RED TACTON BASED DATA TRANSMISSION THROUGH HUMAN BODY

A PROJECT REPORT

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In partial fulfilment for the award of the degree

Of

BACHELOR OF ENGINEERING

In

COMPUTER SCIENCE AND ENGINEERING

ANNAI TERESA COLLEGE OF ENGINEERING THIRUNAVALUR

ANNA UNIVERSITY-CHENNAI 600 025

JUN-2022

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ACKNOWLEDGEMENT

We take this opportunity to express our gratitude to all, whose contribution in this project work can never be forgotten.

Our sincere thanks to our honourable chairman **Ln.Dr.PRAKASHMULL CHORDIA**, M.Com., Ph.D**.,** for this support during the entire course period.

We express our gratitude to our managing director **Dr.P.DINESH KUMAR CHORDIA,** M.Com.,Ph.D., for this support during the entri course period.

We thank our **PRINCIPAL Dr.J.KRISHNA KUMAR, M.Tech., Ph.d.,** for this worthy encouragement to make this project as a successful one.

We express our thanks to our **HEAD OF THE DEPARTMENT Mrs.A.RAMYA**,**M.Tech,** for her valuable suggestion and guidance for the development completion of this project.

Word fail to express my gratitude to my **PROJECT GUIDE Mr.G.RAJA KUMAR,M.E,** who took special interest **on** my project and gave his consistent support and guidance during all stages of this project.

Finally, we thank all the **STAFF MEMBERS OF COMPUTER SCIENCE AND ENGINEERING** of our college who helped to complete this project. Above all we thank our **PARENTS AND FAMILY MEMBERS** for their constant support and encouragement for completing this project

ABSTRACT

Redtacton is a new technology which is based on human area network that enables communication by touching. RedTacton was introduced by Nippon telegraph and telephone corporations (NTT). Which makes use of minute electic field emitted on surface of human body as a communication medium since human body provides safe and high speed data transmission path between user and device in close proximity. The chip which will be embedded in various devices contain transmitter and receiver built to send and accept data in digital format Focusing on different ways of communication like wired or wireless in everyday life, the Redtacton is a technology which makes many things easier. In this we surveyed the RedTacton technology, working principle of RedTacton over human area network, application, etc.

TABLE OF CONTENTS

CHAPTER NO	TITLE	PAGE NO
	ABSTRACT	i
	LIST OF TABLES	ii
	LIST OF FIGURE	iii
	LIST OF ABBREVIATIONS	iv
1	**INTRODUCTION**	
	1.1 Overview Of Researchers	2
	1.29 Red Tacton	4
2	**LITERATURE SURVEY**	
	2.1 Wireless Data Transfer Based on Bone Conduction: Osteoconduct	7
	2.2 Biotelemetry Using Human Area Networking	7
	2.3 Redtacton: A Smarter Network	7
	2.4 Data Transfer Through Human Body using Redtacton	9
	2.5 Direct Measurement of Elbow Joint Angle Using Galvanic Couple System	9
3	**SYSTEM ANALYSIS**	
	3.1 Existing System	11
	3.1.2.Disadvantages Of Existing System	11
	3.2 Proposed System	11

	3.2.1 Advantages Of Proposed System	12
4	**SYSTEM SPECIFICATION**	
	4.1 Hardware Requirements	14
	4.2 Software Requirements	14
5	**SYSTEM DESIGN**	
	5.1 System Architecture	16
	5.2 Data Flow Diagram	17
	5.3 Uml Diagrams	19
	5.4 Goals	19
	5.5 Use Case Diagram	20
	5.6 Class Diagram	21
	5.7 Sequence Diagram	22
	5.8 Activity Diagram	23
6	**MODULE DESCRIPTION**	
	6.1 List Of Modules	25
	6.2 Modules Description	25
	6.2.1 Sensor Module	25
	6.2.2 Data Transfer	25
	6.2.3 Transmitter /Receiver	25
7	**SYSTEM TESTING**	
	7.1 Types Of Tests	29
	7.1.1 Unit Testing	27
	7.1.2 Integration Testing	27
	7.1.3 Functional Test	28

	7.1.4 System Test	28
	7.1.5 White Box Testing	29
	7.1.6 Black Box Testing	29
	7.1.7 Unit Testing	29
	7.2 Integration Testing	30
	7.3 Acceptance Testing	30
8	**APPLICATION AREAS**	
	8.Application Areas	33
9	**SYSTEM STUDY**	
	9.1 Feasibility Study	35
	9.1.1 Economical Feasibility	35
	9.1.2 Technical Feasibility	35
	9.1.3 Social Feasibility	36
10	**CONCLUSION & FUTURE ENCHANCEMENT**	
	10.1 Conclusion	38
	10.2 Future Enhancements	38
	APPENDIX	
	A1. Software Environment	40
	A2. Source Code	66
	A3.Screen Shots	73
	REFERENCES	74

LIST OF FIGURES

FIGURE NO	FIGURE NAME	PAGE NO
5.1	System Architecture	16
5.2	Data Flow Diagram	18
5.5	Use Case Diagram	20
5.6	Class Diagram	21
5.7	Sequence Diagram	22
5.8	Activity Diagram	23
A1.2.	16x 2 Lcd Modules	60
A1.3	Transformer	61
A1.4	voltage regulator	63
A1.5	Red Taccton	65

LIST OF ABBREVATIONS

WSN	wireless sensor network
RF	Radio frequency
HAN	Human Area Network
PIR	Passive Infrared Sensor
LCD	Liquid crystal displays
SPP	Serial Port Protocol
LQIR	Link Quality Indicator based Routing
ACF	Auto-correlation function
VLS	virtual leak source
URL	Uniform Resource Locator

CHAPTER - 1

INTRODUCTION

1.INTRODUCTION

1.1 OVERVIEW OF RESEARCHERS

We may have imagined the feature as a place crawling with antennas and emitters, due to the huge growth of wireless communications. And it seems that the current means of transferring data might already have a very serious competitor none other than the human body. Thus NTT labs from Japan has announced that is currently testing a revolutionary technology called Red Tacton , which use the electric fields generated by the human body as medium for transmitting the data . The chips which will be embedded in various devices contain a transmitter and receiver built to send and accept data in digital format. The chips can take any type of file such as mp3 music file or mail and convert it in to the format that takes the form of digitals pulse that can be passed and read through a human being electric field. The chip in receiver devices reads these tiny changes and converts the file back into its original form.

In the era of digital communication, data transmission is a common need of every individual to communicate their devices with the remote devices or sometimes nearby devices. Even a common man now is everyday indulged in transferring data in some or the other way like the voice calls, SMS, chats, etc. This is nothing but transmission of data from one end to the other. Some data are securely transferred that should not be readable or writable to public as in the case of defense, bank data, etc. But still there is a vast risk of data being hacked by the anti-social elements. For the distance communications, also called Far-field communication, it requires radio frequency (RF) waves to transmit data over long distance where Personal Area Network is not possible to setup and hence Human Area Network (HAN). But for the communication type which can be reached within our hands, also called as Near-field communication, Human Area Network can

be introduced as a medium for transmission of data from start point to end point

Medical biotelemetry is used to remotely track physiological functions of patients, like body temperature, heart rate, blood pressure, ECG, EEG signals, etc., and even to operate devices such as drug delivery systems and prosthetics. Implantable biotelemetry focuses on the transmitter devices implanted in the human or animal being studied, like cochlear implants or implantable pacemakers. The main constituents of a biotelemetry system are sensors of physiology functions located on the transmitters, transmission path and receivers. Transmitters with sensors are placed on the surface of or implanted inside the human body. In contrast to the medical biotelemetry, the implantable implies the absence of wires as a transmission medium between a transmitter and a receiver. Still, the wires are impractical for monitoring, since they disturb the patient and the medical personnel. Using different wireless technologies provides better freedom of movements and the mobility of the patient, which is of particular importance in a long-term monitoring, every day activities of non-ambulatory patients and during the surgeries. Wearable sensor network placed on the human body is called Body Area Network (BAN). RedTacton technology is a Human Area Networking (HAN) technology which was introduced by Nippon telegraph and Telephone Corporation (NTT s) that uses the human body surface as a high speed and safe network transmission path. It is completely distinct from wireless and infrared technologies as it uses the minute electric field emitted on the surface of the human body. A transmission path is formed at the moment a part of the human body comes in contact with a RedTacton transceiver. Communication is possible using anybody surfaces, such as the hands, fingers, arms, feet, face, legs or torso.

RedTacton works through shoes and clothing as well. When the physical contact gets separated, the communication is ended. RED - It is an auspicious colour according to Japanese culture for warmth. TACTON- meaning action triggered by touching . In the past, Bluetooth, infrared communications (IrDA), radio frequency ID systems (RFID), and other technologies have been proposed to solve the "last meter" connectivity problem. But, they each had a various fundamental technical limitations that constrain its usage, such that precipitous fall-off in transmission speeds in multiuser environments producing network congestion. The concept of intra-body communication was first proposed by IBM in 1996.This communication mechanism was later evaluated and reported by several research groups around the world. Finally, all limitations were overcome by NTT (Nippon Telegraph and Telephone Corporation) located in Tokyo, Japan by using photonic electric field sensors and finally came up with a human area networking technology called RedTacton . There are three features based on RedTacton. They are as follows,

1. Touch - Touching, gripping, sitting, walking, stepping and other human movements can be the triggers for unlocking or locking, starting or stopping equipment, or obtaining data.
2. Broadband and Interactive - Duplex, interactive communication is possible at a maximum speed of 10Mbit/s. Because the transmission path is on the surface of the body, transmission speed does not deteriorate in congested areas where many people are communicating at the same time
3. Any media - In addition to the human body, various conductors and dielectrics can be used as transmission media. Conductors and dielectrics may also be used in combination.

1.2 Red Tacton

Red Tacton is a new Human Area Networking technology that uses the surface of the human body as a safe, high speed network transmission path. Red Tacton uses the minute electric field emitted on the surface of the human body. Technically, it is completely distinct from wireless and infrared .A transmission path is formed at the moment a part of the human body comes in contact with a Red Tacton transceiver. Physically separating ends the contact and thus ends communication Using Red Tacton, communication starts when terminals carried by the user or embedded in devices are linked in various combinations according to the user's Communication is possible using anybody surfaces, such as the hands, fingers, arms, feet, face, legs or torso. Red Tacton works for natural physical movements.

Tacton can achieve duplex communication over the human body at a maximum speed of 10 mbps. The Red Tacton transmitter induces a weak electric field on the surface of the body. The Red Tacton receiver senses changes in the weak electric field on the surface of the body caused by the transmitter. Red Tacton relies upon the principle that the optical properties of an electro-optic crystal can vary according to the changes of a weak electric field. Red Tacton detects changes in the optical properties of an electro-optic crystal using a laser and converts the result to an electrical signal in an optical receiver circuit. The transmitter sends data by inducing fluctuations in the minute electric field on the surface of the human body. Data is received using a photonic electric field sensor that combines an electro-optic crystal and a laser light to detect fluctuations in the minute electric field. The naturally occurring electric field induced on the surface of the human body dissipates into the earth. Therefore, this electric field is exceptionally faint and unstable. The photonic electric field sensor developed by NTT enables weak electric fields to be measured by detecting

CHAPTER 2

LITERATURE SURVEY

2. LITERATURE SURVEY

2.1 Wireless Data Transfer Based on Bone Conduction: Osteoconduct

Author:Visvesvaran.C, Ramyadevi.N, Karthi.S.P, Sudhhir.U

Human body communication (HBC) is a novel special strategy in gadgets that use the anatomy as a channel.It is build on the idea relating to Biology and Medicine observation framework.The anatomy Sensor fulcrum test the essential gesticulation of the anatomy and it acts as a conveyance channel. It is beneficial to the client for a longer period of clinical investigation, with greater versatility and selection of benefits with this pioneering.The Sensor Hub's system is set up or embedded within the anatomy of a essence called the Human Area Network (HAN). Now innovation managers empower correspondence by contacting the model of the human realm, an invention known as the RedTacton.This is another invention that is used as a system of shelter, rapid system transmission outside the human body. It essentially uses an electric field that radiates outside the human body.This invention is discretion for wired and remote correspondence, where links are used for correspondence between terminals in wired correspondence,and information in wired correspondence must be specified by the link, which is troubling.Moreover,we deal with the use of the personal body as a signal for correspondence. When a person meets a gadget, the mode of transmission is naturally shaped, and the correspondence between the portable terminals begins and the human body moves at 10Mbit/s,as a medium to support IEEE 802.3 Half-Duplex Correspondence.

2.2 Biotelemetry Using Human Area Networking

Author:Mr. Aniruddha P. Kshirsagar, Mr. Gopal R. Chandangole

Technology is making many things easier; we can say that our concept is standing example for like that only.So far we have seen LAN, MAN, WAN, INTERNET & many more but here a new concept of RED TACTON has

been introduced which makes the human body as a communication network named by HAN (Human Area Network).Human Body Communication (HBC) is a novel communication method between devices which use human body as a transmission medium.This idea is mostly based on the concept of wireless biomedical monitoring system. The on-body sensor nodes can monitor vital signs of a human body and use the body as a transmission medium. This technology is convenient for long durations of clinical monitoring with the option of more mobility and freedom for the user. Biotelemetry is remote monitoring, measuring and recording of a living organism s function, activity or condition. Network of sensor nodes placed on or implanted inside the body of a subject is called Human Body Area Network (HAN).RedTacton is a user-friendly pervasive technology that establishes a communication between human body and devices in a closer proximity.This paper proclaims model of a human area networking technologies that enables communication by means of Touching .Redtacton technology was implemented to overcome the weak radio signals, data speeds and security risks on unwanted signal interceptions. Here, human body is the transmitting medium supporting IEEE 802.3 half-duplex communication at 10 Mbits/s.RedTacton uses the minute electric field generated by human body as a medium to transmit the data.

2.3 Redtacton: A Smarter Network

Author:Dushyant Chauhan

RedTacton technology is an easy to use as well as convincing innovation that builds up effective communication among individuals and items associated in a closer vicinity.This paper exhibits model of a human zone organizing advancements that empowers correspondence by methods for "Contacting". This technology works in transmitting the signals through

mobile terminals and such similar terminals that are implanted in the environment. In order to overcome the weak radio signals and transmit data at greater speeds efficiently, this network is introduced in the field of communication technology.The technology is based on transmitting the information signals through human body that ultimately supports IEEE 802.3 half duplex communication .The paper focuses on the principle of utilising the electric field for Human Area Networking

2.4 Data Transfer Through Human Body using Redtacton

Author:Aviraj M.Jadhav, Krushnkumar A.Bhanuse

Red Tacton is one of the advanced Pervasive technologies that are genuinely user-friendly to everyone who requires technologies that enable communication between people and objects in close proximity. Human area networking technology is one that enables communication by touching, which we call RedTacton. Here, the human body acts as a transmission medium supporting IEEE 802.3 half-duplex communication at 10Mbit/s.The key component of the transceiver is an electric-field sensor implemented with an electro-optic crystal and laser light. RedTacton uses the minute electric field generated by human body as medium for transmitting the data. The chips which will be embedded in various devices contain transmitter and receiver built to send and accept data in digital format. In this paper we surveyed the red tacton technology, working principle of red tacton over human area network,application, protocols for data transmission etc

2.5 Direct Measurement of Elbow Joint Angle Using Galvanic Couple System

Author: X.M. Chen, S.H. Pun, J. F. Zhao, P.U.Mak, B.D. Liang, and M. I. Vai

The built HBC handsets that expand with high data rates from 1Mbps to 40Mbps of late,the diversion characteristics of HBCs,for example,growth

and phase,have been found to be very ance with some physiological parameters, for example,muscle contraction or discontinuation, body fluid hydration and paralysis. In light of these parameters, it is stressed on the galvanic coupling HBC framework that has been adapted and it is used to dictate some physical

CHAPTER 3

SYSTEM ANALYSIS

3.SYSTEM ANALYSIS

3.1.EXISTING SYSTEM

Some data are securely transferred that should not be readable or writable to public as in the case of defense, bank data, etc. But still there is a vast risk of data being hacked by the anti-social elements. For the distance communications, also called Far-field communication, it requires radio frequency (RF) waves to transmit data over long distance where Personal Area Network is not possible to setup and hence Human Area Network (HAN).

3.1.1 DISADVANTAGES OF EXISTING SYSTEM

- Cost high
- RF is limited coverage area.
- Though it is been used only within a few centimetres, the data can be transmitted via multiple person by touching each other.
- Cost is more; it can be reduced in future.

3.2.PROPOSED SYSTEM

The proposed framework uses the human body as a mode of communication for communication. Here, the patient's bioclinical information is transmitted from the transmitter to the collector section by the human body. For biotelemetry, any sensor integrates with the RT transmitter in the human body and the receiver field information can be collected using the RT receiver.

Here, the sensor section available in the transmitter section includes the heart rate and temperature sensor with the Arduino Uno.

It is connected to the RT transmitter.The receiving section includes an RT receiver and screen to show information for biotelemetry work. Shared trust must be connected between the transmitter and the receive

3.2.1. ADVANTAGES OF PROPOSED SYSTEM

- Data transfer is faster and easier.
- Data transmission speed is 10Mbps for shortest distance.
- Data loss during the transfer is low.
- Power consumption is lesser.
- Security is more.

CHAPTER - 4

SYSTEM SPECIFICATION

4. SYSTEM SPECIFICATION

4.1. HARDWARE REQUIREMENTS

- Atmel
- RedTacton Receive
- RedTacton Transmitter
- Lcd
- Power supply

4.2. SOFTWARE REQUIREMENTS

- Embedded C
- Keil C Compiler

CHAPTER - 5

SYSTEM DESIGN

5.SYSTEM DESIGN

5.1 SYSTEM ARCHITECTURE

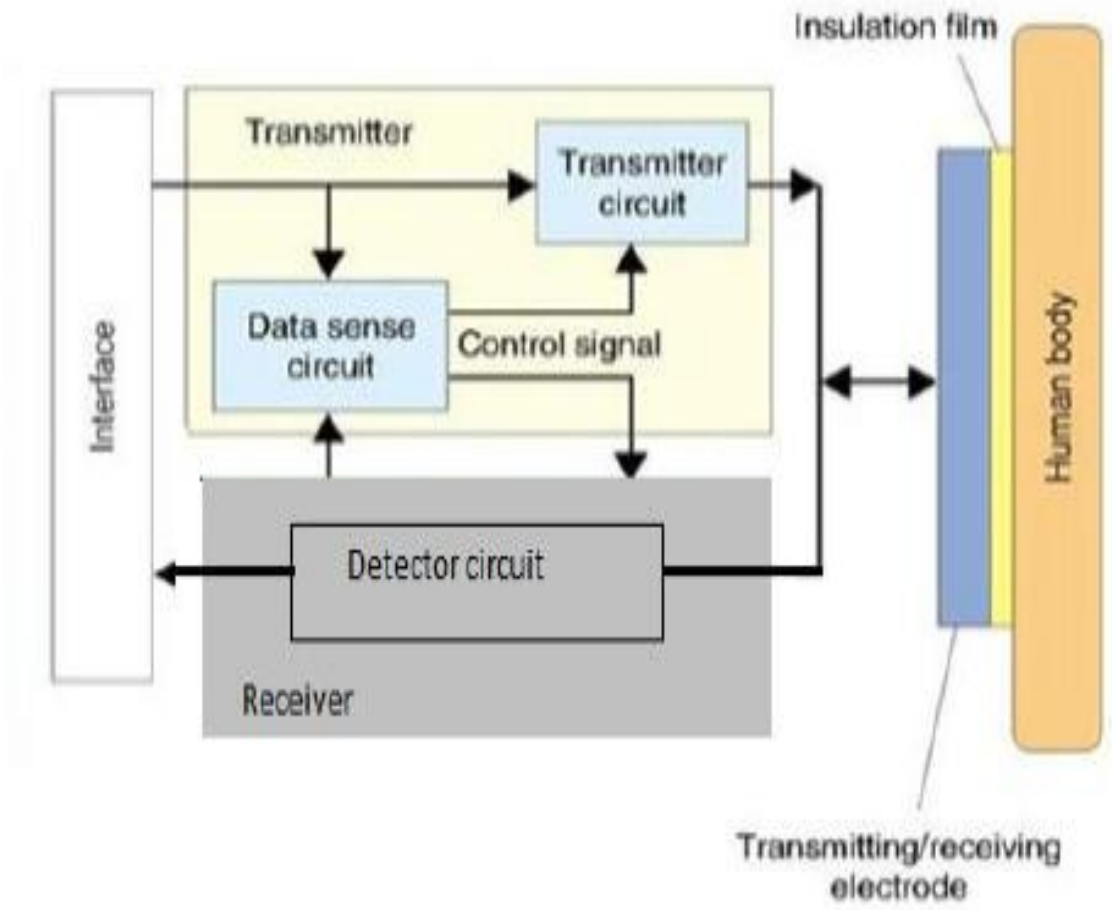


Figure:5.1 System Architecture

5.2 DATA FLOW DIAGRAM

1. The DFD is also called as bubble chart. It is a simple graphical formalism that can be used to represent a system in terms of input data to the system, various processing carried out on this data, and the output data is generated by this system.
2. The data flow diagram (DFD) is one of the most important modeling tools. It is used to model the system components. These components are the system process, the data used by the process, an external entity that interacts with the system and the information flows in the system.
3. DFD shows how the information moves through the system and how it is modified by a series of transformations. It is a graphical technique that depicts information flow and the transformations that are applied as data moves from input to output.
4. DFD is also known as bubble chart. A DFD may be used to represent a system at any level of abstraction. DFD may be partitioned into levels that represent increasing information flow and functional detail.

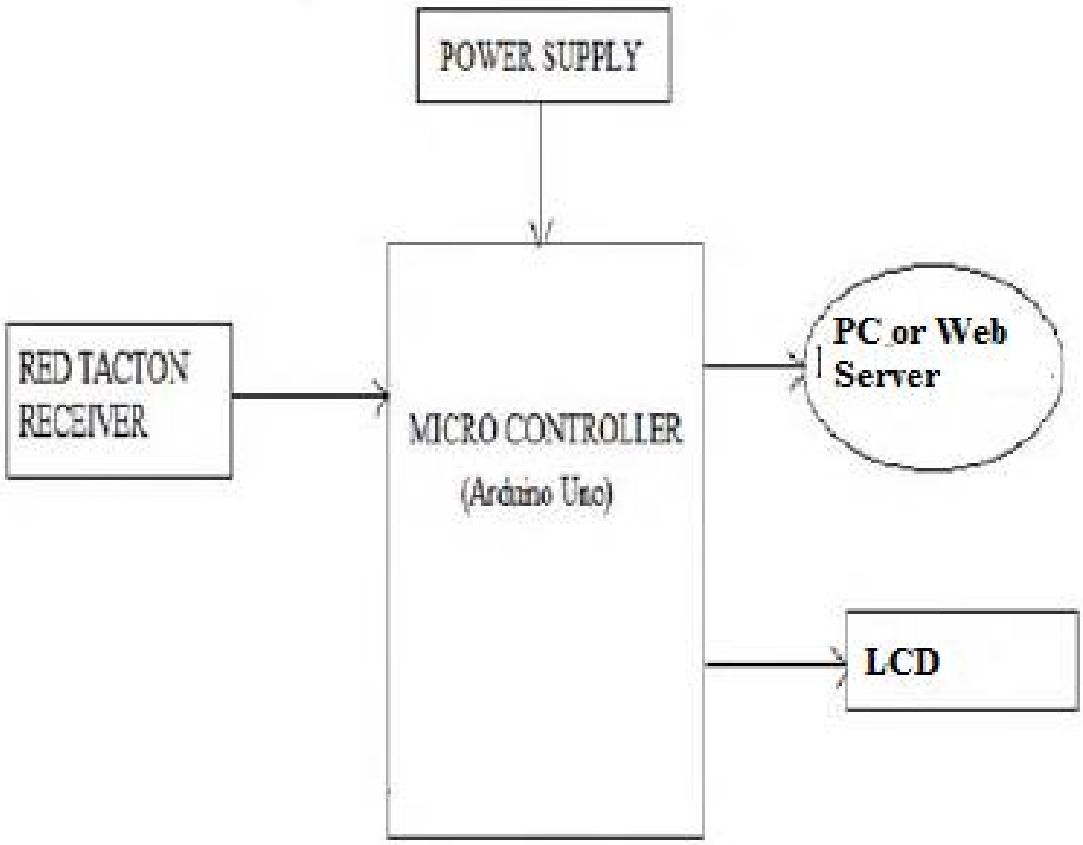


Figure:5.2 Data Flow Diagram

5.3 UML DIAGRAMS

UML stands for Unified Modeling Language. UML is a standardized general-purpose modeling language in the field of object-oriented software engineering. The standard is managed, and was created by, the Object Management Group.

The goal is for UML to become a common language for creating models of object oriented computer software. In its current form UML is comprised of two major components: a Meta-model and a notation. In the future, some form of method or process may also be added to; or associated with, UML.

The Unified Modeling Language is a standard language for specifying, Visualization, Constructing and documenting the artifacts of software system, as well as for business modeling and other non-software systems.

The UML represents a collection of best engineering practices that have proven successful in the modeling of large and complex systems.

The UML is a very important part of developing objects oriented software and the software development process. The UML uses mostly graphical notations to express the design of software projects.

5.4 GOALS

The Primary goals in the design of the UML are as follows:

1. Provide users a ready-to-use, expressive visual modeling Language so that they can develop and exchange meaningful models.
2. Provide extendibility and specialization mechanisms to extend the core concepts.
3. Be independent of particular programming languages and development process.

5.5 USE CASE DIAGRAM

A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.

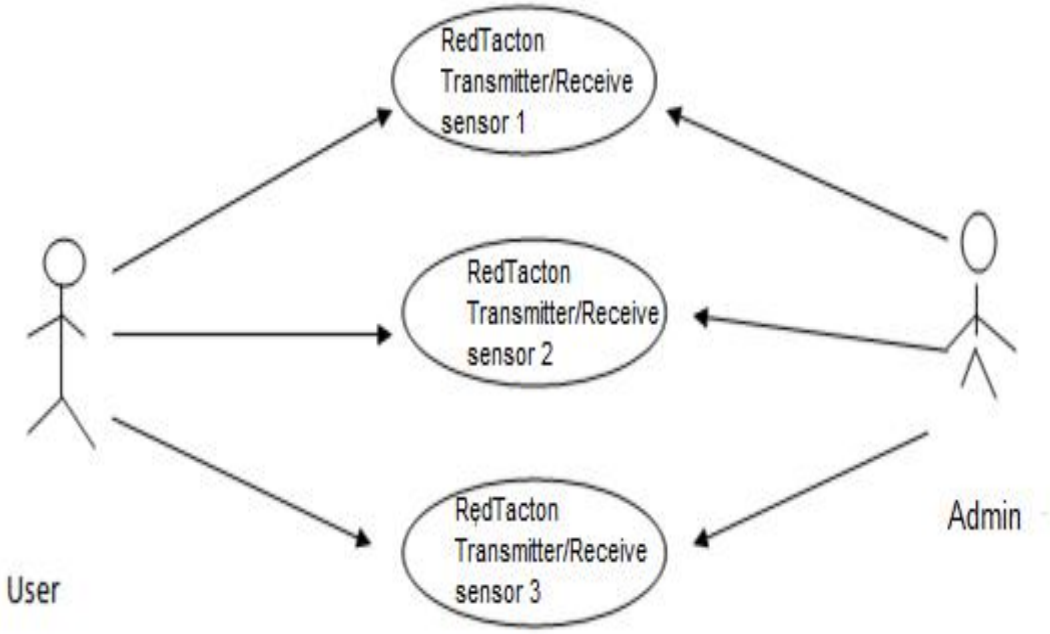


Figure:5.5 Use Case Diagram

5.6 CLASS DIAGRAM

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among the classes. It explains which class contains information.

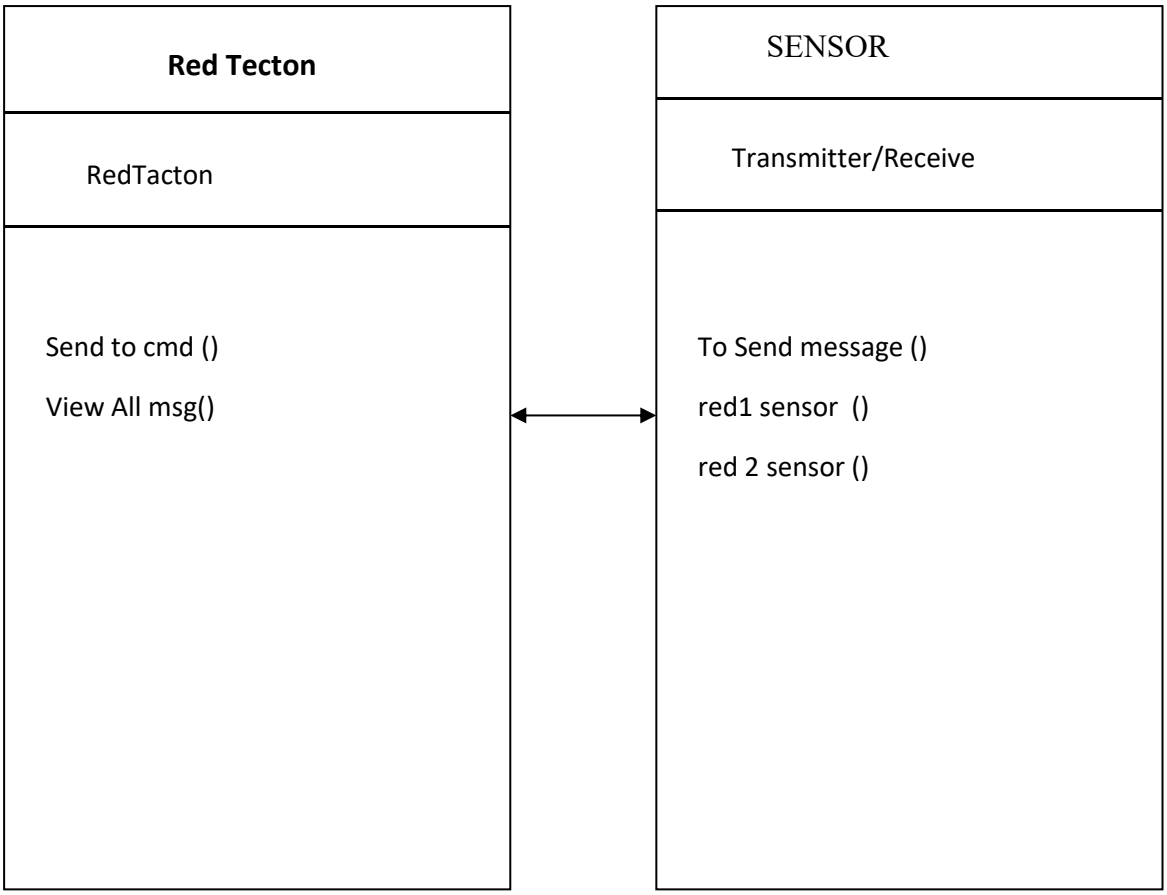


Figure:5.6 Class Diagram

5.7 SEQUENCE DIAGRAM

A sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams.

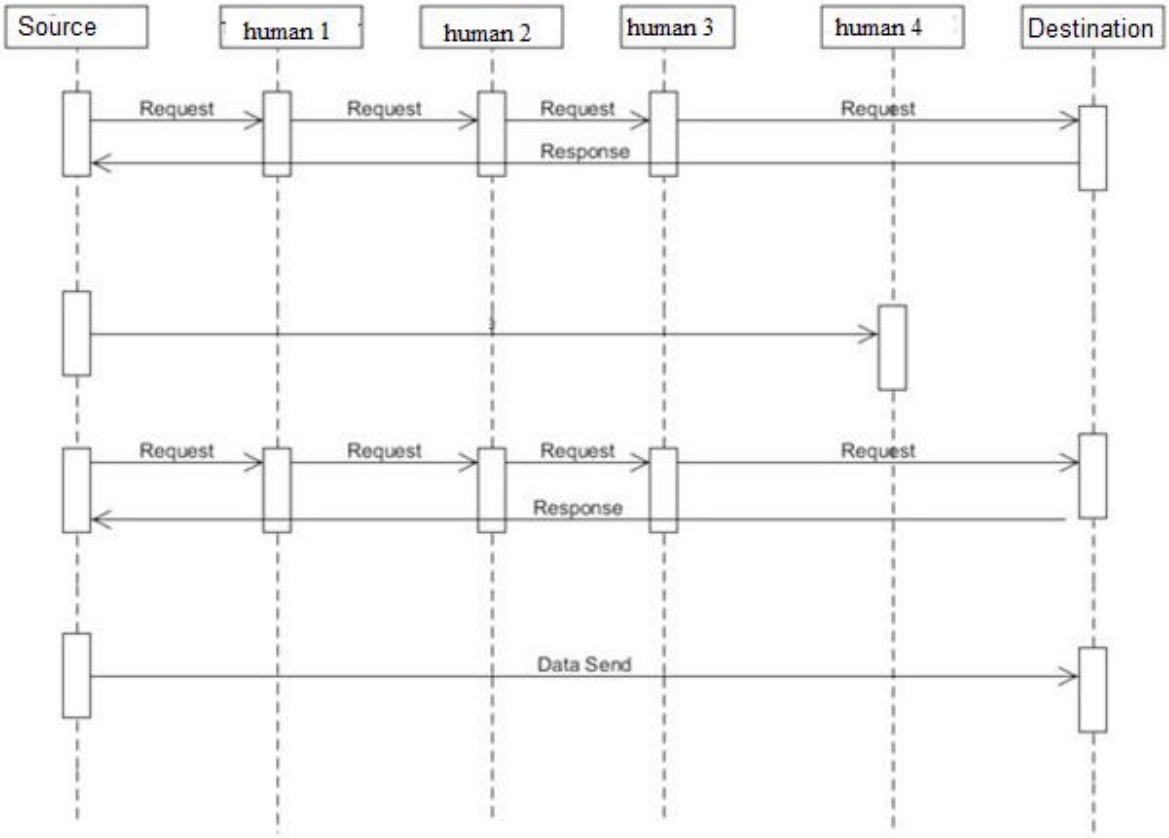


Figure:5.7 Sequence Diagram

5.8 ACTIVITY DIAGRAM

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modeling Language, activity diagrams can be used to describe the business and operational step-by-step workflows of components in a system.

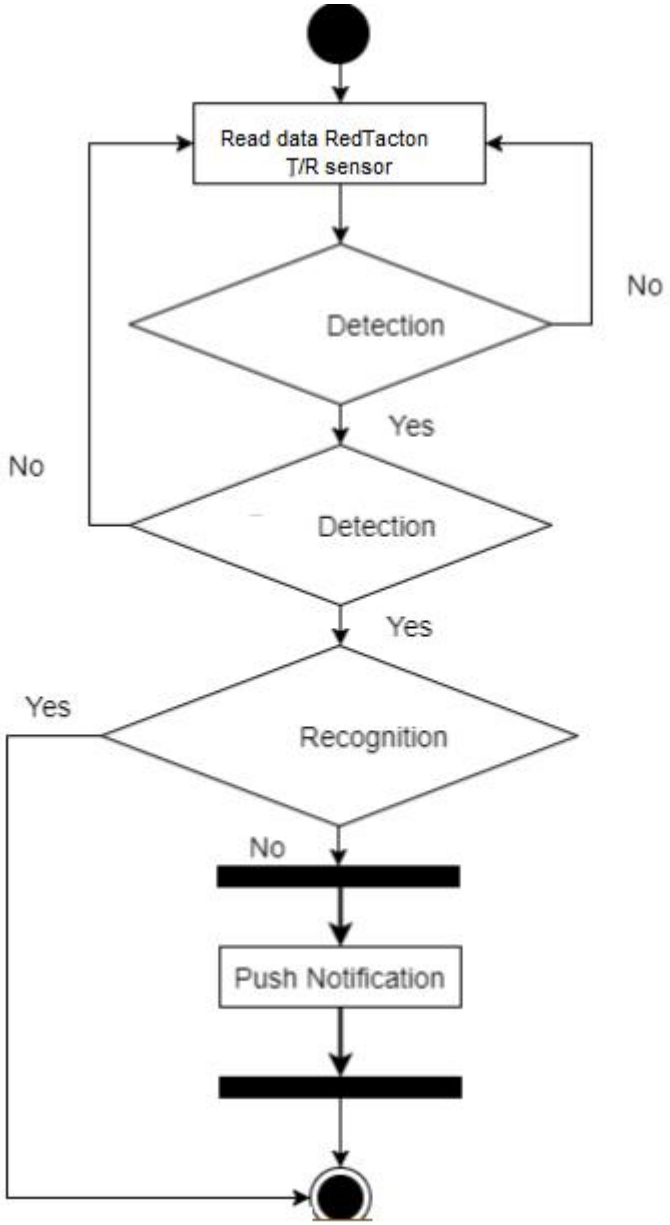


Figure:5.8 Activity Diagram

CHAPTER - 6

MODULE DESCRIPTION

6.MODULE DESCRIPTION

6.1 LIST OF MODULES

Sensor Module

Data Transfer

Transmitter /Receiver

6.2 MODULE DESCRIPTIONS

6.2.1 SENSOR MODULE

The human body as a mode of communication for communication. Here, the patient's bioclinical information is transmitted from the transmitter to the collector section by the human body. For biotelemetry, red tacton sensor integrates with the RT transmitter in the human body and the receiver field information can be collected using the RT receiver. Here, the sensor section available in the transmitter section includes the heart rate and temperature sensor with the Arduino Uno. It is connected to the RT transmitter

6.2.2 DATA TRANSFER

Using microcontroller IDE C++ program is uploaded and a variable is created to store data, which is getting by clicking the button in the website, it send data directly to ESP8266 module through internet. The data received from the internet is stored in the ESP8266 module. For each signal to be analyse module gives a domain id and API key. Domain id and API key are uploaded in the module and then code is executed in order to update the values in Esp8266.

6.2.3 TRANSMITTER /RECEIVER

Transmitter block consist of transmitter circuit that emits electric field towards the body and a data sense circuit, which select transmitting or receiving modes by detecting both transmission and reception data and outputs control signals according to the two modes to allow communication

between human body and transceiver. The signal from interface is Passed to the data sense circuit and transmitter circuit both are used to keep record of transmission & reception by detecting input data sense circuit senses the signal coming from interface and if the data is present it sends control signal to the transmitter.

The receiver circuit consist of a detector circuit which detect the change in electric field caused by transmitter .The output of the detector is passed to the interface of the receiving Redtacton device. Implementation of receive-first half-duplex communication avoids the possibility of packet collision. It sends data only when there is no data to receive. RedTacton takes advantage of electric field that surrounds the human body.

CHAPTER 7

SYSTEM TESTING

7. SYSTEM TESTING

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

7.1 TYPES OF TESTS

7.1.1 UNIT TESTING

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

7.1.2 INTEGRATION TESTING

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is

correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

7.1.3 FUNCTIONAL TEST

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals.

Functional testing is centered on the following items:

Valid Input : identified classes of valid input must be accepted.

Invalid Input : identified classes of invalid input must be rejected.

Functions : identified functions must be exercised.

Output : identified classes of application outputs must be exercised.

Systems/Procedures: interfacing systems or procedures must be invoked.

Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identify Business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is complete, additional tests are identified and the effective value of current tests is determined.

7.1.4 SYSTEM TEST

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration oriented system integration test. System testing is based on process descriptions and flows, emphasizing pre-driven process links and integration points.

7.1.5 WHITE BOX TESTING

White Box Testing is a testing in which in which the software tester has knowledge of the inner workings, structure and language of the software, or at least its purpose. It is purpose. It is used to test areas that cannot be reached from a black box level.

7.1.6 BLACK BOX TESTING

Black Box Testing is testing the software without any knowledge of the inner workings, structure or language of the module being tested. Black box tests, as most other kinds of tests, must be written from a definitive source document, such as specification or requirements document, such as specification or requirements document. It is a testing in which the software under test is treated, as a black box .you cannot see into it. The test provides inputs and responds to outputs without considering how the software works

7.1.7 UNIT TESTING

Unit testing is usually conducted as part of a combined code and unit test phase of the software lifecycle, although it is not uncommon for coding and unit testing to be conducted as two distinct phases.

7.1.8 TEST STRATEGY AND APPROACH

Field testing will be performed manually and functional tests will be written in detail.

7.1.9 TEST OBJECTIVES

All field entries must work properly.

Pages must be activated from the identified link.

The entry screen, messages and responses must not be delayed.

7.1.10 FEATURES TO BE TESTED

Verify that the entries are of the correct format

No duplicate entries should be allowed

All links should take the user to the correct page.

7.2 INTEGRATION TESTING

Software integration testing is the incremental integration testing of two or more integrated software components on a single platform to produce failures caused by interface defects. The task of the integration test is to check that components or software applications, e.g. components in a software system or one step up software applications at the company level interact without error.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

7.3 ACCEPTANCE TESTING

User Acceptance Testing is a critical phase of any project and requires significant participation by the end user. It also ensures that the system meets the functional requirements.

CHAPTER 8

APPLICATION AREAS

8.APPLICATION AREAS

8.1 APPLICATION AREAS OF PROJECT

Redtacton can be used in different applications for secure data transmission in different fields. Some applications of Redtacton are given as below.

- Password based security locks
- Security lock by using image recognition
- Military purpose
- Anywhere when security has highest priority

CHAPTER 9

SYSTEM STUDY

9. SYSTEM STUDY

9.1 FEASIBILITY STUDY

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

Three key considerations involved in the feasibility analysis are

Economical Feasibility

Technical Feasibility

Social Feasibility

9.1.1 ECONOMICAL FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

9.1.2 TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a

modest requirement, as only minimal or null changes are required for implementing this system.

9.1.3 SOCIAL FEASIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

CHAPTER 10

CONCLUSION & FUTURE ENCHANCEMENT

10. CONCLUSION & FUTURE ENCHANCEMENT

10.1 CONCLUSION

In this project we have designed and developed Red tacton. This system is based on Human Area Networking. Where we have developed a transceiver that uses the human body as a data transmission medium. The transceiver takes the data from human body and sends it to the cloud for storage. We conclude that, when we compare Red Tacton with other technology present today it can give a better performance than other technology. Also to connect the network within short distances Red Tacton is best. In this technology, there is no problem of breach of security by third-party intruders since human body is itself a media.

10.2 FUTURE ENHANCEMENTS

RedTacton has a wide range of unique new functional features and enormous potential as a Human Area Networking technology. In future, RedTacton can be developed as a portable device which can be used everywhere. Biotelemetry can be done through Wireless Body Area Network. Data transmission may happen through the user s clothing, handbag or shoes, anyone carrying a special card can unlock the door simply by touching the knob or standing on a particular spot without taking the card out. It will have many future applications such as walkthrough ticket gate, a cabinet that opens only to authorized people and a television control that automatically chooses favourite programs. The system also improves security. It ensures that only drivers can open their cars by touching the doors if the keys are in their pockets, not people around them.

APPENDIX 1

SOFTWARE ENVIRONMENT

A1. SOFTWARE ENVIRONMENT

A1.1 EMBEDDED SYSTEM

A1.1.1 DEFINITION

An embedded system is a system that has embedded software and computer-hardware which makes it a system dedicated for an application(s) or specific part of application or product or a part of a larger system.

A1.1.2 COMPONENTS

An embedded system is a system that has three main components embedded into it

It embeds hardware similar to a computer.

It embeds main application software.

It embeds a real-time operating system (RTOS).

Embedded systems are controllers with on chip control. They consist of microcontrollers, input and output devices, memories etc., on chip and they can be used for a specific application.

A small computer designed in a single chip is called a single chip microcomputer. A single chip microcomputer typically includes a microprocessor RAM, ROM, timer, interrupt and peripheral controller in a single chip. This single chip microcomputer is also called as microcontroller; These Microcontrollers are used for variety of applications where it replaces the computer.

Embedded systems are used for real time applications with high reliability, accuracy and precision, embedded systems are operated with Real Time Operating systems like WinCE, RT Linux, VxWorks, PSOS, etc.

A1.1.3 CLASSIFICATIONS

We can classify embedded systems into three types

Small scale embedded systems: These systems are designed with a single 8-bit or 16-bit microcontroller; they have little hardware and software complexities and involve board-level design. They may even be battery operated.

Medium scale embedded systems: These systems are usually designed with a single or a few 16-bit or 32-bit microcontrollers, DSPs or RISCs. Medium scale embedded systems has both hardware and software complexities.

Sophisticated embedded systems: These systems have enormous hardware and software complexities and may need several IPs, ASIPs, scalable processors or configurable processors and programmable logic arrays.

A1.1.4 CHARACTERISTICS

An embedded system is characterized by the following

Real-time and multirate operations define the ways in which the, system works, reacts to events, and interrupts and schedules the system s functioning in real time.

Complex algorithm.

Complex graphic user interfaces (GUIs) and other user interfaces.

Dedicated functions.

A1.1.5 CONSTRAINTS

An embedded system is designed keeping in view three constraints

- Available system memory.
- Available processor speed.

- The need to limit power dissipation when running the system continuously in cycles of wait for events , run , stop , wake up and sleep .

A1.1.6 ROLE OF EMBEDDED SYSTEMS

Embedded systems are compact, smart, efficient, and economical and user friendly. They respond to the real world situation very fast and also they are closed systems. Closed system means, everything required or specific application is embedded on the chip and hence, they do not call for external requirement for their functioning.

A1.1.7 APPLICATIONS OF EMBEDDED SYSTEMS

Robotics
Aviation
Telecommunication and Broadcasting
Mobile Phones and mobiles networking
Satellite Communication
Blue Tooth
Electronic sensors
Home Appliances etc.

A1.2. KEIL C

INTRODUCTION OF KEIL C

The C programming language is a general-purpose, programming language that provides code efficiency, elements of structured programming, and a rich set of operators. C is not a big language and is not designed for any one particular area of application. Its generality combined with its absence of restrictions, makes C a convenient and effective programming solution for a wide variety of software tasks. Many applications can be

solved more easily and efficiently with C than with other more specialized languages. The Cx51 Optimizing C Compiler is a complete implementation of the American National Standards Institute (ANSI) standard for the C language. Cx51 is not a universal C compiler adapted for the 8051 target. It is a ground-up implementation dedicated to generating extremely fast and compact code for the 8051 microprocessor. Cx51 provides you the flexibility of programming in C and the code efficiency and speed of assembly language. The C language on its own is not capable of performing operations (such as input and output) that would normally require intervention from the operating system. Instead, these capabilities are provided as part of the standard library. Because these functions are separate from the language itself, C is especially suited for producing code that is portable across a wide number of platforms. Since Cx51 is a cross compiler, some aspects of programming language and standard libraries are altered or enhanced to address the peculiarities of an embedded target processor.

A1.2.1. INTERFACING C PROGRAMS TO ASSEMBLER

We can easily interface Cx51 to routines written in 8051 Assembler. The A51 Assembler is an 8051 macro assembler that emits object modules in OMF-51 format. By observing a few programming rules, we can call assembly routines from C and vice versa. Public variables declared in the assembly module are available to your C programs. There are several reasons why we might want to call an assembly routine from your C program. We may have assembly code already written that you wish to use, we may need to improve the speed of a particular function, or we may want to manipulate SFRs or memory-mapped I/O devices directly from assembly.

This section describes how to write assembly routines that can be directly interfaced to C programs. For an assembly routine to be called from C, it

must be aware of the parameter passing and return value conventions used in C functions. For all practical purposes, it must appear to be a C function.

A1.2.2. FUNCTIONS OF Cx51 COMPILER

- Direct Cx51 to generate a listing file
- Control the information included in the object file Specify code optimization and memory models

A1.2.3. DIFFERENCES FROM ANSI C

❖ **WIDE CHARACTERS**

Wide 16-bit characters are not supported by Cx51. ANSI provides wide characters for future support of an international character set.

❖ **RECURSIVE FUNCTION CALLS**

Recursive function calls are not supported by default. Functions that are recursive must be declared using the reentrant function attribute. Reentrant functions can be called recursively because the local data and parameters are stored in a reentrant stack. In comparison, functions which are not declared using the reentrant attribute use static memory segments for the local data of the function. A recursive call to these functions overwrites the local data of the prior function call instance.

A1.2.4. USE OF KEIL C

KEIL C software is used for microcontroller programming. C is efficient when compared to assembly language because

- Minimizes the lines of code - In assembly language, program which takes 100 lines will take 10 lines in Keil C

Easy to code and debug - C is easy to learn so it easy to code and since no of lines is less it will reduce complexity in debugging Compatible with any

microcontrollers - Just changing the header files we can make the program to work for different microcontrollers e.g. PIC.

For programming the Microcontroller we use KEIL C programming. The Microcontroller is programmed for serial communication by enabling Timer 1 and also the coding is written so as to collect the digital data from the Analog to digital convertor. A keil cross compiler is a software, which compiles a source code of one environment as an object file to be executed in different environment. It is broadly classified into development and simulation. The simulation is handled by D Scope.

A1.3. HARDWARE DESCRIPTION

A1.3.1 8051 MICROCONTROLLER

The complete description regarding the interrupt structure of 8051 is given in chapter-5, INTERRUPTS of this manual.

A1.3.2. MEMORY ORGANISATION OF 8051

8051 has got separate address spaces for program and data memory.

A1.3.3. PROGRAM MEMORY

A program memory is a block of memory which can be used to store a sequence of program codes. It can only be read from and not written into, under normal operating conditions.

There can be upto 62k bytes of program memory in 8051. in ROM and EPROM versions of these devices, if the special control signal EA* (External Access enable) to the appendix at the back of this manual for pin details is strapped to Vcc, then program fetches to addresses 000 to 0FFF are directed to the internal ROM. The program fetch will be from external memory, when EA* is grounded.

After reset, the CPU begins execution from address location 0000 of the program memory.

A1.3.4. DATA MEMORY

Data memory is the Read/Write memory. Hence, it can be both read from and written into 8051 has got 128 bytes of internal data memory and 62k of external data memory.

A1.3.5. INTERNAL DATA MEMORY

Internal data memory addresses are one byte wide which includes 128 bytes of on-chip RAM plus a number of special function registers. The 128 bytes of RAM can be accessed either by direct addressing or by indirect addressing.

The lowest 32 bytes (00-1F) of on-chip RAM are grouped into 2 banks of 8 register each. Program instructions call out these registers as RO through R7. bits 3 and 2 in register bank is in use. This allows more efficient use of code space, since register instructions are shorter than instructions that use direct addressing.

Reset initializes the stack pointer register to 7 and it is incremented once to start from location 08, which is register R0 of second register bank. Hence, in order to use more than one register bank, the stack pointer should be initialized to a different location of RAM where it is not used for data storage.

A1.3.6. EXTERNAL DATA MEMORY

There can be upto 62k bytes of data memory external to the chip. External data memory addresses can be either 1 or 2 bytes wide depending on the addressing mode. The MOVX instruction can be used to access the external data memory.

External program and data memory may be combained, if desired, by enabling the external memory devices for both RD* and PSEN* cycles.

A1.3.7. I/O STRUCTURE OF 8051

a) PARALLEL PORT

8051 has four 8-bit parallel ports. All four parallel ports are bi-directional. Each line consists of a latch, an output driver and an input buffer.

The four ports are named as port 0 (p0), port 1(p1), port 2(p2) and port 3 (p3a). they are bit addressable and has to be represented in the form PX, Y i.e. bit Y of port X while using bit addressing mode. PX.0 is the LSB (Least Significant Bit) of port X and PX.7 is the MSB (Most significant bit) of that port.

Out of the four ports, port 0 and port 2 are used in accesses to external memory. All the port 3 pins are multifunctional. They are not only port pins, but also serve the functions of various special features as listed in Table-1.

The alternate functions can only be activated if the corresponding bit latch in the port SFR (Special Function Register) contains a1. Otherwise, the port pin is stuck at 0. hence, only port 1 is available exclusively for the user. Port 3 pins can be used if their alternate functions are not used.

The output drivers of port 0 and port 2 and the input buffers of port 0 are used in accesses to external memory, port 0 outputs the low byte of the external memory address, time-multiplexed with the byte being written or read. Port 2 outputs the high byte of the external memory address when the address is 16-bits wide. Otherwise, port 2 pins continue to emit the p2 SFR content.

NOTE

For the complete details of various registers mentioned in the following sections, please refer to the section Registers of 8051 of this chapter.

b) TIMER/COUNTERS

8051 has two 126-bit timer/counters namely Timer / counter 0 and timer / counter 1. they can be configured in any of the four operating modes, which are selected by bit modes 0,1 and 2 are the same for both the timer/counters. Mode 3 is different.

MODE 0

Either Timer in mode 0 is an 8-bit counter with a divide-by-32 prescaler. In this mode, the timer register is configured as a 13-bit register. As the count rolls over from all is to all 0s, it sets the timer interrupt flag TF1.

The 12-bit register consists of all 8 bits of TH1 and the lower 5 bits of TL1 and the lower 5 bits of TL1. the upper 3 bits of TL1 are indeterminate and should be ignored. Setting the run flag TR1 does not clear the registers.

MODE 1

Mode 1 is the same as mode 0, except that the timer register is being run with all 16 bits.

MODE 2

Mode 2 configures the Timer register as an 8-bit counter (TL1) with automatic reload. Overflow from TL1 not only sets TF1, but also reloads TL1 with the contents of TH1, which is preset by software. The reloads leave TH1 unchanged. Mode 2 operation is the same for timer 0 and 1.

MODE 3

Timer 1 in mode 3 simply holds its count. The effect is the same as setting TR1 =0. Timer 0 in mode 3 establishes TL0 and TH0 as two separate counters.

c) SERIAL PORT

The 8051 has a full Duplex Serial Port, meaning it can transmit and receive simultaneously received byte has been read from the receive register. The serial port receive and transmit registers are both accessed at special function register SBUF (Serial data Buffer). Writing to SUBF loads the transmit register. The serial port of 8051 can be employed in four modes, the details of which are presented below.

MODE 0

Mode 0 has a fixed baud rate which is 1/12 of the crystal oscillator frequency. To run the serial port in this mode, one of the timer/counters need to be set up only the SCON register needs to be defined.

Serial data enters and exists through RxD (Receive data). Tx D (Transmit Data) outputs the shift clock. 8 bits are transmitted/received with LSB taking the leading position.

MODE 1

10 bits are transmitted or received: a start bit(0), 8 data bits and a stop bit(1).On receive, the stop bit goes into RB8 in special function register SCON. The Baud rate is variable.The baud rate can be generated by timer 0 and timer 1.

MODE 2

11 bits are transmitted (through TxD) or received (through RxD); a start bit (0), 8 data bits (LSB), a programmable 9^{th} data bit and a stop bit (1). on transmit, the 9^{th} data bit can be assigned the value of 0 or 1. or, for example, the parity bit goes into RB8 in the special function registers SCON,

while the stop bit is ignored. The baud rate is programmable to either 1/32 or 1/62 of the crystal oscillator frequency.

MODE 3

11 bits are transmitted (through TXD) or received (through RXD): a start bit (0) , 8 data bits (LSB first) , a programmable 9th data bit and a stop bit (1). In fact , Mode 3 is the same as Mode 2 in all respect in all respects expect the baud rate . The baud rate in Mode 3 is variable.

NOTE

Please refer to Chapter 2, for generating baud rates using the on chip timer of 8051 , to access the onchip serial port in various modes, under the heading Onchip features of 8051.

A1.3.7.1. REGSISTERS OF 8051

The various special function registers available in the internal data memory 8051 are listed in Table 2. The table also indicated whether each one is only byte addressable or byte and bit addressable (marked with an asterisk *) and the addresses of those registers (i.e., On-chip RAM address.)

TABLE -1

SYMBOL OF SFR	NAME OF THE SFR	ADDRESS
*ACC	ACCUMULATOR	E0
*B	B REGISTER	F0
*PSW	PROGRAM STATUS WORD	D0
SP	STACK POINTER	81

DPTR	DATA POINTER 2 YTES	
DPL	LOW BYTE	82
DPH	HIGH BYTE	83
*P0	PORT 0	80
*P1	PORT 1	90
*P2	PORT 2	A0
*P3	PORT 3	B0
*IP	INTERRUPT PRIORITY CONTROL	B8
*IE	INTERRUPT ENABLE CONTROL	A8
TMOD	TIMER/COUNTER MODE CONTROL	89
*TCON	TIMER/COUNTER CONTROL	88

A1.3.7.2. ACCUMULATOR

ACC is the Accumulator register, The mnemonics for Accumulator-Specific instructions, however refer to the Accumulator as simply A. Accumulator is an important Register on which various special operations such as reading from or writing to an external memory , rotation , addition, subtraction, multiplication, division and various other operations can be done.

A1.3.8. BREGISTER

Register B is used during multiply and drive operations. For other instructions, it can be treated as another scratch pad register.

PROGRAM STATUS WORD:

The PSW register contains several status bits that reflect the current state of the CPU. It contains the carry bit, the Auxiliary carry bit, two register bank select bits, the over flow flag, the parity bit and two user-definable status flags. This register is bit addressable.

D7	D6	D5	D2	D3	D2	D1	D0
CY	AC	F0	RS1	RS0	OV	-	P

CY	PSW.7	Carry Flag
AC	PSW.6	Auxiliary Carry Flag
F0	PSW.5	Flag 0 available to the user
RS1	PSW.2	Register bank selector BIT 1
RS0	PSW.3	Register bank selector BIT 0
OV	PSW.2	Over flow Flag
-	PSW.1	User definable Flag

PPSW.0 Parity flag. Set/cleared by hardware after the execution of each instruction to indicate odd/even number of 1 bits in the accumulator.

NOTE:

The value of RS0 and RS1 select the onchip register banks.

RS1	RS0	REGISTER BANK	ADDRESS
0	0	0	00 07
0	1	1	08 0F

1 1	0 1	2 3	10 17 18 1F

A1.3.9. STACK POINTER

The stack pointer register is 8 bits wide. It is incremented before data is stored during the execution of PUSH and CALL instructions. While the stackmay reside anywhere in the on-chip RAM, the stack pointer is initialized to 07 after a RESET. This causes the stack to begin at location 08.

A1.3.10. DATA POINTER

The data pointer (DPTR) consists of a high byte (DPH) and a low byte (DPL). Its intended function is to hold a 16-bit address for external memory access. It may be manipulated as a 16-bity register or as two independent 8-bit registers.

PORTS 0 TO 3:

Port 0, port 1, port 2 and port 3 are the SFR latches of ports 0, 1, 2 and 3 respectively.

A1.3.11. SERIAL DATA BUFFER

The serial data buffer is actually two separate registers, a transmit buffer and a receive buffer register when data is written to SUBF, it goes to the transmit buffer where it is held for serial transmission. When data is read from SBUF, it comes from the receive buffer.

A1.3.12. TIMER REGISTERS

Register pairs (TH0, TL0), (TH1, TL1) are the 16-bit counting registers for Timer/counters 0 and 1 respectively.

A1.3.13. CONTROL REGISTERS

Special function registers IP, IE, TMOD, TCON, SCON and PCON contain control and status bits for the interrupt system, the Timer/counters and the serial port.

A1.3.14. PCON: POWER CONTROL REGISTER

Bit 7 of PCON register is used to control the baud clock generated from the timer. In the case of 80C51BH, PCON register can be used to select the power down mode and Idle mode of operation. Please refer to the Intel data sheets of 80C51BH for the complete details of the above said modes. This register is not bit addressable.

D7	D6	D5	D2	D3	D2	D1	D0
Smod	-	-	-	GF1	GF0	PD	IDL

SMO - Double baud rate bit. If timer 1 is used to generate baud rate and SMOD = 1, the baud rate is doubled when the serial port is used in modes 1, 2 or Bits 2,5,6 - Not implemented, reserved for future use. User software should not write is to reserved bits. GF1, GF0 - User definable, general purpose flag bits.

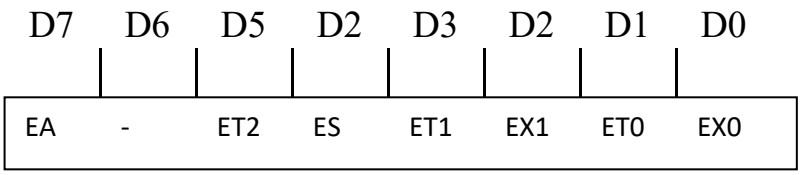
PD - Power down bit. Setting this bit activates power down operation in the 80C51BH. In rest of the microcontrollers, PD and IDL bits does not serve any purpose.

IDL - Idle mode bit. Setting this bit activates Idle mode operation of 80C51BH.

If is are written to PD and IDL at the same time, PD takes precedence.

A1.3.15. IE: INTERRUPT ENABLE REGISTER

IE register, with its bit addressing capability, is used to enable/disable all or any of the interrupts of 8051. if the bit is 0, the corresponding interrupt is disabled. If the bit is 1, the corresponding interrupt is enabled.



EA IE.7 - Diables all interrupts. If EA = 0, no interrupt will be acknowledged. If

EA = 1, each interrupt source is individually enabled or disabled by setting or clearing its enable bit.

IE.6 - Not implemented, reserved for future use.

ET2 IE.5 - Enable or disable the timer 2 overflow interrupt.

ES IE.2 - Enable or disable the serial port interrupt

ET1 IE.3 - Enable or disable the timer 1 overflow interrupt.

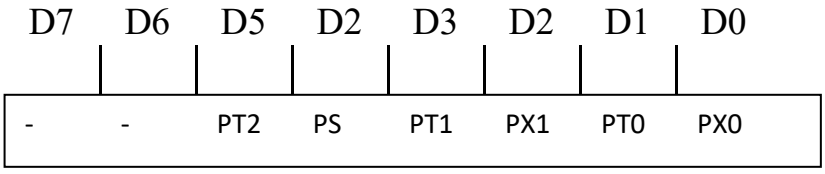
EX1 IE.2 - Enable or disable the external interrupt 1.

ET0 IE.1 - Enable or disable the timer 0 overflow interrupt.

EX0 IE.0 - Enable or disable the external interrupt 0.

A1.3.16. INTERRUPT IP: PRIORITY REGISTER

IP register is used to assign the priority for the interrupts of 8051. if the bit is 0, the corresponding interrupt has a lower priority and if the bit is 1, the corresponding interrupt has a higher priority. Bit addressing is allowed with this register also.



IP.7, IP.6 - Not implemented, reserved for future use.

PT2 IP.5 - Defines the timer 2 interrupt priority

PS IP.2 - Defines the Serial port interrupt priority

PT1 IP.3 - Defines the Timer 1 interrupt 1 priority

PX1 IP.2 - Defines External interrupt 1 priority

PT0 IP.1 - Defines the Timer 0 interrupt priority

PX0 IP.0 - Defines External Interrupt 0 priority.

A1.3.17 TCON: TIMER/COUNTER CONTROL REGISTER

TCON register is used to control the entire operation of the timer/counters of 8051. This register can also be bit addressed.

D7	D6	D5	D2	D3	D2	D1	D0
TF1	TR1	TF0	TR0	IE1	IT1	IE0	IT0

A1.3 REGISTER. BIT ADDRESSABLE

SCON register is used to specify the mode in which the serial port is to work. TI (Transmit interrupt) / RI (Receiver Interrupt) flag(s) of SCON register can be used to check whether the transmission/reception is over.

SM2 SCON.5- Enables the multiprocessor communication feature in modes 2 &3. in mode 2 or 3, if SM2 is set to 1, then RI will not be activated if the received 9th data bit (RB8) is0. in mode 1, if SM2 = 1, then RI will not be activated if a valid stop bit was not received. In mode 0, SM2 should be 0.

REN SCON.2 - Set/cleared by software to enable/disable reception of serial data.

TB8 SCON.3 - The 9th bit that will be transmitted in modes 2 &3. set/cleared by software.

RB8 SCON.2 - In moed 2 & 3, is the 9th data bit that was received. In mode 1, if SM2 =0, RB8 is the stop bit that was received. In mode 0, or at the beginning of the stop bit in the other modes. Must be cleared by software.

TI SCON.1 - Transmit interrupt flag. Set by hardware at the end of the 8th bit time in mode 0, or at the beginning of the stop bit in the other modes. Must be cleared by software.

RI SCON.0 - Receive interrupt flag. Set by hardware at the end of the 8th bit time in mode 0, or halfway through the stop bit time in the other modes. Must be cleared by software.

A1.3.19. ADDRESSABLE MODES

The 8051 instruction operate on data stored in internal CPU registers, external memory or on the I/O ports. There are a number of methods in which these registers, memory and I/O ports can be addressed, called addressing modes. This section giuves a brief summary of the various types of addressing modes available in 8051. these modes are:

- Immediate
- Direct
- Indirect
- Register
- Register specific
- Indexed

A1.3.20. MEDIATE ADDRESSING

In this mode, the data to be operated upon is in the location immediately following the opcode. For example, the instruction,

MOV A,#21

Loads the A ccumulator with the hex value 21. # Signifies IMMEDIATE ADDRESSING.

A1.3.21. DIRECT ADDRESSING

In direct addressing, the operand is specified by an 8-bit address field in the instruction. Only internal data RAM and SFRs can be directly addressed. For example, the instruction,

INC20 Increments the contents of the on-chip data RAM address 20 by one.

A1.3.22. INDIRECT ADDRESSING

In indirect addressing, the instruction specifes a register which contains the address of the operand. Both internal and external RAM can be indirectly addressed.

The address register for 8-bit addresses can be R0 or R1 of the selected register bank or the stack pointer. The address register for 16-bit addresses can only be the 16-bit data pointer register, DPTR. For example, the instruction,

A1.3.23. REGISTER ADDRESSING

The register banks, containing registers R0 through R7, can be accessed by certain instruction which carry a 3-bit register specification within the opcode of the instruction. Instructions that access the registers this way are code efficient, since this mode eliminates an addres byte.

When the instruction is executed, one of the eight registers in the selected bank is accessed. One of the four banks is selected at the execution time by the two bank select bits in the PSW. For example, the instruction,MOV A,R0Copies the contents of the register R0 to the accumulator.

A1.3.24. REGISTER-SPECIFIC INSTRUCTIONS

Some instructions are specific to a certain register. Stating in other words, the opcode itself contains the implied operand or the operand destination. For example, some instruction always operate on the

accumulator or data pointer, etc., so no address byte is needed to point to it. The opcode itself does that needed to point to it. The opcode itself does that instructions that refer to the accumulator as a assemble as accumulator-specific opcodes. Such instructions are one byte long.

A1.3.25. INDEDDRESSING

Only program memory can be accessed with indexed addressing and it can only be read. This addressing mode is intended for reading look-up tables in program memory. A 16-bit base register points to the base of the table and the accumulator is set up with the table entry number. The address of the table entry in program meory is formed by adding the accumulator data to the base pointer. The instruction, MOV

A,@A+DPTRReads the contents of program memory, whose address is obtained by adding the contents of DPTR and accumulator and copies it to the accumulator.Another type of indexed addressing is used in the case jump instruction. In this case, the destination address of a jump instruction is computed as the sum of the contents of base pointer and accumulator.

A1.3.26. I/O ADDRESSES OF PERIPHERALS IN MICRO-51 AND MP-I (8051)

This manual is formulated as a user manual common for both Micro-51 and Micro power-I based 8031/8051 piggyback boards. Since almost all the features are common for both the kits, the worked out examples given in chapters 2, 3 and 2 will work in both the kits. But, the peripherals addresses will differ.

Having this in mind, the addresses of all the peripherals provided in both the kits are tabulated in table-3 and are given a general name. In the worked out examples, only these general names are mentioned. The user has to substitute the correct address depending on the kit in which the user is working.

A1.2. 16x 2 LCD MODULES

Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal.

When the LCD is in the off state, light rays are rotated by the two polarizers and the liquid crystal, such that the light rays come out of the LCD without any orientation, and hence the LCD appears transparent. When sufficient voltage is applied to the electrodes, the liquid crystal molecules would be aligned in a specific direction. The light rays passing through the LCD would be rotated by the polarizers, which would result in activating / highlighting the desired characters.

The LCD s don t generate light and so light is needed to read the display. By using backlighting, reading is possible in the dark. The LCD s have long life and a wide operating temperature range. Changing the display size or the layout size is relatively simple which makes the LCD s more customer friendly.

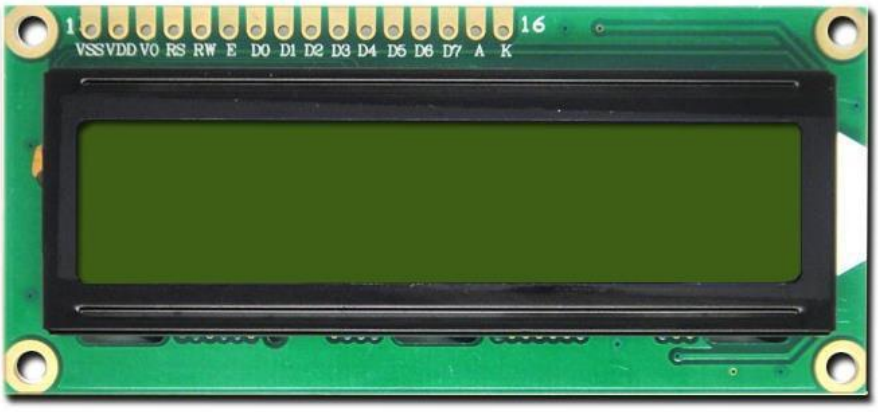


Figure: A1.2. 16x 2 LCD MODULES

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

FEATURES

1)Wide viewing angle and high contrast.

2)57 dot character matrix with cursor.

3)Interfaces with 4-bit or 8-bit MPUs.

4)Displays up to 226 characters and special symbols.

5)Custom character patterns are displayed with the character RAM.

6)Abundant instruction set including clear display, cursor on/off, and character blinking.

7)Compact and light weight for easy assembly to the host instrument.

8)Operable on single 5 V power supply.

9)Low power consumption.

Step-up transformers increase voltage, step-down transformers reduce voltage. Most power supplies use a step-down transformer to reduce the dangerously high mains voltage (230V in UK) to a safer low voltage

The input coil is called the **primary** and the output coil is called the **secondary**. There is no electrical connection between the two coils,

instead they are linked by an alternating magnetic field created in the soft-iron core of the transformer. The two lines in the middle of the circuit symbol represent the core.

Transformers waste very little power so the power out is (almost) equal to the power in. Note that as voltage is stepped down current is stepped up.

The ratio of the number of turns on each coil, called the **turns ratio**, determines the ratio of the voltages. A step-down transformer has a large number of turns on its primary (input) coil which is connected to the high voltage mains supply, and a small number of turns on its secondary (output) coil to give a low output voltage.

A1.3.Transformer

Transformer circuit symbol

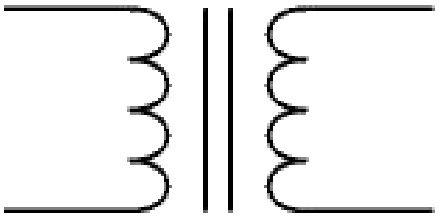


Figure:A1.3. Transformer circuit

the transmitter section includes an IR sensor, which transmits continuous IR rays to be received by an IR receiver module. An IR output terminal of the receiver varies depending upon its receiving of IR rays. Since this variation cannot be analyzed as such, therefore this output can be fed to a comparator circuit. Here an operational amplifier (op-amp) of LM 339 is used as comparator circuit.

When the IR receiver does not receive a signal, the potential at the inverting input goes higher than that non-inverting input of the comparator IC (LM339). Thus the output of the comparator goes low, but the LED does not glow. When the IR receiver module receives signal to the potential at the

inverting input goes low. Thus the output of the comparator (LM 339) goes high and the LED starts glowing. Resistor R1 (100), R2 (10k) and R3 (330) are used to ensure that minimum 10 mA current passes through the IR LED Devices like Photodiode and normal LEDs respectively. Resistor VR2 (preset=5k) is used to adjust the output terminals. Resistor VR1 (preset=10k) is used to set the sensitivity of the circuit Diagram. Read more about IR sensors.

A1.4. VOLTAGE REGULATOR

A voltage regulator is an electronic circuit that provides a stable DC voltage independent of the load current, temperature and AC line voltage variations. A voltage regulator may use a simple feed-forward design or may include negative feedback. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages.

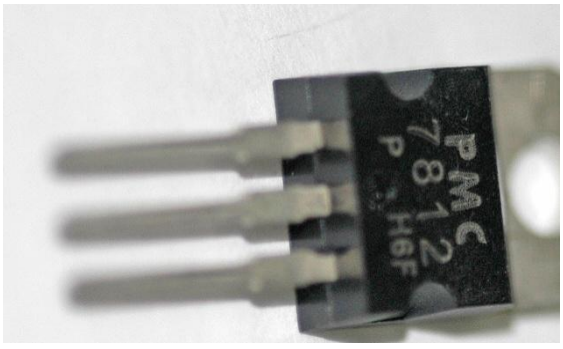


Figure A1.4. voltage regulator

A1.4.1. ELECTRONIC VOLTAGE REGULATORS

A simple voltage/current regulator can be made from a resistor in series with a diode (or series of diodes). Due to the logarithmic shape of diode V-I curves, the voltage across the diode changes only slightly due to changes in

current drawn or changes in the input. When precise voltage control and efficiency are not important, this design may be fine. Since the forward voltage of a diode is small, this kind of voltage regulator is only suitable for low voltage regulated output. When higher voltage output is needed, a zener diode or series of zener diodes may be employed. Zener diode regulators make use of the zener diode's fixed reverse voltage, which can be quite large.

Feedback voltage regulators operate by comparing the actual output voltage to some fixed5reference voltage. Any difference is amplified and used to control the regulation element in such a way as to reduce the voltage error. This forms a negative feedback control loop; increasing the open-loop gain tends to increase regulation accuracy but reduce stability. (Stability is avoidance of oscillation, or ringing, during step changes.) There will also be a trade-off between stability and the speed of the response to changes. If the output voltage is too low (perhaps due to input voltage reducing or load current increasing), the regulation element is commanded, up to a point, to produce a higher output voltage by dropping less of the input voltage (for linear series regulators and buck switching regulators), or to draw input current for longer periods (boost-type switching regulators); if the output voltage is too high, the regulation element will normally be commanded to produce a lower voltage. However, many regulators have over-current protection, so that they will entirely stop sourcing current (or limit the current in some way) if the output current is too high, and some regulators may also shut down if the input voltage is outside a given range .

A1.5 RED TACTON

RedTacton Innovation is a Human Field Networking (HN) invention instigated by Nippon Transmit and Telephone Corporation (NTT) and it uses the surface of the anatomy that will be sprightly and secure system conveyance method.It will be entirely faultless by remote and infrared

inventions as it uses the electric field transmitted to the anatomy of the outer layer. The mode of conveyance is still in shape, and apart of the anatomy interacts with the RedTacton handset. Correspondence can be useful on any surface, for example,the hands, fingers, hands, feet, face, feet, or center.RedTacton also works with shoes and clothing. When contiguity falls apart, the correspondence stops.

FigureA1.5: red tacton

APPENDIX 2

SOURCE CODE

A2.SOURCE CODE

```
#include <REGX52.H>
sbit REL_1 = 0x96;
sbit REL_2 = 0x95;
sbit REL_3 = 0x97;
sbit FIRST = 0x90;
sbit SECOND = 0x91;
sbit BACK = 0x92;
sbit RS=0xB7;
sbit EN=0xB6;
sfr lcd_dat=0xA0;
#define SERIAL_NEXT_LINE serial_trans(0x0d);serial_trans(0x0a);
#define ENTER serial_trans(0x0d);
void lcd_data(unsigned char);
void lcd_command(unsigned char);
void lcd_line(unsigned char*,unsigned char);
void lcd_init(void);
void delay(unsigned long);
unsigned char z=1,y=1;
void serial_init(void);
void serial_trans(unsigned char);
void serial_line_trans(unsigned char*);
unsigned char serial_recev(void);
void gsm_module_init(void);
unsigned int sms_read(void);
void sms_delete(void);
void sms_send(unsigned char*,unsigned char*);
```

```
unsigned char sms_rec_data;
void main()
 {
unsigned char sms_rec_data;
P1=0XFF;  REL_1=REL_2=REL_3=0;
lcd_init();        // fn calling
lcd_line(" CAMP SECURITY              ",0x80);
lcd_line("   SYSTEM              ",0xc0);
//serial_init();
//gsm_mod ule_init();
//sms_delete();
z=1;  //REL1=0;REL2=0;
while(1)
{
 if(FIRST==1)
 {
  REL_1=REL_2=REL_3=0;
 }
 else
 {
  REL_1=REL_2=REL_3=1;
 }
// if(FIRST==1)
// {
//  serial_line_trans(" HUMAN DETECTED @ FIRST UNIT  ");
serial_trans(0X0A);        serial_trans(0X0D);        serial_trans('#');
//  lcd_line("HUMAN DETECTED              ",0x80);
```

```
//  lcd_line("ON FIRST UNIT                ",0xc0);
//        REL_1 = 1;
//        REL_2 = 0;
// }
// else if(SECOND==1)
// {
//  serial_line_trans(" HUMAN DETECTED @ SECOND UNIT  ");
serial_trans(0X0A);        serial_trans(0X0D);        serial_trans('#');
//  lcd_line("HUMAN DETECTED               ",0x80);
//  lcd_line("ON SECOND UNIT               ",0xc0);
//        REL_1 = 0;
//        REL_2 = 1;
}
//// else
//// {
////   ////   lcd_line(" CAMP SECURITY              ",0x80);
////lcd_line("   SYSTEM              ",0xc0);
//// }
// else if(BACK==1)
// {
//   serial_line_trans(" HUMAN DETECTED @ BACK UNIT  ");
serial_trans(0X0A);        serial_trans(0X0D);        serial_trans('#');
//  lcd_line("HUMAN DETECTED               ",0x80);
//  lcd_line("boby                ",0xc0);
//  REL_3 = 0;
// }
// else
// {
```

```
// lcd_line(" CAMP SECURITY            ",0x80);
//lcd_line("   SYSTEM             ",0xc0);
// REL_3 = 1;         REL_1 = 1;
//        REL_2 = 1;
// }
}
void lcd_init(void)
{
        lcd_command(0x38);
        delay(1000);
        lcd_command(0x06);                    // disp on cur off
        delay(1000);
        lcd_command(0x0c);                                  // shift right
        delay(1000);
        //lcd_command(0x01);                                // clear display
}
void lcd_command(unsigned char addr)
{
        lcd_dat=addr;
        RS=0;
        EN=1;
        delay(100);
        EN=0;
        delay(100);
}
void lcd_data(unsigned char dat)
{
```

```
        lcd_dat=dat;
        RS=1;
        EN=1;
        delay(100);
        EN=0;
        delay(100);
}
void lcd_line(unsigned char *disp,unsigned char addr)
{
        lcd_command(addr);
        while(*disp)
{       lcd_data(*disp);
        disp++;         }
}
void delay(unsigned long count)
{
        while(count--);
}
void serial_init(void)
{       TMOD=0x20;
        SCON=0x40;
//      TH0=TL0=TL1=0x00;
        TH1=0xFD;
        TR1=1;
}
void serial_trans(unsigned char dat)
{
```

```
        SCON=0x40;
        TR1=1;
        SBUF=dat;
        while(TI==0);
        TI=0; }
void serial_line_trans(unsigned char const*line_dat)
{
        while(*line_dat)
        {
                serial_trans(*line_dat);
                line_dat++;  } }
unsigned char serial_recev(void)
{
SCON=0x50;
TR1=1;
        while(RI==0);
        RI=0;
        return(SBUF);
}
```

APPENDIX 3

SCREEN SHOTS

A3.SCREEN SHOTS

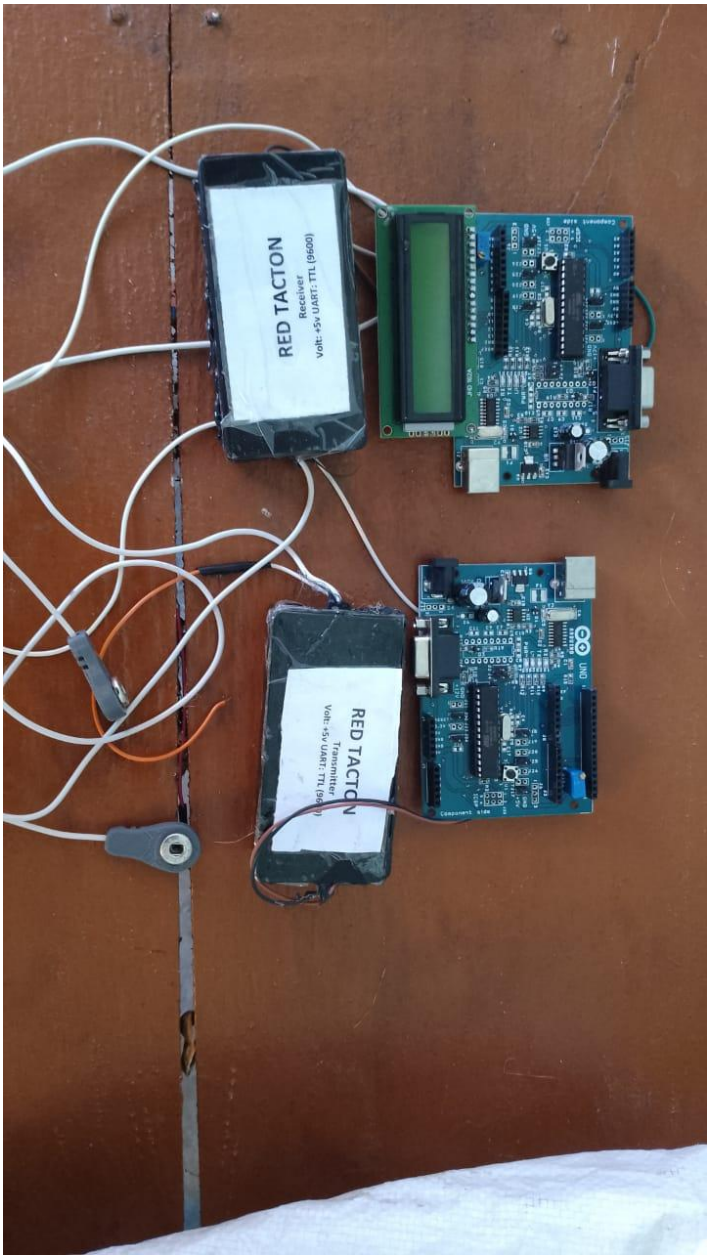


Figure:A3.1 KIT

REFERENCES

[1] . H. Anandakumar and K. Umamaheswari, A bio-inspired swarm intelligence technique for social aware cognitive radio handovers, Computers & Electrical Engineering, vol. 71, pp. 925-937, Oct.2018. doi:10.1016/j.compeleceng.2017.09.016

[2] H. Anandakumar and K. Umamaheswari, An Efficient Optimized Handover in Cognitive Radio Networks using Cooperative Spectrum Sensing, Intelligent Automation & Soft Computing, pp. 1-8, Sep. 2017. doi: 10.1080/10798587.2017.136493

[3] . R. Arulmurugan and H. Anandakumar, Early Detection of Lung Cancer Using Wavelet Feature Descriptor and Feed Forward Back Propagation Neural Networks Classifier, Lecture Notes in Computational Vision and Biomechanics, pp. 103-110, 2018.doi:10.1007/978-3-319-71767-8_9

[4] . R. Arulmurugan and H. Anandakumar, Region-based seed pointcell segmentation and detection for biomedical image analysis, International Journal of Biomedical Engineering and Technology,vol. 27, no. 4, p. 273, 2018.

[5] . M. Suganya and H. Anandakumar, Handover based spectrum allocation in cognitive radio networks, 2013 International Conference on Green Computing, Communication and Conservation of Energy (ICGCE), Dec.

2013.doi:10.1109/icgce.2013.6823431. doi: 10.4018/978-1-5225-5246-8.ch012

[6] . X. M. Chen, S. Barma, S. H. Pun, M. I. Vai, and P. U. Mak, Direct Measurement of Elbow Joint Angle Using Galvanic Couple System, IEEE

Transactions on Instrumentation and Measurement, vol. 66, no. 4, pp. 757-766, 2017.

[7] . X.M. Chen, S.H. Pun, J. F. Zhao, P.U.Mak, B.D. Liang, and M. I. Vai, Effects of human limb gestures on galvanic coupling intrabody communication for advanced healthcare system, Biomedical Engineering Online, vol. 15, no. 1, article no. 60, 2016.

[8] . Haldorai, A. Ramu, and S. Murugan, Social Aware Cognitive Radio Networks, Social Network Analytics for Contemporary Business Organizations, pp. 188-202. doi: 10.4018/978-1-5225-5097-6.ch010

[9] . Haldorai and A. Ramu, An Intelligent-Based Wavelet Classifier for Accurate Prediction of Breast Cancer, Intelligent Multidimensional Data and Image Processing, pp. 306-319.

[10] . S, D., & H, A. (2019). AODV Route Discovery and Route Maintenance in MANETs. 2019 5th International Conference on Advanced Computing & Communication Systems (ICACCS).doi: 10.1109/icaccs.2019.8728456

[11] . Visvesvaran, C., Vinesha, P., Rajarajeshwari, S., Sowmiya,K., Athithya Janani, A., " IOP measurement using contact tonometer by MEMS technology", International Journal of Innovative Technology and Exploring Engineering, 2019.

[12]Visvesvaran.C1, Ramyadevi.N2, Karthi.S.P3, Sudhhir.U.S,"Wireless Data Transfer Based on Bone Conduction: Osteoconduct"2021 7th International Conference on Advanced Computing & Communication Systems (ICACCS) 978-1-6654-0521-8/21/$31.00 ©2021 IEEE