موضع الحدث/ الحالة State . هذا النوع من المسيطرات يستخدم في العمليات الصناعية أو الوسائل المراد السيطرة عليها ، يوصف بعدد من الأحداث/الحالات أو من التوقيتات المتعاقبة . بالرغم من أن عمل هذا من المتعاقبات غير مرن وغير متين بسبب أستخدام أجزاء متحركة في تركيبته، لكن يبقى هذا النوع يملك ميزات حسنة تتفوق على النوع الألكتروني الأعتيادي من كونه يحتفظ بموضع الحدث/ الحالة عندما ينقطع المصدر المجهز للطاقة الكهربائية لأي سبب كان، ويستأنف المسيطر عمله مجددا بعد عودة تجهيز الطاقة الكهربائية من الموضع الذي أنقطع به المصدر الكهربائي.

التقنية الحديثة مكنت من تطوير نوع من المسيطرات التعاقبية المبرمجة معتمدا على التطور الذي حدث في مجال صناعة الرقائق الألكترونية الدقيقة . هذه الرقائق التي تحتوي على وحدة المعالجة المركزية CPU والذاكرة العشوائية RAM وذاكرة القراءة فقط ROM والموقتات Timer ووحدة الأتصال المتوالي UART ومنصات الأدخال والأخراج Ports متوفرة حاليا وتصنف ضمن المنظومات المطمورة Embedded System وتدعى االمسيطرات المايكروية Microcontroller . المسيطرات المايكروية أعلاه تعتبر من الوسائل المبرمجة وهذا يعني ان هذه المسيطرات تنفذ البرنامج المحمل عليها بالتعاقب من أعلى الى الأسفل (نهاية البرنامج) . هذه المسيطرات لا تحفظ موضع الحدث/الحالة في حالة أنقطاع مصدر الطاقة الكهربائية ، بل أن المسيطر يستأنف عمله بعد عودة مصدر الطاقة الكهربائية مجددا من الموضع البدائي للعملية

هذا البحث يقدم تصميم مسيطر تعاقبي مبرمج يعتمد على السيطرات المايكروية وبأستخدام ذاكرة توالي برمجة/مسح كهربائي Serial EEPROM لحفظ موضع الحدث/الحالة . هذا النوع من الذاكرة تعشق مع المسيطر المايكروي بواسطة ناقل توالي I2C المكون من زوج من الأسلاك والذي يستخدم بروتوكول خاص بالناقل لنقل المعلومات بين المسيطر المايكروي والذاكرة المتوالية. المسيطر التعاقبي المراد تصميمه يحتوي على لوحة مفاتيح صغيرة وظيفتها أدخال توقيتات الأحداث/الحالات عن طريق أختيار تلك القيم وعرضها على شاشة LCD . تم تطبيق هذا التصميم عمليا للسيطرة على عمليات تعقيم الحقن الطبية ولمدة طويلة وبدون مشاكل حقيقية تذكر.

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COMPACTNESS OF FUZZY SETS

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Abstract

The objective of this paper is to study the compactness of fuzzy sets in fuzzy topological spaces, especially the connection between compact, closed and bounded fuzzy sets.

1-Introduction:

The concept of fuzzy sets was introduced initially by Zadeh in 1965. Since then, this concept is used in topology and some branches of analysis, many authors have expensively developed the theory of fuzzy sets and its application, [1].

Chang, C. L. in 1968 used the fuzzy set theory for defining and introducing fuzzy topological spaces, while Wong, C. K. in 1973, discussed the covering properties of fuzzy topological spaces, [2].

Ercey, M. A. in 1979, studied fuzzy metric spaces and its connection with statistical metric spaces, Ming P. P. and Ming L. Y. in 1980, used fuzzy topology to define neighborhood structure of fuzzy point and Moore-Smith convergence, Zike Deng in 1982, studied the fuzzy point and discussed the fuzzy metric spaces with the metric defined between two fuzzy points,[3].

The main objective of this paper is to study the relationship between closed and bounded fuzzy sets and the compactness of such fuzzy sets.

2- Basic Concepts in Fuzzy Topology [3], [4], [5]:

Chang C. L. in 1968 introduced the notion of fuzzy topological spaces, which is anon-empty set X together with a family of fuzzy sets in X which is closed under arbitrary union and finite intersection, as it is given precisely in the next definition.

We start first with the obvious definition of fuzzy topological spaces.

Definition (3.1),[3][7]:

A family $\tilde{T}$ of fuzzy sets of X is called a fuzzy topology for X if and only if it satisfying the following conditions:

(a) $\varnothing, 1_X \in \tilde{T}$.where $\varnothing$ is the empty fuzzy set with membership function 0 and 1x is the universal set with membership function 1.

(b) If $\tilde{A}, \tilde{B} \in \tilde{T}$, then $\tilde{A} \cap \tilde{B} \in \tilde{T}$.

(c) If $\tilde{A}_i \in \tilde{T}, \forall\ i \in J$, where J is any index set, then $\bigcup_{i\in I} \tilde{A}_i \in \tilde{T}$.

$\tilde{T}$ is called fuzzy topology for X, and the pair $(X, \tilde{T})$ is a fuzzy topological space.

Definition (3.2),[3]:

A fuzzy set $\tilde{A} \in X^*$ is said to be an open fuzzy set if $\tilde{A} \in \tilde{T}$ and is said to be closed fuzzy set if $\tilde{A}^c \in \tilde{T}$. X^* is the set of all closed and bounded fuzzy subsets of X

Definition (3.3), [2][4]:

Let $(X, \tilde{T})$ be a fuzzy topological space. A family of fuzzy subsets $\tilde{A}$ of I^X is said to be a cover of a fuzzy set $\tilde{B}$ in X if and only if $\tilde{B} = \cup\tilde{A}$. If each member of the cover is a member of $\tilde{T}$, then this cover is said to be an open cover of $\tilde{B}$. A subcover of $\tilde{B}$ is a subfamily of the cover which is also a cover.

Definition (3.4),[5]:

A fuzzy topological space is compact if and only if each open cover of the space has a finite subcover.

Definition (3.5),[5]:

A fuzzy point x_r of fuzzy set $\tilde{A}$ in a fuzzy topological space $(X, \tilde{T})$ is said to be fuzzy θ-cluster point (fuzzy δ-cluster point) of a fuzzy set $\tilde{A}$ in X if and only if fuzzy closure (respectively, interior of the closure) of every open q-neighborhood of x_r is q-coincident with $\tilde{A}$

3- Compactness Fuzzy Set:

The compactness set is one of the fundamental aspects in topological space , in general, and of fuzzy set in particular, therefore, several approaches are proposed to study this subject.

Hence, in this section, we will give one of such approaches as a theorem. Also, we will stand and present some of the basic ideas for the construction and the proof of the completeness of fuzzy set, where the following abbreviation is used, X^* is the set of all closed and bounded fuzzy subsets of X.

Theorem(4.1):

If a fuzzy set is nonempty and is bounded below, then an infimum exist.

Proof:

Let $\tilde{A}$ be a nonempty fuzzy set which is bounded below. Denote by C1 the fuzzy the set of all real numbers which are lower bounds of $\tilde{A}$, and let C2 consist of all other real numbers.

We may then show that [C1, C2] is a Dedekind.

1- The nature of the definition of C2 is a assurance that each real number is in C1 or C2.

2- Since $\tilde{A}$ is bounded below, C1 is non empty and since $\tilde{A}$ is not empty, not all real numbers are in C1. Hence C2 is not empty.

3- Let c1 be any member of C1, and let C be any number such C < C1.it follows that C is less than a lower bound of $\tilde{A}$ and hence is also a lower bound of $\tilde{A}$.therefore c is a member of C1. This implies that all members of C2 exceed all members of C1.

4- Suppose C2 to have a least member. Denote it by c. then c is not a lower bound of $\tilde{A}$, and, as a consequence, a number x of $\tilde{A}$ exists such that x < C. Also, between x and C exists another real number y, x < y < C, since y is less than c, it is necessarily in C1.

Also, since y exceeds x; a member of $\tilde{A}$, it is not a lower bound and so is not in C1.the contradiction implies that C2 does not possess a least member. ■

Theorem (4.2):

The infimum of a nonempty fuzzy set $\tilde{A}$ is either a member of $\tilde{A}$ or a cluster point of $\tilde{A}$.

Proof:

Let $\tilde{b} = \inf \tilde{A}$, be a fuzzy set with membership function

$$\mu_{\tilde{b}}(x) = \inf \mu_{\tilde{A}}(x), \forall x \in X$$

It is the minimum fuzzy point of $\tilde{A}$, if $\tilde{b}$ is a member of $\tilde{A}$

While if $\tilde{b}$ is not a member of $\tilde{A}$, then corresponding to each positive number $\varepsilon > 0$, the deleted fuzzy neighborhood $\tilde{N}^*(\tilde{b},\varepsilon)$ contains a point a of $\tilde{A}$.

Hence b is a cluster point of $\tilde{A}$. ■

Theorem (4.3):

A nonempty closed fuzzy set $\tilde{A}$, which is bounded below possesses a minimum point.

Proof:

By theorem (4.1) the infimum of the fuzzy set $\tilde{A}$ exists a fuzzy point $\tilde{b}$ which is either a point of $\tilde{A}$ or a cluster point of $\tilde{A}$.

In the latter case it also follows that $\tilde{b}$ is in $\tilde{A}$, since $\tilde{A}$ is closed.

Hence the infimum of $\tilde{A}$ belongs to $\tilde{A}$ and is, of course, the minimum member of $\tilde{A}$. ■

Theorem (4.4):

Any family of disjoint fuzzy intervals is countable.

Proof:

Let $\{\tilde{I}_n\}$ be a sequence of fuzzy intervals hence, for all $\alpha \in (0, 1]$, let $\tilde{I}_n = [\underline{I_n}, \overline{I_n}\, I]$ and hence, their is an equivalent two sequence of nonfuzzy intervals $\{\underline{I_n}\}$ and $\{\overline{I_n}\}$ which are countable hence $\{\tilde{I}_n\}$ is countable. ■

Similarly, using the idea of α-level sets, one can state and prove the following theorem:

Theorem (4.5):

Any nonempty open fuzzy set is the union of a unique countable collection of disjoint open intervals.

4- The Main Results:

Denoting that member of the family which corresponds to the integer n by A_n, we may represent the sequence by $A_1, A_2, \ldots, A_n, \ldots$; or by the symbol $\{A_n\}$,

If a sequence of fuzzy sets of points has the property that $A_{n+1} \subset A_n$ for each n, then the sequence is referred to as decreasing or nested, concerning a nested sequence of sets each of which is closed, we state the following.

Theorem (5.1):

If $\{\tilde{F}_n\}$ is a nested sequence of non empty, closed, and bounded fuzzy set, then the fuzzy set $\tilde{F} = \bigcap_{n=1}^{\infty} \tilde{F}_n$ is non empty, where $\mu_{\tilde{F}}(x) = \mu_{\bigcap_{n=1}^{\infty} \tilde{F}_n}(x)$.

Proof:

By theorem (4.3) each of the fuzzy set $\tilde{F}_n$ possesses a maximum point.

Let $\tilde{X}_n = \max \tilde{F}_n$, for each n

$\mu_{\tilde{X}_n}(x) = \max \mu_{\tilde{F}_n}(x)$, from the hypothesis

$\tilde{F}_{n+1} \subset \tilde{F}_n$, $\mu_{\tilde{F}_{n+1}}(x) < \mu_{\tilde{F}_n}(x)$. It follows that $\tilde{X}_{n+1} \subseteq \tilde{X}_n$, and for each positive

integer q it is the case that $\tilde{X}_n \tilde{\in} \tilde{F}_q$, for all $n \geq q$.

Denote the fuzzy set of numbers $\tilde{X}_n$ by T, because $T \subset \tilde{F}_1$ and $\tilde{F}_1$ is bounded, it follows that T is bounded and, particular, is bounded below. Denoting the infimum of T by c. We shall show that $c \in \tilde{F}_n$, for all n.

Let q denote an arbitrary positive integer, and consider the subset of T defined by $\tilde{T}_q = \{\tilde{X}_n : n \geq q\}$, since c is the infimum of T, it is also the infimum of $\tilde{T}_q$, by theorem (4.2) it follows that $c \in \tilde{T}_q$. Also, since:

$\tilde{T}_q \subset \tilde{F}_q$, we have $\mu_{\tilde{T}_q}(x) \leq \mu_{\tilde{F}_q}(x)$. ■

Now, consider the following remarks:

Remarks (5.1):

A. Let $\tilde{F}_n = \tilde{\varnothing}$, for all positive integers n where $\varnothing$ is the empty fuzzy set with membership function 0. Then $\tilde{F}_n$ is closed and bounded, and $\{\tilde{F}_n\}$ is nested. However, the fuzzy set $\tilde{F} = \bigcap_{n=1}^{\infty} \tilde{F}_n$, with membership function $\mu_{\tilde{F}}(x) = \mu_{\bigcap_{n=1}^{\infty} \tilde{F}_n}(x)$ is empty since the $\tilde{F}_n$ are not non empty.

B. Let $\tilde{F}_n = \{(x, \mu_{\tilde{F}}(x)$, where $x \in X \geq n$ is the universal set with membership function 1.} here the sequence $\{\tilde{F}_n\}$ is nested and $\tilde{F}_n$ is nonempty and closed for each n. however, each $\tilde{F}_n$ is unbounded. It is easy to see that $\tilde{F} = \bigcap_{n=1}^{\infty} \tilde{F}_n$, with membership function $\mu_{\tilde{F}}(x) = \mu_{\bigcap_{n=1}^{\infty} \tilde{F}_n}(x)$ is empty.

C. Let $\tilde{F}_n = (0, 1/n]$, the sequence $\{\tilde{F}_n\}$ is obviously nested, each $\tilde{F}_n$ is nonempty and bounded but not closed. The set $\tilde{F} = \bigcap_{n=1}^{\infty} \tilde{F}_n$, with membership function $\mu_{\tilde{F}}(x) = \mu_{\bigcap_{n=1}^{\infty} \tilde{F}_n}(x)$, seems to be empty.

D. Let $\tilde{F}_n = [2n, 2n+1]$. Here each $\tilde{F}_n$ is nonempty closed, and bounded, but the sequence $\{\tilde{F}_n\}$ is not nested. The

set $\tilde{F} = \bigcap_{n=1}^{\infty} \tilde{F}_n$, with membership function $\mu_{\tilde{F}}(x) = \mu_{\bigcap_{n=1}^{\infty} \tilde{F}_n}(x)$ is empty.

Therem (5.2):

If L^* is any open covering of a fuzzy set $\tilde{A}$, then there exists a countable subfamily of L which also covers the fuzzy set $\tilde{A}$.

Proof:

Let a denote any member of the given fuzzy set $\tilde{A}$. Then a fuzzy set $\tilde{G}_a$ of L exists such that $a \in \tilde{G}_a$. Further, since $\tilde{G}_a$ is open, a neighborhood N(a, ε) exists such that $N(a, \varepsilon) \subset \tilde{G}_a$.

Now, let r_1 and r_2 designate two rational numbers with the property that $a - \varepsilon < r_1 < a < r_2 < a + \varepsilon$.

It is then the case that the interval $I_a = (r_1, r_2)$ is such that $a \in I_a$ and $I_q \subset \tilde{G}_a$.

Hence, in this manner we may associate with each member a of the fuzzy set $\tilde{A}$ an open interval I_a with rational end points.

Since the fuzzy set of all possible intervals with rational end points is countable, if follows that the fuzzy set $\tilde{B} = \{I_a : a \in \tilde{A}\}$ is also countable.

Each interval I_a is contained in at least one of the open fuzzy sets of L and denote one such by $G_{a'}$. In this way a subfamily L' of L is constructed with the property that with each interval I_a of the countable fuzzy set $\tilde{B}$ is associated exactly one member $G_{a'}$ of L'.

Consequently L' is countable and, moreover, covers A since for each member a of $\tilde{A}$ we have $a \in I_a$ and $I_a \subset G_{a'}$. ■

Theorem (5.3):

Let X = lR be the universal set, then a fuzzy subset of X is closed and bounded then it is compact.

Proof:

Let $\tilde{A} \in X$ be a closed and bounded fuzzy subset of X and a family of a fuzzy sets A is a cover of a fuzzy set $\tilde{A}$ if and only if $\tilde{B} \subseteq \cup\{\tilde{A} \mid \tilde{A} \in A\}$

It is an open cover if and only if each member of A is an open fuzzy set $\tilde{A}$.

Because of the (Lindelof theorem in fuzzy sets), we may assume, without

loss of generality, that $\tilde{B}$ be a countable and thereby denote its members by $\tilde{G}_1$, $\tilde{G}_2$, …, $\tilde{G}_n$, … and define the fuzzy set:

$$\tilde{K}_n = \bigcup_{i=1}^{n} \tilde{G}_i \quad \text{and} \quad \tilde{L}_n = \tilde{A} \cap y \tilde{K}_n$$

which is s also a fuzzy set of X with membership function, for any index J

$$\mu_{\tilde{L}_n} \tilde{G}_j(x) = \sup_{i \in J} \mu_{\tilde{G}_i}(x), \; x \in X$$

$$\mu_{\tilde{L}_n}(x) = \text{Min} \{ \mu_{\tilde{A}}(x), y \mu_{\tilde{K}_n}(x) \}, \text{ for } n = 1, 2, \ldots$$

and observe that, because of the theorems on unions and intersection of closed and open fuzzy set, the fuzzy set $\tilde{K}_n$ are open and the fuzzy set $\tilde{L}_n$ closed for all values of n. further, it is the case that:

$$\tilde{K}_n \subseteq \tilde{K}_{n+1}, \text{ then } \mu_{\tilde{K}_n}(x) \leq \mu_{\tilde{K}_{n+1}}(x), \forall x \in X$$

and from this follows

$$\tilde{L}_{n+1} \subseteq \tilde{L}_n, \text{ then } \mu_{\tilde{L}_{n+1}}(x) \leq \mu_{\tilde{L}_n}(x), \forall x \in X, \text{ for all n.}$$

Assume now that none of the fuzzy sets $\tilde{L}_n$ is empty fuzzy set, then:

$$\mu_{\tilde{L}_n}(x) = 1, \text{ since } \tilde{L}_n \subset \tilde{A}$$

and hence:

$$\mu_{\tilde{L}_n}(x) < \mu_{\tilde{A}}(x), \; x \in X$$

$1 < \mu_{\tilde{A}}(x)$, and hence $\tilde{A}$ is bounded

It follows then that the sequence $\{\tilde{L}_n\} \subset \{\tilde{L}_{n+1}\}$, n = 1, 2, …; i.e.,

$$\mu_{\tilde{L}_n}(x) < \mu_{\tilde{L}_{n+1}}(x), \; x \in X, \text{ for all n.}$$

Satisfies the hypotheses of the theorem (5.2)

$$\tilde{L}_{n+1} = \bigcap_{n=1}^{\infty} \tilde{L}_n$$

$$\mu_{\tilde{L}_{n+1}}(x) = \mu_{\bigcap_{n=1}^{\infty} \tilde{L}_n}(x)$$

$$= \inf_n \mu_{\tilde{L}_n}(x), \forall x \in X$$

Therefore, for some positive integer q the fuzzy set $\tilde{L}_q = \tilde{A} \cap \xi \tilde{K}_q$ is empty.

$$\mu_{\tilde{L}_q}(x) = \min\{ \mu_{\tilde{A}}(x), \xi \mu_{\tilde{K}_q}(x) \}$$

$= 0$, for any index j, $\forall$ j = 1, 2, …, q

Hence, $\tilde{A} \subset \tilde{K}_q = \bigcup_{i=1}^{q} \tilde{G}_i$, i.e.,

$$\mu_{\tilde{A}}(x) < \mu_{\tilde{K}_q}(x) = \mu_{\bigcup_{i=1}^{q} \tilde{G}_i}(x)$$

$$= \sup_{i \in j} \mu_{\tilde{G}_i}(x), \ \forall$$

$x \in X$

$\therefore \tilde{A} \subset \tilde{C}$ (since $\mu_{\tilde{A}}(x) \leq \mu_{\tilde{C}}(x)$

)

$\tilde{A}$ may be covered by the set $\tilde{C}$.

Let $\tilde{B}$ denote the family of open fuzzy sets of fuzzy points $\tilde{G}_n$, defined by:

$$\tilde{G}_n = \{(x, \mu_{\tilde{G}_n}(x)) : x \in X, -n \leq$$

$\mu_{\tilde{G}_n}(x) \leq n$, for each positive integer n}

It is obvious that $\tilde{B}$ is an open covering of the fuzzy set of all real numbers and hence of any fuzzy set of real numbers suppose now that $\tilde{A} \in X^*$ is some compact fuzzy set, $\tilde{A} \in \tilde{T}$.

Then, since any open covering of $\tilde{A}$ possesses a finite sub family which also covers $\tilde{A}$. It follows, in particular, that this is true of $\tilde{B}$.

Consequently, a finite collection of intervals $\tilde{G}_n$ covers the fuzzy set $\tilde{A}$, and, if denotes the maximum subscript for this finite family, then clearly the open interval:

$$\tilde{G}_{n_0} = \{(x, \mu_{\tilde{G}_{n_0}}(x)) : x \in X;$$

$-n_0 \leq \mu_{\tilde{G}_{n_0}}(x) \leq n_0\}$

covers $\tilde{A}$.

This implies that a compact fuzzy set is bounded.

To show that $\tilde{A}$ is necessarily closed, let c be a real number and consider the family of closed fuzzy sets:

$$\tilde{F}_n = \{(x, \mu_{\tilde{F}_n}(x) \mid x \in X, c - 1/n$$

$\leq \mu_{\tilde{F}_n}(x) \leq c + 1/n\}$, $n = 1, 2, \ldots$

The fuzzy sets $\tilde{H}_n = \xi \tilde{F}_n$, $\forall\ n = 1, 2, \ldots$

$$\mu_{\tilde{H}_n}(x) = \xi \mu_{\tilde{F}_n}(x), \ \forall \ n = 1, 2,$$

$\ldots$

Then constitute a family of open fuzzy sets. It is obvious that the set $\bigcap_{n=1}^{\infty} \tilde{F}_n$

$$\mu_{\bigcap_{n=1}^{\infty} \tilde{F}_n}(x) = \inf_{i \in j} \mu_{\tilde{F}_i}(x), x \in X$$

for j any index set consists of the single points, and, since c in net in $\tilde{A}$, it follows that:

$$\tilde{A} \subset \xi \bigcap_{n=1}^{\infty} \tilde{F}_n$$

i.e.,

$$\mu_{\tilde{A}}(x) < \xi\mu_{\bigcap_{n=1}^{\infty}\tilde{F}_n}(x)$$

$$= \xi\inf_{i\in j}\mu_{\tilde{F}_i}(x), \quad \forall \quad x \quad \in$$

X…(1)

where:

$$\mu_{\tilde{A}}(x) < \mu_{\bigcup_{i=1}^{\infty}\tilde{H}_i}(x)$$

$$= \sup_{i\in j}\mu_{\tilde{H}_i}(x), \quad \forall \quad x \quad \in$$

X…..(2)

Thus the fuzzy set $\tilde{A}$ is covered by the family Δ.

The compactness of $\tilde{A}$ implies that a finite subfamily of Δ exists which also covers $\tilde{A}$.

Therefore a positive integer n_1 exists such that each point of $\tilde{A}$ is contained in at least one of the open fuzzy sets $\tilde{H}_1$, $\tilde{H}_2$, …, $\tilde{H}_n$, …; then, no point of $\tilde{A}$ is contained in:

$$\tilde{F}_{n_1} = \{(x, \mu_{\tilde{F}_{n_1}}(x)) : x \in X, c - 1/n_1 \leq \mu_{\tilde{F}_{n_1}}(x) \leq c + 1/n_1\}$$

and from this it follows that the point c is not a cluster point of the fuzzy set $\tilde{A}$.

Thus it is proved that any point which is not a point of the fuzzy set $\tilde{A}$ is also not a cluster point of $\tilde{A}$.

All cluster points of $\tilde{A}$ are, therefore, points of $\tilde{A}$ itself.

Hence $\tilde{A}$ is closed.

تراص المجموعات الضبابية

أماني التفات كاظم

قسم علوم هندسة البرامجيات ،كلية مدينة العلم الجامعة،بغداد ، العراق

المستخلص

ان هدف هذا البحث ان تدرس تراص المجموعات الضبابية في الفضاءات التبولوجية الضبابية وبالاخص العلاقة بين التراص ،انغلاق، وتقييد المجموعات الضبابية .

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Evaluation

Toxic oxidant activity for pure cinnamic acid in albino mice

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Abstract

The study was carried out to determine the toxic ,oxidant and antioxidant effects 0f Cinnamic acid in comparison with Vitamin C against the mutagenic effect of Cyclophosphamide ,which is a chemical compound that damage hepatic cells and has mutagenic effects. The effect was studied in mouse .This *invivo* system depended on evaluating the enzymatic activity of two antioxidant enzymes :Catalase and Glutathione Reductase .Two concentration of pure cinnamic acid 5.6 and 2.8 mg/ Kg were evaluated to choice the suitable concentration which remembered the negative control. In order to used in the interaction experiments ,included two types of treatment pre-cyclophosphamide and post –cyclophosphamide in order to determine the mechanisms of pure cinnamic acid which showed no toxic and oxidant effects in biological system and instead it showed highly performance in preventing or reducing the oxidant stress influences of cyclophosphamide. It increased the Catalase and Glutathione reductase antioxidant activity ,especially in dose 2.8 mg/ kg. The positive effect was higher when pure cinnamic acid was used as pre-cyclophosphamide treatment and to less extent in post –cyclophosphamide treatment, Therefore ,the cinnamic acid can be considered as an antioxidant compound and Desmutagens in the first degree and Bioantimutagens in the second degree..

Introductions

Oxidative stress is thought to contribute to the development of a wide range of diseases including Al-Zheimer's disease [1,2] Parkinson'disease[3]the pathologic caused by diabetes [4,5],rheumatoid arthritis [6]and neuro degeneration in motor neuro- diseases [7].It has been proposed that polymorphisms in enzymes such as Catalase and Glutathione Reductase are associated with DNA damage and subsequently the individual's risk of cancer susceptibility[8].

Antioxidant molecular is capable of inhibiting the oxidation of other molecular ,When oxidant compound produce free radicals and that radicals can start chain reaction which damage cells the antioxidant compounds terminate these chain reaction by removing free radicals intermediates and inhibit other oxidation reaction and that happen by being oxidized themselves ,so they often reducing against such as thiols , ascorbic acid and Polyphenols[9].Antioxidant are widely used as ingredients in dietary supplements in the hope of maintaining health and preventing diseases such as cancer ,coronary heart disease and even attitude sickness , they work by chelating transition metals and preventing from catalyzing the production of free radicals in the cell or by scavenge reaction oxygen before they can damage cells[10].

The bioavaibilities of Polyphenols in plants such as cinnamic acid in cinnamon bark(with all kinds),grape fruit and others and their ability to inhibit and prevent tumor formation after entering blood circulation and absorbing by bowel[11]. They work directly to inhibitor by effect on protein or control factors which operate in active the system repairing cell and also because of motivate immunology system and increasing conformation natural killer cells and effect in the enzymes which responsible of process and complete the cell cycle by hyperexpression arrangement [12].The pure cinnamic acid is a white crystalline hydroxyl cinnamic acid ,sli8ghtly soluble in water, it's a part of the biosynthetic shikimate and phenylpropanoid pathways. It is biosynthesis performed by action of the enzyme phenylalnine aminanie-lyse (PAL)on phenylalanine [13].

The derivatives of cinnamic acid such as ferulic acid ,cinnamicaldehyde ,caffic acid ,chlorogenic acid and others showed ability to cure some disease[14]such as antioxidant in vitro and prevention of type 2-Diabetes Mellitus and cardio vascular diseases[15]and because the scientific and locals tends to use the natural products specially the graces in medical and nutrition yields that made

us to focus our immediately study to evaluated the antioxidant effect of pure cinnamic acid in one of the biosystem of albino mice .

Material and Methods

Solution:

1.Phosphate Buffer Solution(PBS) [16].
2. Beta-Nicotinamide Adenine Dinucleotide Phosphate Sodium Salt (NADPH+H) (1Mm)[17].
3.Hydrogen peroxide(Catalase)(H_2O_2[18].
4.Bovine Serum Albumin (BSA)1%[18].
5.Colchicine Solution : Colchicine1mg (one tablet)and sterile distilled water 1ml .The solution was used immediately after preparing 2.5 to 3 hours.[19].
6. Biuret solution.made by 9g from Potassium tatrate dissolving in 500 ml from 0.2M from NaOH(8g/1L)and adding to it 3g from $CuSO_4.2H_2O$ and 5g from Potassium Iodine and the volume completed to one liter by using the solution NaOH(0.2M)then kept in refrigerator 4Ċ till used.

Doses:

Two doses from the pure cinnamic acid (Riedel-de Haën company)which are(5.6 ,2.8) mg/ Kg(LD_{50} =1600mg/kg) [20], vitamin C(180 mg/ kg)as comparative groups and cyclophosphamide compound in (50 mg/ kg)as a positive control and the PBS as a negative control.

Antioxidant effects:

To study the oxidant effect and the antioxidant in laboratory animals ,the gulping was orally by syringe 1 ml size supplying with gulping instrument as thin plastic tube to turning shape and soft edge to avoid harm the mice and inserted to the digestive system of mouse ,but the cyclophosphamide solution was injected Intraperitonially because it lost after (3-12)hours by urine[21].The albino mice was used in the experiments which is *Mus muscles*(Balb/C)in age (8-12)weeks that get from the National Center for Drug Control and Research .The mice put in plastic cages in groups depend on the experimental need in temperature room(25-32)Ċ and gave the water and integrated animal fed which manufacture locally.

The experiment:

The experiment performed by using two concentration of from pure cinnamic acid (5.6,2.8) mg/ kg ,the concentration a count depended on the mouse weight .The experiment contains 40 mice divided in to 5 groups of 8 mice each (16 mice gulped with the two cinnamic acid concentration(5.6,2.8) mg/ kg ,8mice gulped with PBS and depended as a negative control ,8 mice injected with cyclophosphamide compound and depended as a positive control ,8 mice gulped with vitamin C and depended as a comparative groups and from the two control) and the comparative groups

can gain primary idea about the suitable concentrate to cinnamic acid .

Study the interaction between the cinnamic acid and cyclophosphamide .

Forty eight mice used in studying the interaction between the cinnamic acid and cyclophosphamide. After treated with cyclophosphamide compound,24 mice were used in this experiment ,8 gulped with the perfect concentrate from the pure cinnamic acid 5.6 mg/ kg, other 8 gulped with vitamin C(180 mg/ kg) and the last 8 mice gulped with the PBS.

_1st group:(positive control): The mice injected with cyclophosphamide compound 50 mg/ kg in the Intraperitonial membrane in the first day with dose 0.1 ml and then gulped orally with the PBS for 7 days ,mice anatomy happened after24 h from the last dose.

_2nd group: The mice injected with cyclophosphamide compound 50 mg/ kg in the Intraperitonial membrane in the first day with dose 0.1 ml and then gulped orally with the vitamin C (180 mg/ kg) for 7 days ,mice anatomy happened after24 h from the last dose.

_3rd group: The mice injected with cyclophosphamide compound 50 mg/ kg in the Intraperitonial membrane in the first day with dose 0.1 ml and then gulped orally with the perfect concentrate of pure cinnamic acid (2.8 mg/ kg), mice anatomy happened after24 h from the last dose.

Preparing of tissue extract from Liver mouse:

Weight 1 g from the mouse liver and cut it to very small pieces by sharp knife in 1 ml from PBS and using in the same time the Mechanism pressure of hand to crush the liver tissue till be sticky solution then move the attain to the centrifuge with(5000 round/ second)speed for one hour .Get the upper layer and let the remainder in the bottom of the test tubes ,avoid the fatty layer above it ,store in freezer(-20)Ċ until evaluate or use directly to measure the activity of enzyme [23].

Value the activity of Glutathione Reductase:

To evaluate the activity of enzyme in endly volume 1 ml, contains interaction mixture: 0.1 ml from BSA 1%. , 0.4 ml from oxidation Glutathione. , 0.4 ml from 1mM NADPH+H., 0.1 ml from the enzyme extraction, then read the interaction mixture in spectrophotometer in 340 nm and recorded the reading every 30 second for half an hour. The Glutathione Reductase value in the liver extract based on the hydrogen move from $NADPH_2$ to the oxidation Glutathione and then measure the interaction by spectrophotometer ,the continuous of interaction led to reduced the absorbance as a result to change the oxidation Glutathione to Glutathione Reductase. The unit of enzyme

evaluation based on reduces the amount of absorbance through one minute under the standard interaction and the unit of enzyme known that it is the change in absorbance 0.001/1 second under interaction elements[17,18]. To evaluate the enzyme activity (unit/milliliter) flow the rule:

$$\text{Enzyme activity} = \frac{\text{The whole volume of interaction}}{\text{0.001 x1xenzyme extract volume}} \times \frac{\Delta^{\circ}}{T2 - T1}$$

Δ°= referred the reduce mount in absorbance.

$T_2 - T_1 =$ referred to the change in time.

Value Catalase activity:

Dissolved 1 mg from the standard Catalase which contain 60 U/mg in 10 ml from PBS. A chain of concentrate made (0.6, 0.3, 0.15, 0.075, 0.0375) U/ml and that to gain standard curve Fig(1).

Input 3 milliliter from the physiology hydrogen peroxide (H_2O_2) in quartz cell of spectrophotometer and let in for 3 minutes to get stability, after that 0.1 ml from standard Catalase added and mixed in the same time. The highly reading in spectrophotometer must be in wavelength 240nm in absorbance 0.5 ,the educe in absorbance followed every 20 second ,the first reading was at 10 second from adding enzyme ,and the second reading be after 30 second ,to draw the standard curve.

The standard Catalase curve drawing from the absorbance reading against the standard enzyme concentrated valuated with unites (Unit/milliliter),So can get the mount of enzyme in strange substance from count (Catalase) standard enzyme curve line. Specific activity express about the enzyme units numbers for all mg/protein in enzyme extract ,using by Annion,(1964) in evaluating the protein quality for enzyme specific activity ,exampled in reduced the amount of absorbance 1 ml in enzyme extract through one minute for all milligram from protein under interaction elements .

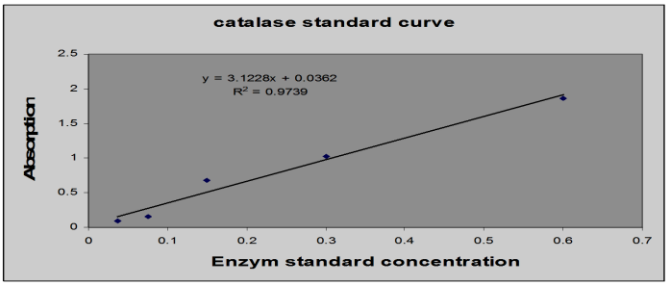

Fig (1) the activity of standard Enzyme

Evaluate protein mount:

Three test tubes get, the first example, the blank, the second example the standard and the third referred to the test sample.

1. The first tube, add to it 2ml from sterilizing distiller water.

2. The second tube, add 2ml from the standard solution of protein(BSA).
3. The third tube, add 0.2 ml from the test (the liver extract from mouse liver)and 1.8 ml from sterilizing distilled water.
4. Five milliliter from Biuret solution[18] to the three tubes and mixed well ,then put in the water bath in 37Ċ for 10 minutes after that let to cool and read in wavelength 50nm ,the calculate of protein mount happen by:

$$\text{Protein mount g/100 ml=test absorbance} = \frac{\text{Standard concentrate of protein}}{\text{Standard absorbance of protein}}$$

Statistical analysis

The statistical analysis is done to get the means ±SE and test the different significant among the means by using Duncan test [24] then differences among the means in interaction experiments were compared between the Vit. C, cinnamic extract and the cyclophosphamide by using T- test [25].

Results and Discussion

Select the perfect concentrate from the pure cinnamic acid in Antioxidant activity.

Specific activity to Catalase enzyme (CAT).

To determine the value of enzyme concentrate with unknown component by calculating the value of absorption via spectrophotometer, comparison with the value of catalase standard curve (Figure 1).

The results in (Table 1) showed denoted with lowing in specific activity of catalase when treated with cyclophosphamide, the treatment with comparative group showed that there was statistically significant of specific activity (0.91U/ mg protein) in comparison with negative and positive treatment with p value ($p \leq 0.05$).

The cinnamic acid extract concentration (5.6mg/kg) showed that different significantly (594U/mg protein) comparison with positive treatment and comparative group while there is no significant with negative treatment. So, the cinnamic acid extract concentration (2.8mg/kg) showed no significant comparison with comparative group (0.965 and 0.91U/mg protein) respectively

Specific activity of Glutathione Reductase enzyme (CR).

Treating with positive group as cyclophosphamide component led to low value of specific activity with significant for Glutathione Reductase (3.755U/mg protein), The comparative group gave significant differences of

enzyme activity comparison with negative and positive treatment (7.096, 4.132 and 3.75U/mg protein) respectively. Results of gulping the mice with concentrate (2.8mg/kg) of cinnamic acid extract showed significant (5.126U/mg protein) comparing with other treatment, while gulping the mice with concentrate (2.8mg/kg) of cinnamic acid showed elevating in significantly (7.77U/ mg protein) and no significant when compared with the comparative group ($p \leq 0.05$) (Table 1).

The pure cinnamic acid dose 5.6 mg /Kg showed increasing and with significant in antioxidant activity by increasing the liver Glutathione and Catalase enzyme which caused lowing in oxidant pressure that confirmed with the results of [26].The oxidant and damaging cells happened because the Cyclophosphamide[22]attaches the guanine base in the 7 nitrogen at one of the imidazole ring and stopping the cell divided , The main effect of it by metabolize the phosphoramide mustard and this formed only in cell that have low of aldehyde -dehydrogen (ALDH). Phospharamide mustard forms DNA crosslinks between (interstrand crosslinkages) and within (intrastrand crosslinkages) DAN strands at guanine N-7 position that is irreversible and leads to cell dead. Dead cell by cell caused “hyper acute Liver Failure “if the failure happen in 7 days and with decreased production of protein [27].

Interaction between the cyclophosphamide and the pure cinnamic acid dose2.8 mg /kg.

After make sure from no oxidative effects to the perfect concentrate of the pure cinnamic acid which depended in this study ,the interaction between the pure cinnamic acid and cyclophosphamide which caused toxicity and mutation influences because it prevent the cell from divided by damaging the DNA itself and the interaction contain giving the pure cinnamic acid with dose2.8 mg /kg after the mutation factor.

Specific activity to Catalase enzyme (CAT).

Table (2) showed that treating with Vit. C after cyclophosphamide treatment increasing in specific activity (0.434)U/mg protein comparison with control treatment (0.193)U/mg protein. When gulping with concentration (2.8mg /kg) of cinnamic acid after cyclophosphamide treatment showed increasing in

Specific activity of Glutathione Reductase enzyme (CR).

Table (2) showed that treating with Vit. C after cyclophosphamide treatment increasing in specific activity of glutathione reductase (2.905)U/mg protein comparison with control treatment (0.903)U/mg protein. When gulping with (2.8 mg/kg) of cinnamic

acid after the cyclophosphamide treatment showed increasing in specific activity (5.085)U/ mg protein when compared with both control and Vit.C treatment with p value ($p \leq 0.05$).

The results revealed that the pure cinnamic acid able to act as antioxidant [26] in a number of ways**:**

1. Phenolic hydroxyl groups in cinnamic acid are a good hydrogen donors[27], hydrogen donating antioxidants can react with react oxygen and reactive nitrogen species [28, 29] and breaks the cycle of generation of new radicals [30].

2. Following interaction with the initial reactive species, a radical form of the antioxidant was produced and had a greater chemical stability than the initial radical [30,31] .

3. Interaction of phenol hydroxyl groups with π-electrons of benzene ring gave molecules with special properties, the ability to generate free radicals where stabilized by delocalization [28]. Formation of these long-lived free radicals is able to modify radical-mediated oxidation processes [30].

4. Antioxidant capacity of phenolic compounds is also attributed to ability chelate metal ions involved in production of free radicals [33]. However, phenolic compounds can acts as pro-oxidants by chelating metals in manner that maintains or increases their catalytic activity or by reducing metals, thus increasing their ability to form free radicals [34].

Hydrophobic benzenoid rings and hydrogen bonding potential of phenolic hydroxyl groups interact with protein and gave cinnamic acid capacity to inhibit some enzymes involved in radical generation [32;33]

The above results showed that the pure cinnamic acid dose(2.8 mg/kg) have antioxidant activity and with activity mire than the vitamin C and Can consider the pure cinnamic acid from Bioantimutagen because it work to remove the toxicity influence of mutation factor ,so we recommendated to study the effect of pH on the antioxidant activity and study other sides such as the Antimutagenic activity of pure cinnamic acid and the anticancer activity and the ability of cinnamic acid to protect the immunology and mutation system from the Mutants damage that caused.

Table (1): The average of Antioxidant enzymes results for 7 days.

Treat Test	Negative treat (PBS)	Comparative groups Vit. C. (180mg/Kg)	Positive treat Cyclophosphamide (50mg/Kg)	Cinnamic acid (5.6 m /Kg)	Cinnamic acid(2.8 mg /Kg)
Mean ±SE (U/ mg protein)					
Catalase	0.53±0.13 b	0.91±0.31 a	0.162±0.13 c	0.594±0.18 b	0.965±0.21 a
Glutathione Reductase	4.132±0.24 c	7.096±0.52 a	3.75±0.21 c	5.126±0.22 b	7.77±0.10 a

*Probability(p≤ 0.05). * Values are presented as means ±SE (n= 8 mice /group).

* The means within any column with different letters are of significant differences.

Table (2): The average of Antioxidant enzymes results after the Cyclophasphamide treated for 7 days.

Treatment Test	Cyclophosphamide and phosphate buffer solution	Cyclophosphamide and Vit. C	Cyclophosphamide and Perfect concentrate of Cinnamic acid (2.8 mg/kg)
Mean ±SE (U/ mg protein)			
Catalase	0.193±0.25 c	0.434 ± 0.34 b	0.746 ± 0.33 a
Glutathione reductase	0.903 ± 0.32 c	2.905 ± 0.81 b	5.085 ± 0.85 a

*Probability(p≤ 0.05). * Values are presented as means ±SE (n= 8 mice /group).

* The means within any column with different letters are of significant differences.

تقييـــم فعاليـــة السمية المؤكسدة لحامض السينـــاميك النقـي في الفئـران البيض

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الخلاصـة

أجريت الدراسة للكشف عن التأثير السمي المؤكسد والمضاد للأكسدة حامض السينامك النقي cinnamic acid ومقارنته بفيتامين C تجاه السايكلوفوسفومايد Cyclophosphamide والذي يعد مركب كيمائي يسبب تلف خلايا الكبد وتمتلك تأثيرا سمي مؤكسد ،وباستخدام نظام اللبائن في in vivo وبالاعتماد على تقييم الفعالية الإنزيمية للمضادين للأكسدة: الكاتليز وكلوتاثايون المختزل لمجانس خلايا الكبد.

استخدم تركيزين للسينامك اسد النقي(٢.٨، ٥.٦)ملغم /كغم وكل على انفراد لاختبار فعلها المؤكسد والمضاد للاكسدة في الفئران البيض ،وتم انتخاب التركيز الامثل للمركب والذي اعطى نتائج افضل من الحالة الطبيعية السيطرة السالبة،بعد ذلك اجري التداخل مابين التركيز الامثل والمؤكسدالسايكلوفوسفومايد وبشكل معاملتان قبل وبعد العامل المؤكسدلمعرفة الاليةالتي يعمل بها هذا المركب في منع او تقليل الاثر التاكسدي السايكلوفوسفومايد فقد عمل على رفع قيمة انزيمي الماتاليز والكلوتاثايون المختزل المضادين للاكسدة وقد كان الفعل الاكثر ايجابية عند استعمال حامض السينامك النقي بجرعة ٢.٨ ملغم /كغم قبل العامل المؤكسد وبدرجة اقل عند معاملة الحيوانات بحامض االسينامك النقي بعد العامل المؤكسد وبالتالي يمكن تصنيف فعل هذا المركب في نظام اللبائن كونه مضاد للاكسدة ومثبط مباشر Desmutagens بالدرجة الاولى ومثبطات حيوية Bioantimutagens بالدرجة الثانية.

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Biochemical, Hepatoprotcetive Effects of Pure Cinnamic acid Against Cyclophosphamide in White Mice.

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Abstract

The study was carried out to determine hepatotoxicity and hepatoprotcetive effects for Cinnamic acid in comparison with vitamin C against the mutagenic influence of cyclophosphamide ,which is a chemical compound that damage hepatic cells and has mutagenic effects .The effect was studied in mammalian system *invivo* depended on evaluating the enzymatic activity of three hepatic enzymes: Alanine Transaminase(ALT),Aspartate Transaminase (AST),Alkaline Phosphate (ALP).

Two concentration of pure cinnamic acid (5.6 , 2.8) mg/kg were evaluated to chose the suitable concentration which remembered the negative control. In order to used in the interaction experiments, included two types to treatments pre-cyclophosphamide and post- cyclophosphamide in order to determine the mechanisms of the pure cinnamic acid showed no toxic and hepatotoxicity influence in biological system and instead it showed highly performance in preventing or reducing the hepatotoxicity of cyclophosphamide.

Cinnamic acid increased the ALT,AST and ALP especially in dose 2.8 mg/kg .The positive effect was higher were pure cinnamic acid was used as post- cyclophosphamide treatments and to less extent in pre- cyclophosphamide treatments, therefore , cinnamic acid can be considered as a cure hepatocytes from acute liver damage at first degree and responsible at the second degree as a cardiac ,skeletal muscle and placental tissue protective.

Introduction

Hepatotoxicity is a general term for liver damage [1].The symptoms of hepatotoxicity can be sign in damage of the liver which reflected in liver enzyme levels in the blood ,when the liver is damaged, there enzymes are released in to the blood stream ,where the levels can be measured by blood tests, these are called Liver Function Tests enzymes(LFTs)[2]that are routinely checked as part of LFTs include:

_Alanine Transaminase (ALT) also called Serum Glutamic Pyruvate Transaminase (SGPT)or Alanine aminotransferase (ALAT),is an enzyme present in hepatocytes (liver cells).When a cell is damage ,it releases this enzyme into the blood ,where it is measured ALT rises dramatically in acute liver damage ,such as viral hepatitis or paracetamol overdose .Elevations are often measured in multiple of the upper limit of normal (ULM)[3,4].

_Aspartate Transaminase (AST)also called Serum Glutamic Oxaloacetic Transaminas e(SGOT)or Aspartate aminotransferase(ASAT)is similar to ALT in that it is another enzyme associated with liver parenchmal cells. Its raised in acute liver damage ,but is also present in red blood cells and cardiac and skeletal muscle and is therefore, not specific to liver .The ratio of AST to ALT is sometimes useful in differentiating between causes of liver damage .Elevated AST levels are not specific for liver damage and AST has also been used as a cardiac marker[4,5].

_Alkaline Phosphatase (ALP)is an enzyme in the cells lining the billary ducts of the liver .ALP levels in plasma will rise with large bile duct obstruction ,intrahepatic cholestasis or infiltrative diseases of the liver .ALP is also present in bone and placental tissue[5].

Most liver diseases cause only mild symptoms initially but it is vital that these diseases be detected early. Hepatic (liver)involvement in some diseases can be of crucial importance .The tasting AST,ALT and ALP are liver function tests (LFTs)is performed by a medical technologist on a patient serum or plasma sample obtained by phlebotomy. Some tests are associated with functionality (e.g., albumin),some with cellular integrity (e.g., transaminase)and some with conditions linked to the billary tract (ALP)[6].

Liver plays a central role in transforming and clearing chemicals and is susceptible to the toxicity from these agents [7].Certain medicinal agents ,when taken in overdoses and sometimes even when introduced within therapeutic ranges ,may injure the organ[8].Other chemicals agents ,such as those used in laboratories and industries ,natural chemicals and herbal

remedies can also induced hepatotoxicity chemicals that cause liver injury are called hepatotoxins[9].

The bioaviabilities of Polyphenols in plants such as cinnamic acid in cinnamon bark(with all kinds),grape fruit and other and their ability to inhibition and prevent tumor formation after entering blood circulation and absorbing by bowel. They work directly inhibitor by effect on protein or control factors which operate in active the system repairing cell[10]and also because of motivate immune system and increasing conformation natural killer cells and effect in the enzymes which responsible of process and complete the cell cycle by hyperexpression arrangement [11].The pure cinnamic acid is a white crystalline hydroxyl cinnamic acid ,slightly soluble in water, it's a part of the biosynthetic shikimate and phenylpropanoid pathways. It is biosynthesis performed by action of the enzyme phenylalnine aminanielyse (PAL)on phenylalanine [12].

The derivates of cinnamic acid such as ferulic acid ,cinnamicaldehyde ,caffeic acid ,chlorogenic acid and others sowed ability to cure some disease[13]such as antioxidant in vitro and prevention of type 2-Diabetes Mellitus and cardio vascular diseases and because the scientific and locals tends to use the natural products specially the graces in medical and nutrition yields that made us to focus our immediately study to evaluated the antioxidant effect of pure cinnamic acid in one of the biosystem the white mice [14].

Material and Methods

Solution:

Phosphate Buffer Solution(PBS) [15].
NaOH(0.4N)prepared according to [16].
Colchicine Solution : Colchicine1mg (one tablet)and sterile distilled water 1ml .The solution was used immediately after preparing 2.5 to 3 hours.[17].

Doses:

Two doses from the pure cinnamic acid (Riedel-de Haën company)which are(5.6,2.8) mg/ kg and vitamin C(180 mg/ kg)[18](as comparative groups and cyclophosphamide compound in (50 mg/ kg)[19]as a positive control and the PBS as a negative control.

Hepatoprotectivity effects:

To study the hepatotoxicity effect and the hepatoprotcetive in laboratory animals ,the gulping was orally by syringe 1 ml size supplying with gulping instrument as thin plastic tube to turning shape and soft edge to avoid harm the mice and inserted to the digestive system of mouse ,but the cyclophosphamide was injected Intraperitonially because it lost after (3-12)hours by urine[20].The white mice was used in the experiments

which is *Mus musculus*(Balb/C)in age (8-12)weeks that get from the National Center for Drug Control and Research .The mice put in plastic cages in groups depend on the experimental need in temperature room(25-32)Ċ and gave the water and integrated animal fed which manufacture locally.

The experiment:

Two concentration of from pure cinnamic acid (5.6,2.8) mg/ Kg ,the concentration a count depended on the mouse weight .The experiment contains 40 mice divided in to 5 groups of 8 mice each (16 mice gulped with the two cinnamic acid concentration (5.6,2.8) mg/ Kg ,8 mice gulped with PBS and depended as a negative control ,8 mice injected with cyclophosphamide compound and depended as a positive control ,8 mice gulped with vitamin C and depended as a comparative groups and from the two control) and the comparative groups can gain primary idea about the suitable concentrate to cinnamic acid .

Study the interaction between the cinnamic acid and cyclophosphamide.

After treated with cyclophosphamide compound,24 mice were used in this experiment ,8 gulped with the perfect concentrate from the pure cinnamic acid 5.6 mg/ kg, other 8 gulped with vitamin C(180 mg/ kg) and the last 8 mice gulped with the PBS.

_1st group:(positive control): Mice injected with cyclophosphamide compound 50 mg/ kg in the Intraperitonial membrane in the first day with dose 0.1 ml and then gulped orally with the PBS for 7 days ,mice dissected after24 h from the last dose.

_2nd group: Mice injected with cyclophosphamide compound 50 mg/ kg in the Intraperitonial membrane in the first day with dose 0.1 ml and then gulped orally with the vitamin C (180 mg/ kg) for 7 days ,mice dissected after24 h from the last dose.

_3rd group: Mice injected with cyclophosphamide compound 50 mg/ kg in the Intraperitonial membrane in the first day with dose 0.1 ml and then gulped orally with the perfect concentrate of pure cinnamic acid (2.8 mg/ kg), mice dissected after24 h from the last dose.

Preparing of tissue extract from Liver mouse:

One gram from the mouse liver were cutting in to very small pieces by sharp knife in 1 ml from PBS and using in the same time the pressure of hand used to crush the liver tissue till be sticky solution then move the attain to the centrifuge with (5000 round/ second) speed for one hour .Remove the upper layer and let the remainder in the bottom of the test tubes,, keep in freezer (-20) Ċ until evaluate or use

directly to measure the activity of enzyme [21].

Enzymatic assay:

-Measured the enzyme activity of Alanine transaminase (ALT), Aspartate transaminase (AST).

Used the test instrument belonging to measured the activity of AST enzyme (Aspartate transaminase),ALT(Alanine transaminase) ,which imported from SYRBIO company get the two test tubes for all par ten, the first one containing blank reagent and the other the sample which need to measure the enzyme activity [16].

	Reagent (blank)	Sample
Sample	---	0.1 ml
Solution 1 (ALT or AST)	0.5 ml	0.5 ml
Distilled Water	0.1 ml	--
Shaken gently and keep Incubate 37 Ċ for 30 minute		
Solution 2 (ALT or AST)	0.5 ml	0.5 ml
Shaken gently and keep in 20 Ċ for 20 minute.		
NaOH (0.4 N)	5 ml	5 ml
Shaken tubes ,read absorbance after 5-10 minutes at wavelength 530 – 55((546) nm		

-Measured the Enzyme activity of Alkaline Phosphatase (ALP):

Four test tubes prepared for all part ten ,the first containing the sample, The second is the sample blank, The third containing the standard sample ,The fourth containing the detection blank, [22].

Contains	First tube (sample)	Second tube (sample blank)	Third tube (standard sample)	Fourth tube (detection blank)
Detection reagent	2 ml	2 ml	2 ml	2ml
Incubate for 5 minute in 37 Ċ				
Serum **Reagent 2**	50 µl ----	___ ---	___ 50 µl	___ ___
Incubate for 51 minute exacting in 37 Ċ				
Reagent 3	0.5 ml	0.5 ml	0.5 ml	0.5 ml

Shaken the tubes handily or by vortex				
Reagent4	0.5 ml	0.5 ml	0.5 ml	0.5 ml
Serum	---	50 µl	---	---
D.W.	---	---	---	50 µl
Shaken tubes ,read absorbance after 10 minutes ,in wavelength 520 nm				

$$\text{The absorbance measured} = \frac{\text{OD of sample serum} - \text{OD Serum blank}}{\text{Standard absorbance}} \times n$$

Statistical analysis

The statistical analysis is done to get the means ±SE and test the different significant among the means by using Duncan test [23] then differences among the means in interaction experiments were compared between the Vit. C, cinnamic extract and the cyclophosphamide by using T- test [24].

Results and Discussion

Select the perfect concentrate from the pure cinnamic acid in antioxidant activity.

The changes of liver function tests (LFTs) in the serum of white mice

The liver carries out numerous synthetic, excretion and detoxification functions[25,26], however only a minority of these can be measured by levels of products in the blood. Liver Function Testes (LFTs) measure the concentration of various different protein and enzyme in the blood that are either produced by liver cell or released when liver cells are damaged [25.26]

Aspartate Transaminase Enzyme (AST).

Table (1) expressed that the position treatment with cyclophosphamide related to low value of AST enzyme in the serum (27.2U/L) with significant ($p \leq 0.05$) comparing with the negative treatment (30.75U/L), while comparative group showed high value in enzyme level (40.2U/L) and increasing with different significant when compared with both the negative and positive treatment. The gulping with cinnamic acid (2.8mg/kg) showed that the value reached to (30.77U/L) when comparison with both negative and positive treatment and no significant with the comparative group ($p \leq 0.05$), but when gulping with the concentrate (2.8mg/kg) of cinnamic acid showed significant when compared with the positive treatment and high significant (40.69U/L) when compare with both cinnamic acid (5.6 mg/kg) and also with the comparative

group, there is no significant in compared with the negative treatment .

The result indicated that (2.8 mg/kg) was the best concentration when gulping for seven days, which showed in the result of AST enzyme and referred to caused heart attack, infectious mononucleosis, liver disease hepatitis and trauma when the level of this enzyme was increasing [25,26].

Alanine Transaminase Enzyme (ALT).

Table (1) showed that the positive treatment as a result by using cyclophosphamide was lowing in ALA concentration reached to (61.4U/L) and this result indicated to different significant in comparing with negative treatment (63.6U/L) and comparative group (70.36U/L) with p value ($p \leq 0.05$).The cinnamic acid (5.6mg/kg) showed (75.62U/L) when compared with positive and negative treatment and no significant when compared with comparative group, then the present study showed that the mean of cinnamic acid (2.8mg/kg) and comparative group significantly from other treatment with p value ($p \leq 0.05$)

In comparison with other study, results referred to increasing in significant between them and the best result related to concentrate (2.8 mg/kg) of cinnamic acid in value of ALA enzyme results which caused hepatitis, cirrhosis and infectious mononucleosis [25,26]

Alkaline phosphates Enzyme (ALP).

This enzyme is mainly implicated in the diagnosis of billary abstraction and was normally found in small bile tracts in the liver, it is also found in the liver, bone, placenta and the evaluated levels may be due to a problem outside the liver such as a malignancy (cancer) [25,26].Mice treatment with cyclophosphamide was showed significantly elevated (256.6U/L), comparison with negative treatment (148.38U/L) and Vit.C with p value ($p \leq 0.05$). The cinnamic acid concentration (5.6 mg/kg) showed significantly elevated (438.7U/L) in mice serum with p value ($p \leq 0.05$) comparative with other treatment, while cinnamic acid extract concentration (2.8mg/kg) showed increased with significant reached (395.7U/L) in mice serum with p value ($p \leq 0.05$) comparative with other treatment table(1).

Interaction between the cyclophosphamide and the pure cinnamic acid dose 2.8 mg /kg.

After make sure from no hepatotoxicity effects to the perfect concentrate of the pure cinnamic acid which depended in this study ,the interaction between the pure cinnamic acid and cyclophosphamide which caused toxicity and mutation influences because it prevent the cell from divided

by damaging the DNA itself and the interaction contain giving the pure cinnamic acid with dose2.8 mg /Kg after the mutation factor.

_ The changes of liver function tests (LFTs) in the serum of white mice after the cyclophasphamide treatment.

Aspartate Transaminase Enzyme (AST).

Table (2) showed that treating with Vit. C after cyclophosphamide increased the rate of AST concentrated in the serum of mice (33.01)U/L comparison with control (28.05)U/L. When gulping with (2.8mg/Kg) of cinnamic acid after cyclophosphamide was showed no significant (31.09) U/L when compared with the Vit. C with p value ($p \leq 0.05$)

Alanine Transaminase Enzyme (ALT).

Results showed increasing in the rate of ALT concentrated when treating with Vit.C after cyclophosphamide (59.89)U/L comparison with the control treatment (52.52)U/L. When gulping with (2.8mg/Kg) of cinnamic acid extract after the cyclophosphamide showed increasing in the rate of ALT comparing with control and no significant when it compared with the Vit .C with p value ($p \leq 0.05$), as showed in table (2).

Alkaline phosphates Enzyme (ALP).

Table (2) was appeared that Vit.C treatment after the cyclophosphamide increased in ALP concentrated in serum of mice (478.09) U/L comparison with control treatment (456.32)U/L. When gulping with (2.8mg/kg) of cinnamic acid after cyclophosphamide showed lowing Lin ALP concentrate (236.74) U/L when compared with both control and Vit. C treatment with p value ($p \leq 0.05$).

The above results showed that the pure cinnamic acid dose 2.8 mg/Kg have hepatoprotcetive activity and with activity more than the vitamin C , mechanisms of cinnamic acid to repair hepatocytes were:

- Avoid and prevent hydroxyl radical as a product of hydrogen peroxide and gave the first spark for start the chemical interaction such as lipid peroxidation [27].
- Avoid or prevent or repair oxidation of DNA and protein, which depend on the hydroxyl groups of cinnamic acid [28.29].
- Cinnamic acid was suppressed hepatic fibrosis and protected liver against damage [30].
- Cinnamic acid have anti-hyperlipidemic action [31].
- Release of inflammatory mediators such as cytokines, histamine, prostaglandins and leukotrenes to protect hepatocyte [31].
- The liver cytochrome p-450 system converts cyclophosphamide to 4-

hydroxycyclophosphamide, which is a equilibrium with aldophosphamide. phosphoramide mustard and acrolien were yielded from cleavage aldophosphamide. These two compounds are highly cytotoxic .Cyclophosphamide is uncommon hepatic toxin and its effect was due to an idiosyncratic reaction [32].

Table (1) Liver function tests (LFTs) in the serum of white mice.

Treat / Test	Negative treat (PBS)	Comparative groups, Vit.C (180mg/Kg)	Positive treatment Cyclophosphamide (50 mg /Kg)	Cinnamic acid (5.6 mg /Kg)	Cinnamic acid (2.8 mg /Kg)
Mean ±SE (U/L)					
AST	30.75±0.99 b	40.2±0.81 a	27.2± 0.96 c	30.77±0.75 a	40.69±0.14 b
ALT	63.6± 0.11 b	70.36±0.34 a	52.5± 0.17 c	61.4±0.89 a	75.62±0.91 b
ALP	148.30±0.85 a	385.125±0.92 b	256.6± 0.34 c	438.7±0.68 a	395.7±0.99 b

*Values are presented as means ±SE (n= 8 mice /group). *Probability(p≤ 0.05).

* a, b, c within any column significant differences.

Table (2): Liver function tests (LFTs) in the serum of white mice after with the Cyclophasphamide component treated(7 days).

Treat / Test	Cyclophosphamide after Phosphate Buffer solution	Cyclophosphamide after Vit. C	Cyclophosphamide after perfect concentrate of Cinnamic acid (2.8 mg/kg)
Mean ±SE (U/L)			
AST	28.05 ± 0.91 b	33.01 ± 0.83 a	31.812±0.25 a
ALA	52.52 ± 0.93 b	59.89 ± 0.91 a	61.23± 0.93 a
ALP	456.32 ± 0.62 b	478.09 ± 0.83 a	236.74±0.48 b

*Values are presented as means ±SE (n= 8 mice /group). *Probability(p≤ 0.05).

* a, b, c within any column significant differences.

التأثيرات الكيموحيوية

لحامض السينـــاميـــك النقـــي لحماية الكبد ضد السايكلوفوسفومايد في الفئـــــران البيض

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الخلاصـــــة

أجريت الدراسة للكشف عن التأثير السمي للكبد لحامض السينماميك النقي cinnamic acid ومقارنته بفيتامين C تجاه السايكلوفوسفومايد Cyclophosphamide والذي يعد مركب كيمائي يسبب تلف خلايا الكبد وباستخدام نظام اللبائن في *invivo* وبالاعتماد على تقييم لثلاث من إنزيمات وظائف الكبد: Alanine Transaminase(ALT),Aspartate Transaminase (AST),Alkaline Phosphate (ALP).

استخدم تركيزيين لحامض السينماميك النقي(٢.٨،٥.٦) ملغم /كغم وكل على انفراد لانتخاب التركيز الأمثل للمركب والذي أعطى نتائج أفضل من الحالة الطبيعية السيطرة السالبة،بعد ذلك اجري التداخل مابين التركيز الأمثل السايكلوفوسفومايد وبشكل معاملتان قبل وبعد لمعرفة الآلية التي يعمل بها حامض السينماميك في منع و تقليل الأثر السمي للكبد للسايكلوفوسفومايد فقد عمل على رفع قيمة إنزيمات وظائف الكبد LFTs(ALT,AST,ALP) وقد كان الفعل الأكثر ايجابية عند استعمال حامض السينماميك النقي بجرعة ٢.٨ ملغم /كغم بعد السايكلوفوسفومايد وبدرجة اقل عند معاملة الحيوانات بحامض السينماميك النقي قبل السايكلوفوسفومايد وبالتالي يمكن تصنيف فعل هذا المركب في نظام اللبائن كونه علاج بالدرجة الأولى لحماية خلايا الكبد من الضرر الحاد وبالدرجة الثانية وقائيا للعضلات الهيكلية والقلبية وخلايا المشيمة .

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Iraq ICT Situation and its effect on Iraq Rebuilding Study, Analysis and Suggestion

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Abstract

Information and Communication Technology (ICT) provides developing nations with an unprecedented opportunity to meet vital development goals, such as poverty reduction, basic healthcare, and education, far more effectively than before. In this paper a general survey to ICT statistics in Iraq will be studded and an analysis and a comparison between ICT statistics in Iraq, Arabian and Developing countries will be performed. In add a statistical result from a USA and European Countries will be performed for comparison purposes.

Suggestions will be presented to reach the required level of ICT in Iraq to enable the process of Iraqi rebuilding. These suggestions include the requirements from Educational, governmental and private sector activities.

Key Words: ICT, ICT In Education, ICT in Iraq, ICT and ITU

1. Introduction

Information and **C**ommunications **T**echnology 0r **T**echnologie**s** (ICTs) have been identified by many international development institutions as a crucial element in developing the worlds' poorest countries, by integrating them into the global economy and by making global markets more accessible. The World Bank has collaborated with the International Finance Corporation to promote access to ICTs, an initiative which it describes as one of its most successful. In 2006 the United Nations launched an initiative called the Global Alliance for Information and Communication Technologies and Development.[1]

The new information technologies are the driving force behind the explosion of information and the fragmentation of knowledge that we witness today. All available information doubles every three years and yet, we are able to use less than ten percent of the available information.
The greatest challenge facing us today is how to organize information into structured knowledge. We must rise above the obsession with the quantity of information and the speed of transmission, and focus on the fact that the key issue for us is our ability to organize the information once it has been amassed, to assimilate it, to find meaning in it and assure its survival.[2]

ICT covers any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital form. Importantly, it is also concerned with the way these different uses can work with each other. Some products for example, are personal computers, digital television, email, and robots.

In business, ICT is often categorized into two broad types of product: -

1- The traditional computer-based technologies (things can be typically do on a personal computer or using computers at home or at work); and

2- The more recent and fast-growing range of digital communication technologies (which allow people and organizations to communicate and share information digitally). [2,3]

ICT is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning. ICTs are often spoken of in a particular context, such as ICTs in education, health care, or libraries.

According to the European Commission, the importance of ICTs lies less in the technology itself than in its ability to create greater access to information and communication in underserved populations. Many countries around the world have established organizations for the promotion of ICTs, because it is feared that unless less technologically

advanced areas have a chance to catch up, the increasing technological advances in developed nations will only serve to exacerbate the already-existing economic gap between technological "have" and "have not" areas. Internationally, the United Nations actively promotes ICTs for Development (ICT4D) as a means of bridging the digital divide. [4]

ICTs allow users to participate in a rapidly changing world in which work and other activities are increasingly transformed by access to varied and developing technologies.[2]

2. Some ICT Impacts

2.1 Economic Impact

In the recent decades widespread incorporation of ICTs into many tiers of business, political processes and structuring of the global economy has occurred. ICTs have increased international interconnectedness and sped up the process of globalization. They have been ICTs, in conjunction with globalization and the information revolution, have reshaped the workforce. By increasing the speed of international communication, ICTs have enabled corporations to outsource jobs, both in the manufacturing as well as white collar sectors. While this lowers production costs and, as a result, the cost of goods, it has also had fundamental and often detrimental impacts on labor conditions.

Despite the international spread of ICTs, the economic impacts have been geographically uneven. They have exacerbated pre-existing disparities between developed countries, which can afford to produce and consume the latest technologies, and developing countries, which cannot. This gap is known as the digital divide.[2]

2.2 Social Impact

ICTs have impacted societies on many levels. They have extended the reach of public administration, leading to a centralization of regional management into urban centers.

They have led to new forms of employment in innovation and production of ICTs and a demand for highly-skilled specialists. However, ICTs have also enabled professionals in certain industries to be replaced by unskilled workers, or even made entirely redundant. Proponents of ICTs portray this as a ‘re-skilling’ of the workforce, while to detractors it is a ‘de-skilling’ process.

ICTs facilitate the ease of communication, which has many profound effects. In the business world, deals can be made through emails and video conferencing, and mobile phone technology has made it possible for people to check and send messages on the go, allowing us to be connected. Although this has greatly facilitated the business world in general, many negative implications to be considered as well. Simple messages which used to be delivered face-to-face are now being sent through the cold impersonal

means of email. This has effectively reduced socialization within the office, thus contributing to the weakening of bonds within the workplace.

Despite these imbalances in power relations, many social justice movements believe ICTs can be used to promote equality and empower marginalized groups. These groups advocate ICTs as a means of providing accessible and affordable information and as a platform for voices that might otherwise go unheard. [2]

3. Core Lists of ICT Indicators

The core list of ICT1 indicators presented was the outcome of an intensive consultation process by the *Partnership on Measuring ICT for Development* with national statistics offices (NSOs). This included a stocktaking exercise through which metadata on the status of official information society statistics were obtained from NSOs worldwide, as well as a series of regional events on core ICT indicators.[5]

3.1 Core Indicators on ICT Infrastructure and Access

Basic core examples (A1 to A12)

A1 Fixed telephone lines per 100 inhabitants
A2 Mobile cellular subscribers per 100 inhabitants
A3 Computers per 100 inhabitants
A4 Internet subscribers per 100 inhabitants
A10 Percentage of localities with public Internet access centers (PIACs) by number of inhabitants (rural/urban)

Extended core

A11 Radio sets per 100 inhabitants
A12 Television sets per 100 inhabitants

3.2 Core Indicators on Access to, and Use of, ICT by Households and Individuals

Basic core examples (HH1 to HH10)

HH1 Proportion of households with a radio
HH2 Proportion of households with a TV
HH10 Internet activities undertaken by individuals in the last 12 months getting information: (a) about goods or services; (b) related to health or health services; (c) from government organizations / public authorities via websites or email; and (d) other information or general Web browsing

In addition there is a list of Extended core (See [5] for details).

3.3 Core Indicators on Use of ICT by Businesses

Basic core examples (B1 to B8)

B1 Proportion of businesses using computers
B2 Proportion of employees using computers
B8 Proportion of businesses placing orders over the Internet

In addition there is a list of Extended core (See [5] for details).

3.4 Core Indicators on the ICT Sector and Trade in ICT Goods

Basic core

ICT1 Proportion of total business sector workforce involved in the ICT sector

ICT2 Value added in the ICT sector (as a percentage of total business sector value added)
ICT3 ICT goods imports as a percentage of total imports
ICT4 ICT goods exports as a percentage of total exports

Table (1) shows some statistical indicators to compute the ICT Development Indicator IDI for some world countries including some Arabic and Developing countries. Unfortunately Iraq not included in these international statistics.

Table (1) Statistical tables of indicators used to compute the IDI [6]

	Fixed Telephone lines per 100 inhab		Mobile cellular subscriptions per 100 inhab		International Internet B W per Internet user(bit/s)		Proportion of Households with computer		Proportion of Households with Interne	
Country	**2002**	**2007**	**2002**	**2007**	**2002**	**2007**	**2002**	**2007**	2002	2007
Bahrain	**25.2**	***25.9***	**55.9**	**148.3**	**1'588**	**7'660**	**35.0**	***50.7***	19.0	*34.1*
Egypt	**11.1**	**14.9**	**6.4 3**	**9.83**	**39**	**1'023**	**3.0**	**16.1**	*1.4*	*9.1*
Jordan	**12.8**	**9.9**	**23.2**	**80.5**	**293**	**831**	**16.4**	***25.1***	5.0	*10.5*
Syria	**11.9**	**17.3**	**2.2**	**31.3**	**44**	**304**	**20.0**	**35.0**	20.0	30.0
Kuwait	**19.8**	***18.6***	**50.3**	**97.3**	**308**	**2'577**	***29.0***	***34.1***	*24.0*	*29.1*
China	**16.6**	**27.5**	**16.0**	**41.2**	**159**	**1'735**	**10.2**	***39.1***	5.0	*16.4*
U A E	**29.1**	**31.6**	**64.6**	**176.5**	**1'067**	**5'380**	**33.0**	***43.3***	30.0	*40.4*
U K	**58.8**	**55.4**	**83.3**	**118.5**	**9'662**	**55'281**	**57.9**	**75.0**	50.0	67.0
U S A	**65.3**	**53.4**	**48.9**	**83.5**	**2'208**	**15'341**	**59.0**	***70.2***	52.0	61.7
Sweden	62.5	60.4	89.0	113.7	14'96	62'48	75.0	83.0	66.0	79.0

5. ICT IN EDUCATION

ICT has become, within a very short time, one of the basic building blocks of modern society. Many countries now regard understanding ICT and mastering the basic skills and concepts of ICT as part of the core of education, alongside reading, writing and numeracy.

One of UNESCO's overriding aims is to ensure that all countries, both developed and developing, have access to the best educational facilities necessary to prepare young people to play full roles in modern society and to contribute to a knowledge nation. Maintaining a capacity to advise national governments on the use of technology in schools and, in particular, on the optimal balance, given local circumstances, between ICT and older educational technologies and assisting countries in developing educational software and materials that reflect their own national and regional cultures are key components of the Organization's strategy to achieve the *Education for All* goals.

The goal has two key purposes. The first is to specify a curriculum in ICT for secondary schools that is in line with current international trends. The second purpose is to outline a program of professional development for teachers necessary to implement the specified ICT curriculum successfully.[7]

The main purpose of ICT in Education means is implementing of ICT Equipments and Tools in Teaching-Learning process as a media and methodology. The purpose of ICT in education is generally to familiarize students with the use and workings of computers, and related social and ethical issues.

ICT has also enabled learning through multiple intelligence as ICT has introduced learning through simulation games; this enables active learning through all senses

ICT in education can be broadly categorized in the following ways as

-ICT as a subject (i.e., computer studies)

-ICT as a tool to support traditional subjects (i.e., computer-based learning, presentation, research)

-ICT as an administrative tool (i.e., education management information systems/EMIS).

As an example In **Kenya**, ICT is not taught as a subject in primary school. It is taught as an added advantage to some schools. In high school, the ICT is an optional subject.

In the **United Kingdom**, Information and Communication Technology (ICT) is a subject in education, and a part of the National Curriculum. All students must study Information and Communication Technology to GCSE level.

Within Scotland and the North East of England a pilot enterprise in education initiative aims to use ICT as a vehicle to encourage creative thinking within the youth demographic. Tapping into the 'unconstrained' minds of the region's young people, the program simulates the process of taking a new innovative ICT idea through the commercialization process. The competition is sponsored by Microsoft and BT and hopes to expand its reach throughout the UK in 2009/10.[8]

For developing countries ICTs have the potential for increasing access to and improving the relevance and quality of education. It thus represents a potentially equalizing strategy for developing countries.

ICTs are a potentially powerful tool for extending educational opportunities, both formal and non-formal, to previously underserved constituencies—scattered and rural populations, groups traditionally excluded from education due to cultural or social reasons such as ethnic minorities, girls and women, persons with disabilities, and the elderly, as well as all others who for reasons of

cost or because of time constraints are unable to enroll on campus. **[7]**

5. Challenges for the Uptake of ICT In Arab States

Table (2) shows some statistical ICT indicators for some Arab countries included Iraq for years up to 2008(That what is available in 2010 publications). [9,10]

Table (2) Statistical tables of indicators used to compute the IDI

	Main(Fixed) telephone lines per 100 inhab.		Mobile cellular subscriptions per 100 inhab.		International Internet B W (bit/s) per Internet user		Proportion of Households with computer		Proportion of Households with Interne	
Country	**2007**	**2008**	**2007**	**2008**	**2007**	**2008**	**2007**	**2008**	2007	2008
Bahrain	**26.8**	**28.4**	**146.9**	**185.8**	**7'660**	***11'020***	**87.0**	**87.0**	*46.5*	*48.0*
Egypt	**14.1**	**14.6**	**37.6**	**50.6**	**1'262**	**1'995**	**10.5**	**13.1**	9.5	12.9
Jordan	**9.4**	**8.5**	**80.3**	**86.6**	**788**	**2'893**	**25.1**	**39.3**	10.4	13.2
Syria	**16.8**	**17.1**	**30.4**	**33.2**	**304**	**589**	**35.0**	***38.5***	30.0	*31.2*
Kuwait	***18.6***	***18.5***	**97.3**	***99.6***	**2'577**	***3'390***	**34.1**	***35.2***	29.1	*29.7*
China	**27.5**	**25.5**	**41.2**	**47.9**	**1'735**	**2'149**	***29.0***	***31.8***	16.4	*18.3*
U A E	**31.7**	**33.6**	**177.2**	**208.6**	**8'718**	**13'333**	**58.5**	**74.0**	48.7	66.4
U K	**55.5**	**54.2**	**121.2**	**126.3**	**55'259**	***77'179***	**75.0**	**78.0**	66.7	71.1
U S A	**51.3**	**49.6**	**85.2**	**86.8**	**15'341**	***21'403***	**70.2**	***72.5***	61.7	*62.5*
Sweden	60.1	57.8	111.1	118.3	62'174	*109'928*	83.0	87.1	78.5	84.4

The Challenges for the Uptake of ICT In Arab States as;

5.1 Obstacles Relating to the Environment

Most challenges in ICT adoption and usage lie in the political and regulatory environment. With uneven records in legal and regulatory issues, weak ICT strategies, chronic R&D shortages, excessive reliance on foreign technology, and

Ongoing weaknesses in ICT implementation, Arab states are frequently lagging in their readiness for the networked future.

1- High software piracy rates jeopardize confidence with one of the highest software piracy rates in the world.

2- Regulatory Framework Ignores the Arab Citizen

3- No common plan: foregoing ICT efficiency opportunities

4- Insufficient Funding for ICT Research and Development

5- "Digital Poverty:" mediocre bandwidth and connectivity

6- Poor Interconnectivity of Arab IP Systems

5.2 Obstacles Relating to Individual Capabilities and Access to Technology

Several of the obstacles faced by individual countries are deeply engrained. Such obstacles include societal rigidity, weaknesses in education, unfair income distribution, and uneven access to technology.

1- An Increasing Arab "brain drain"
2- Digital Divide Remains
3- Obstacles in Business and Governmental Sectors
4- Weak Local ICT Capabilities
5- Marginal Local Language Content

5.3 Prescriptions

1- Create a Common Arab ICT Strategy Aligned With National Ambitions
2- Proceed Towards Technological Sovereignty
3- Increase the Competitiveness of the Telecommunications Industry
4- Reduce the Digital Divide
5- Stimulate Arabic Content

In the developing world, mobile phones have revolutionized telecommunication and have reached an estimated average 49.5 per cent penetration rate at the end of 2008 – from close to zero only ten years ago. This is not only faster than any other technology in the past, but the mobile phone is also the single most widespread ICT today. The number of Internet users, on the other hand, has grown at a much slower rate, in particular in the developing world, where at the end of 2007 only 13 out of 100 inhabitants used the Internet. Fixed Internet access in developing countries is still limited, and, where available, often slow and/or expensive. High-speed (broadband) connections are rare and mobile broadband, while increasing steeply in high-income countries, is still insignificant in most developing countries. In light of such developments, the question remains as to whether the global digital divide is widening or narrowing, what the contributing factors are, and what progress has been made by individual countries to close the digital divide.[9]

6. ICT in IRAQ

Despite Iraq's turmoil, successive governments have been able to improve the telecom sector and the information society, as well as involve the private sector through the creation of the regulatory environment which is represented by the Communications and Media Commission, which resulted in a boom in the mobile services (GSM). Work is also underway to restructure the sector and to plan its policies by approving a package of legislation and governmental regulations.

In 2009, the Ministry of Communications, almost completed several strategic projects, through which modern technologies for the NGN systems, optical, microwave, and wireless communication services will be introduced. Added to that is the step taken to establish more international space stations, more Internet services, and more infrastructure projects for electronic applications, notably the e-government project.

There are also measures taken to approve the five-year strategy for the development of the sector which has been laid down in collaboration with ESCWA (Economic and Social Commission for Western Asia).

Currently, consecutive meetings are being held to study the strategy, yet its implementation has not been approved.

The Ministry of Communications will be the body responsible for its implementation starting from 2010 instead of 2009 as was decided earlier. [11]

6.1 Iraqi Infrastructure

By The Ministry of Communications is heading towards renewing its outdated fixed phone networks and updating its communication systems infrastructure with the latest technologies. As evident in the following projects:

- There is the seven rings optical network which connects all Iraqi governorates via an optical system (DWDM) with a capacity of STM-64. There are also other projects like the Baghdad eight rings optical network (DWDM) with a capacity of STM-64, the optical links STM-1 project, and other projects that link the Iraqi governorates together and with neighboring countries and with the rest of the world;
- There is the national microwave system with seven tracks, with capacities of 7STM-1+ 1, and 5STM1+1;
- There is a new exchange system (NGN) with 720,000 numbers distributed over 26 exchanges of different capacities, work is also carried out to expand the IP Backbone, and update the aging ground network in-order to operate all modern exchanges, as well as establishing 3-management domains which are divided into three zones northern, central and southern, work is also carried out

to complete the optical system DWDM access networks to overcome the fiber to cabinet problems;

- There are also the space communications, where there are three satellite stations operating in service with a total expandable capacity of 74E1S. There is also a plan to create more space stations, one of which is Al-Kadhimiya station to the north of Baghdad which is under construction with an expandable capacity of 24E1S;
- There is also the IP project for the e-government and to link ministries and state institutions;
- Seeking to establish a management center to control all communication projects in Iraq, and the electronic archiving project together with the establishing of the LAN networks for the center of the Ministry;
- The reliance of the Internet company on the above mentioned infrastructure to implement its plan using various technologies as a means of network access, including DSL, WiMAX, and in some assemblies the Wi-Fi technology. [11]

6.2 Initiatives and Projects For ICT Infrastructure and Development of New Service

In 2008, the sum of government allocations for investment projects of the Ministry of Communications reached 378 billion Iraqi dinars according to preliminary estimates for this budget. In 2009, these allocations exceeded 250 billion dinars.

Investments in communications networks reached big sums, whereby approximately 3.75 billion dollars worth of mobile phone licenses were invested in. That was in addition to the revenue share of these companies, which ranges between (15-18 per cent) of the gross revenue, and approximately 80 million dollars worth

of fixed wireless phone licenses and a revenue share ranging between (10-33 per cent) of the gross revenue. This investment encouraged competition in the telecommunications market in Iraq, which resulted in better service at a lower cost. [11]

6.3 ICT Connectivity

Based on a survey carried out by "The Iraqi Mobile Bang", mobile phone users did not face difficulties and they were from both sexes and from all social classes. They were also able to call rural areas which suffer from limited fixed telecommunications networks, the public mobile telephone service covered nearly all of Iraq, and the rate of mobile phones reached 1.56 mobile phone per Iraqi family. The rate of the Internet use by Iraqis amounted to 3 per cent, where 39 per cent of whom use it at home, 34 per cent in internet cafés, and 26 per cent in educational institutions, work and other places. [11]

6.4 Internet Infrastructure

The Ministry of Communications signed a partnership contract with a Lebanese firm to supply the devices necessary for the Internet service using (Dial-up, VoIP, WiFi, DSL) technologies. The contract continued until 31/12/2007. The Ministry is planning to provide Internet service using fiber optic cables network. It is also planning to sign contracts for the supply of a band between (50-100) MB / s via satellite, as well as to carry out the management, maintenance and expansion of the broadband in Baghdad in-order to provide interconnection to all ministries and some institutions and universities via the micro technology (PTP) and (PMP). This would serve as the infrastructure for the e-government project. Added to that is the expansion of the project during 2008 to cover all the city of Baghdad, using the WiMAX technology, and targeting the year 2012 to cover with this technology all of Iraq in-order to serve all government institutions.

In 2009, the building of the international access portals of the Internet in Iraq was completed and its expansion to include all governorates will be finished by 2011. This would provide the possibility to integrate with a very broadband of up to (10GB / s). At the national level, the Communications and Media Commission granted licenses to provide fixed service WiMAX (802.16d) under the fixed wireless phone licenses in the band of 3.5 GHz whereby it granted every national company a band of 4 * 3.5 MHz and every local company a band of 3 * 3.5MHz in order to provide this service. The Commission looks forward to granting other mobile licenses for this service (802.16e) one of which is the license which will be allocated to meet the requirements of government institutions.[11]

6.5 ICT in Education and Training

The Iraqi Commission for Computer and Informatics prepared a number of projects to improve the ICT status in Iraq. It also established in universities about 110 computer centers and 37 centers for the Internet. The Commission opened an academy for networks to train employees from both the public and private sectors, after

which the participant is granted an international certificate recognized by the (Cisco) company.

Iraqi universities have more than (50) departments in the disciplines of computer engineering, computer sciences, and IT. The number of students in the preparatory studies for these disciplines amounted to about 7,000 students. The number of graduates in these specialties amounted to 8,089 graduates and their ratio to the total number of graduates is about 10.8 per cent (according to the reports of the Central organization for Statistics and IT). The universities benefit from ESCWA project on Iraqi academic networks. Refer to Box 2 for more information. To give a general idea about the number of employees working in the ICT disciplines, the General Company for Telecommunications and Post is given as an example, whereby in 2008 the number of its engineering staff amounted to about 1,150 engineers from both sexes, and the number of its technicians amounted to 7,100 in addition to the various supporting staff from other disciplines. [11]

7. Recommendations

The recommendations will be divided to three parts due to the deep gap in ICT requirements and infrastructure, these parts are:

- Recommendations due to would and international situations needs.
- Recommendations due to Arab state situation and needs.
- Recommendations for Iraqi Educational process.

7.1 Recommendations due to would and international situations needs

The World Summit on the Information Society (WSIS) held in Geneva (2003) and Tunis (2005) brought together governments, civil society and the business sector to discuss a broad range of subjects related to ICT for development. In the end, governments agreed on a set of commitments and actions to foster the establishment of an inclusive information society. In particular, ten targets were identified in the Geneva Plan of Action, along with numerous recommendations based on different action lines (Action Lines C1 – C11). The targets, to be achieved by 2015, as they are mentioned in the ninth edition of the World Telecommunication/ICT Development Report is being published at the half-way point between the World Summit on the Information Society (WSIS) in 2005 and the target date for the Millennium Development Goals (MDGs) in 2015 are:

1. To connect villages with ICTs and establish community access points
2. To connect universities, colleges, secondary schools and primary schools with ICTs
3. To connect scientific and research centers with ICTs
4. To connect public libraries, cultural centers, museums, post offices and archives with ICTs
5. To connect health centers and hospitals with ICTs
6. To connect all local and central government departments and establish websites and e-mail addresses
7. To adapt all primary and secondary school curricula to meet the challenges of the information society, taking into account national circumstances

8. To ensure that all of the world's population has access to television and radio services
9. To encourage the development of content and put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet
10. To ensure that more than half the world's inhabitants have access to ICTs within their reach. [12]

7.2 Recommendations due to Arab state situation and needs

The Capacity-building Workshop on Information Society Measurements, Household and Business Surveys was held in Cairo from 20 to 21 June 2007 under the patronage of the Ministry of Communications and Information Technology (MCIT) in Egypt, the Information Technology Industry Development Agency (ITIDA) and the League of Arab States (LAS). It was organized by the
Economic and Social Commission for Western Asia (ESCWA), the United Nations Conference on Trade and Development (UNCTAD), the Arab Regional Office of the International Telecommunication Union (ITU-ARO) and the Organization for Economic Co-operation and Development (OECD). They recommend the following main points:

1- Provide practical training to National Statistical Offices (NSOs) and statistics units in ICT establishments at the national level in a number of Arab countries. International organizations and Arab countries advanced in ICT indicators collection can help other countries, particularly in designing questionnaires, sampling, collecting, validating and analyzing data;

2-Follow international definitions, measurements, methodologies and classifications, such as the International Standard Industrial Classification of all Economic Activities (ISIC), when collecting information technology (IT) data in the whole Arab region;

3- Re-enforce cooperation between the ministries of ICT and the NSOs in Arab countries with respect to measuring, collecting and analyzing ICT indicators;

4- Stratify and represent the community through the existing statistical methodologies available in statistical bodies;

5- Raise the awareness of policymakers with regard to the need to emphasize the collection and analysis of ICT indicators in IT-related policies and strategies;

6- Develop ICT gender-related indicators for the Arab region while taking into consideration women equality and the existing differences between women in rural and urban areas;

7- Emphasize the need for NSOs and ICT statistical units to participate in follow-up workshops in order to ensure continuity and effectiveness;

8- Unify the efforts related to the development of statistical systems for the collection and management of indicators, make the ESCWA Statistical Information System (ESIS) available to organizations in member countries for their in-house usage in managing indicators and provide the necessary training for set-up, administration and efficient use;

(i) Create a database for existing expertise in ICT indicators in the Arab region to facilitate the exchange of

knowledge and accelerate the implementation of work;
(j) Call upon international donors to help Arab countries finance their own initiatives on collecting and analyzing IT indicators. [13]

7.3 Recommendations for Iraqi Education process

1- Completing building the infrastructure of the communication backbones and connect Iraq with the world through high band width (Fiber optics and see cables).
2- Strengthen the connection with the International and UN organizations and follow up their recommendations including the standardization.
3- Activating the NSOs in Ministry of planning.
4- Connecting the Universities, research centers, colleges, secondary, and primary schools with the ICT.
5- Put the digitizing polices to the primary and secondary schools and equips them with the computers and networks.
6- The digitizing revolution should be started from universities by planning clear polices for digitizing and networking the universities to cover whole Iraq.
7- Unify and integrating the efforts of MHESR and MoE.
8- Training the ICT groups in MHESR and MoE

وضع تكنولوجيا المعلومات والاتصالات ICT العراقية وتأثيرها على إعادة بناء العراق ،دراسة وتحليل ومقترحات

الخلاصة

يزود الـ ICT الدول النامية بفرصةٍ لم يسبق لها مثيلٍ للوصول إلى أهداف النمو الحيوية، مثل تخفيضِ الفاقة والرعاية الصحية الأساسية والتعليم وبشكل فعال أكثر بكثير مِن ذي قبل .

يقدم البحث دراسة للمسح العام لإحصاءات الـICT في العراق ويعرض هذا البحث أيضا تحليل و مقارنة بين إحصائيات الـ ICT في العراق والدول العربية ودول نامية. بالإضافة إلى ذلك فأن نتائج إحصائية من الولايات المتحدة الأمريكية وبلدان أوروبية متطورة سينجز لأغراضِ المقارنة. وكذلك يقدم هذا البحث اقتراحات لغرض الوصول إلى المستوى المطلوب للـ ICT في العراق للتمكين في عملية إعادة بناء العراق. تتضمن المقترحات ما مطلوب من القطاع التعليمي وقطاع الدولة و القطاعِ الخاص.

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Population Density and Biological Studies of Two Cucucrbit Flies Species :*Dacus ciliates* Loew and *Dacus frontalis* Beecker (Diptera :Tephritidae)

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Liqa Hady Edan * Abdel Razak Mahmood

Abstract

Population density of cucurbit flies *Dacus ciliates and Dacus frontalis* were studied in Suwaira and Tuwaitha regions in addition to percentage of infestation by these two species on three varieties of vegetables :Cucumber ,Snake Cucumber and Squash.

The results showed that no significant differences in the number of eggs laid and percent of its hatching for the wild and laboratory strains mated separately for each species .

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I . INTRODUCTION

The cucurbit fly regards as an important species in family Tephritidae ,that they infect cucurbitaceous plants that have large distribution in the world and in the Iraq because they are cultivated twice a year this provided suitable conditions for insect development moreover ,the natural enemies were rarely found this resulted to serious economic damage in various parts of Iraq by this pest . The genus *Dacus* include large species causing damage to vegetables and fruits that often have puncture marks made by the entry of the females ovipositor ,while larvae hatched inside the fruits , a sign of mould growth on vegetables started to develop , larvae usually do not obtain sufficient nourishment that causing more decompose to infested cucurbit , Some species have become pest in regions far removed from their native range . So additional first record for the new species *D.frontalis* in Iraq has been reported for three years ago from which it attacks cucurbit crops on large scale. This pest is worldwide distributed , it has been recorded in Australia from snake gourd by (1,2) .In Africa it was found with cultivated and wild cucurbit (3,4), Heavy infestations of cucurbits by *Dacus ciliates* have been reported in Egypt (5) . There were confirmed records from Middle and Eastern Asia (6) . In India was described by (7) . While (8) indicated a substantial proportion of many species in Palestine . White showed that the host plant was visited only by the females during oviposition period while they mates on rest plants included : maize and sunflower . The first recording of *D. ciliatus* Lowe as a pest of cucumber in Iraq was by (10) . This research aim to study the biology and distribution of these two species which were *D.ciliatus* in and *D.frontalis* in two regions around Baghdad

П. MATERIALS AND METHOD

A.Sample collection

Infested cucurbits , including cucumber , snake cucumber and squash from two different regions Tuwaitha and Suwaira were collected from May till October – 2010 , then kept in carton boxes and coverd by smooth fabric mesh till the emerging adults . flies were identified in Iraqi Natural History Museum.

B. Preparation of Colony

In order to get laboratory strain the collected and identified flies were kept to inbreed for at least six generations inside laboratory in cubic cages ($40\times40\times40 cm^3$) made from Perspex glass with upper side open which covered by smooth fabric mesh , a fresh cucurbit was put inside the cage every day for oviposition , a Petri – dish contain cotton dipped in 5% sugar

solution 20×20×20 for adult nutrition.

C. Mating cages

ar solution as mentioned above were prepared to make multiple mating of one virgin female with 2 males to determine fecundity and percent of egg hatching for both species ; *D. ciliatus* and *D. frontalis* , each mating were repeated for 25 times.

III . RESULTS AND DISUSSION

The distribution of cucurbit flies in Suwaira and Tuwaitha regions were illustrated in figs 1 , and 2 for *D. frontalis* and figs 3 and 4 for *D . ciliatus* respectively, the percent of cucurbit infestation increased gradually with cucurbit ripeness during May and reaching the peak in August as a result of increasing temperatures in the field, after that the infestation descended with the beginning of Autumn season for the three varieties with the snake cucumber appeared to be more preferable than the others (11) .

Biological studies presented in Table (1) which showed reproduction ability of both species , the average number of eggs were (26.7 and 22.2%) for *D . ciliatus* and *D. frontalis* respectively , while the percent of egge hatching were 88.69% for *D . ciliatus* and 88.68% for *D. frontalis* in wild type mating (12). Heavy infestations of cucurbits indicated by (5) in *D . ciliates* that have been reported in Egypt and South Africa , damage in some areas was similar injury as caused by a closely related species , D . longistylus

Both cucurbit pests *D . ciliatus* and *D. frontalis* they were very similar probably difficult to differentiate except of the two circular dark spot on the dorsal abdomen segment in *D .f rontalis* while the spot is dark and appeared to be diffused in *D. c*iliatus (3).

Fig.1: Distribution of Dacus frontalis.in Swaria

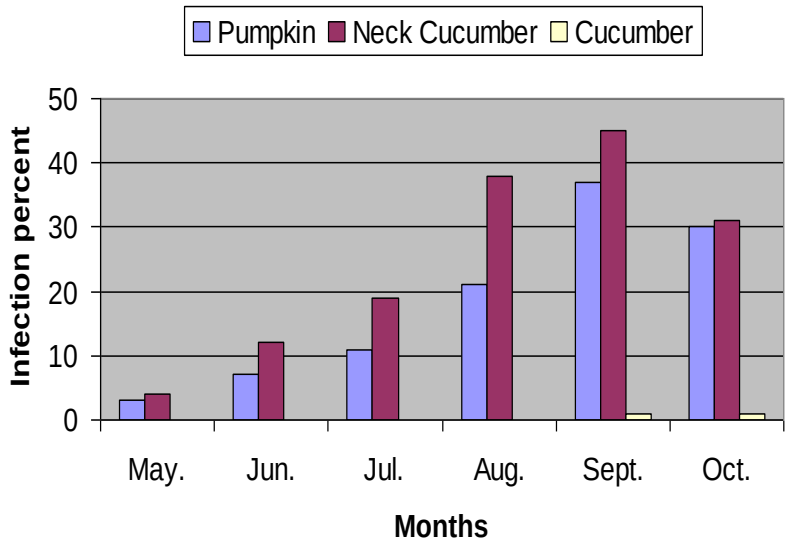
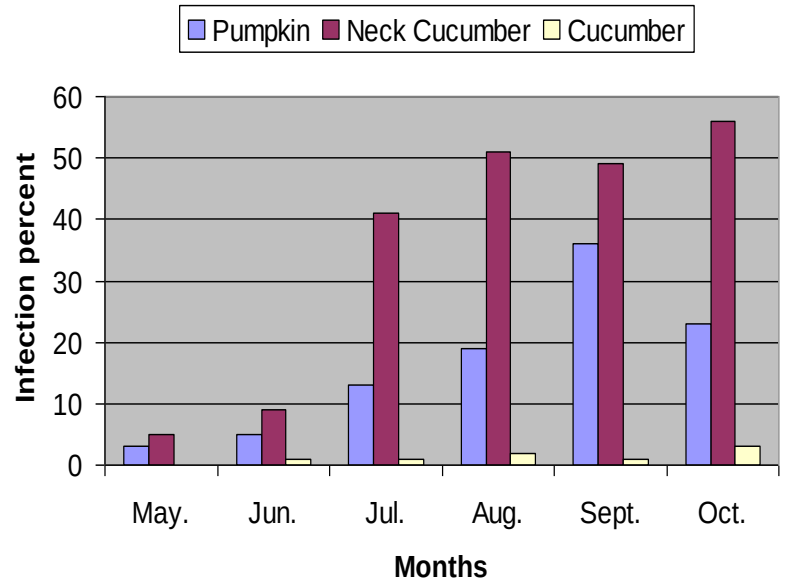


Fig.2: Distribution of Dacus frontalis.in Tawithia



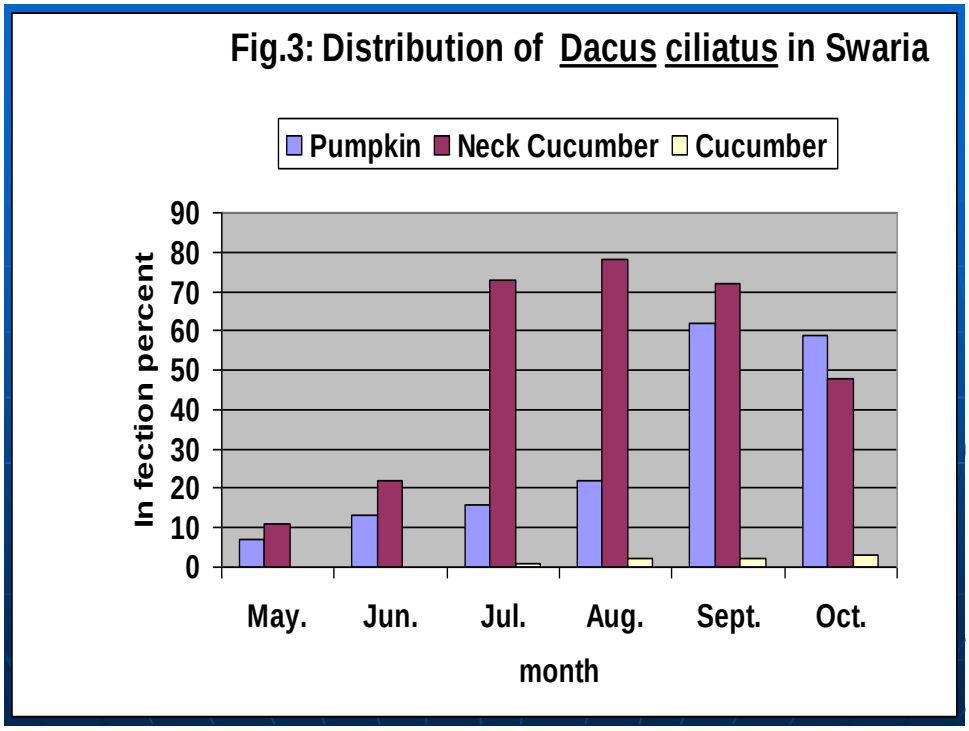


Fig.3: Distribution of Dacus ciliatus in Swaria
Pumpkin
Neck Cucumber
Cucumber
In fection percent
90
80
70
60
50
40
30
20
10
0
May.
Jun.
Jul.
Aug.
Sept.
Oct.
month

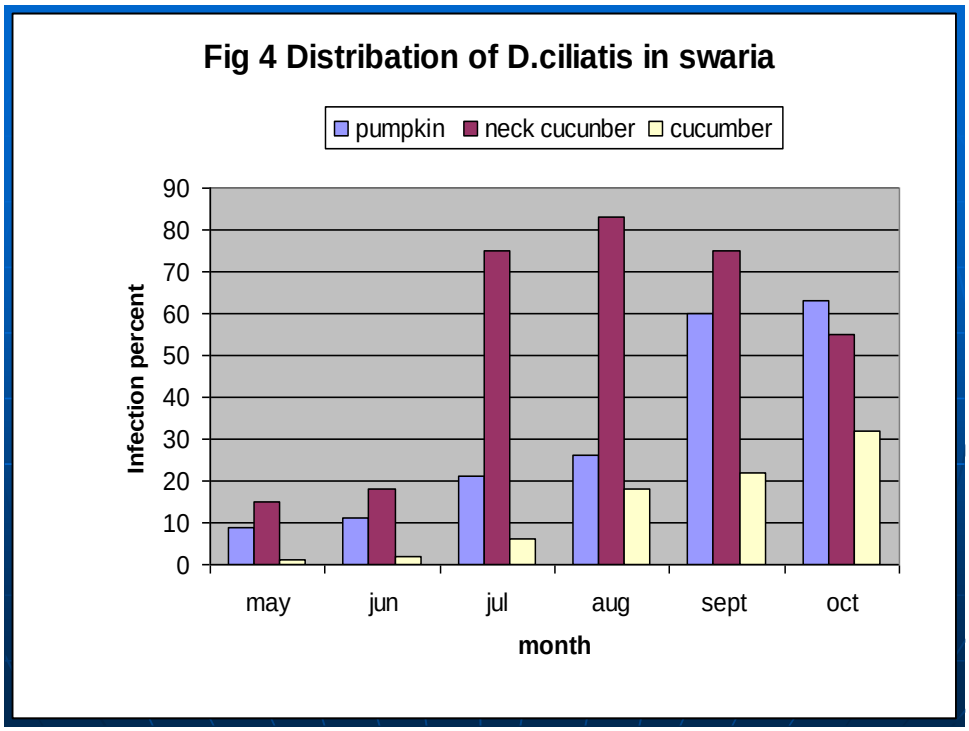


Fig 4 Distribation of D.ciliatis in swaria
pumpkin
neck cucunber
cucumber
Infection percent
90
80
70
60
50
40
30
20
10
0
may
jun
jul
aug
sept
oct
month

TABL 1 : Mating Capacity for both two species *D.ciliatus* and *D. frontalis*

Cucurbit pest	Mating type	Average No. of eggsfor (10) days Mean ±S.D.	% hatch Mean ± s.D.
D.ciliatus	Wild strain × wild strain	26.7± 6.0 a	**88.7± 4.8 a**
	Lab. strain × Lab strain	25.0± 6.3 ab	**89.9± 13.1 a**
D. frontalis	Wild strain × wild strain	22.2± 7.0 b	**88.7± 3.9 a**
	Lab. strain × Lab strain	**22.0± 8.9 b**	**89.0± 13.8 a**

دراسة الكثافة السكانية والحياتية لنوعين من ذباب القرعيات :

Dacus ciliates Loew , *Dacus frontalis* Beecker

(Diptera : Tephritidae)

لقاء هادي عيدان ، عبد الرزاق محمود

***دائرة البحوث الزراعية - وزارة العلوم والتكنولوجيا - بغداد - العراق**

الملخص

درست الكثافة السكانية لنوعين من ذباب القرعيات *Dacus frontalis ,Dacus ciliates* في منطقتي الدراسة الصويرة والتويثة من خلال إصابتهما لثلاث عوائل نباتية هي :-

قرع الكوسة وخيار القثاء وخيار الماء . وأظهرت النتائج عدم وجود فروقات معنوية من حيث معدل عدد البيض الملقى ونسبة فقسه عند المقارنة بين السلالة البرية والمختبرية لكل نوع .

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