Secure Design and Implementation of Fingerprint and RFID-Based Abortion Tracking Systems

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ABSTRACT

According to 2011 census there are decline in both rural and urban area of the country.This sex ratio decline in rural India is three times as compared to drop in urban area. A matter is great concern. In 2011 there is 914 girls for every 1000 boys under the age of seven , so that to stop sex selective abortion we have to developed 'Cloud Computing solution for Abortion tracking system ' .When pregnant women comes to hospital she has to register using Fingerprint and RFID which is connected to microcontroller at UART 0 and UART1.hardware connected to software linked pc server through USB cable. After using this system with Cloud Computing hospital from any where and any time can accept registered cases and monitor by regular authority. Also we can send message to patient or police station using Gateway technology. In this way our system is enough to track illegal abortion.

Keywords: *Cloud Computing, Abortion Tracking System, RFID etc.*

1. CHAPTER-1 INTRODUCTION

There are many rules and regulations but that not enough to stop abortion of girl fetus. In a India abortion is legal up to 12th week of pregnancy. It because of sex of child can be determined later.After sonography,when people found it is a girl they abort their unborn fetus.

In 1991 there were 945 girls for every 1000 boys under the age of seven.10 year later statistics shows that this figure has dropped to 927 girls. So to stop the gender-selective abortion we wants to developed abortion tracking system using cloud Computing, it may enough to stop the abortion of girls.

The anti-abortion system includes two units a hospital unit and server unit the pregnant women has to be registered using fingerprint connected to hardware at UART0 and UART1.hardware connected to software which is linked to server PC via USB cable. Using the fingerprint identification and RFID card combination we can try to increase security.

Thus progress of all babies of pregnant women monitored by regulatory authority. So that there will be no killing of female fetus and no illegal abortion.

After using this system with Cloud Computing hospital from any where and any time can accept registered cases and monitor by regular authority. Also we can send message to patient or police station using Gateway technology. In this way our system is enough to track illegal abortion.

1.1 NEED OF PROJECT:

A 2011 census shows that India has fewer and fewer girls, mostly because unborn female babies are being killed at a very high rate. many pregnant women abort their unborn child as soon as they find out it is a girl. In 1961 there were 976 girls for every 1000 boys under the age of seven.50 year later statistics shows that this figure has dropped to 914 girls.

So to stop the sex-selective abortion we have to developed the Cloud Computing solution abortion tracking system using Fingerprint & RFID authentication it may enough to stop the abortion of girls. Thus progress of all babies of pregnant women monitored by regulatory authority. So there is no killing of female fetus and no illegal abortion.

2. CHAPTER 2
LITERATURE SURVEY

LITERATURE REVIEW

SR No	PAPER (YEAR)	AUTHER	TECNOLOGY USED	DISADVANTAGES
1.	Trends in selective abortions of girls in India (March 2011)	Prabhat Jha, Maya A Kesler, Rajesh Kumar, Faujdar Ram, Usha Ram, Lukasz Aleksandrowicz, Diego G Bassani, Shailaja Chandra, Jayant K Banthia	analysis of nationally representative birth histories from 1990 to 2005 and census data from 1991 to 2011	
2.	Sex-selective abortions in India (June 2012)	Suman Saurabh, Sitanshu Sekhar Kar, Dhruv Kumar Pandey	RFID is used for authentication	Security is less
3.	"ANTI ABORTION SYSTEM GSM&FINGERPRINT MODULE." (March April 2013)	Sagar Shinde, Dhanashri Patil	Fingerprint module used for authentication with RFID	Local database used so limited for only one hospital
PROPOSED TECHNOLOGY:- •Cloud computing technology used to add multiple hospitals •Gateway technology used to send messages •Fingerprint module add for more security				

1) [ARM 7 based Fingerprint detection system,International journal of application & innovation in engineering and management 2013,V.Shridhar,M.Rajendra Prasad]

Finger print recognition technology to allow access to only those whose fingerprints you choose. It contains all the necessary electronics to allow you to store, delete, and verify fingerprints with just the touch of a button. Stored fingerprints are retained even in the event of complete power failure or battery drain. These eliminates the need for keeping track of keys or remembering a combination password, or PIN.
Fingerprint sensor captures the fingerprint images, matches the uniqueness of each print read by the sensor and compares it to the one stored in its module or local system database. The goal of this paper is to develop a finger print authentication system with the help of LPC2148. Initially we are storing user fingerprint information in fingerprint module data base. Here after pressing one switch we are scanning the finger print and we have to check with the predefined data using microcontroller. After identifying, user name is displayed on the LCD

2) A Cloud Computing Solution for Patient's Data Collection in Health Care Institutions ,Date of Currert Version:18 march 2010,ST marten conference.

Existing processes for patients' vital data collection require a great deal of labor work to collect input and analyze the information. These processes are usually **slow and error-prone, introducing a latency** that prevents real-time data accessibility. This scenario restrains the clinical diagnostics and monitoring capabilities. **Cloud computing** refers to the delivery of computing and storage capacity as a service to a heterogeneous community of end-recipient.

3) Sagar Shinde, Dhanashri Patil / International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com Vol. 3, Issue 2, pp.1764-1766 using GSM&FINGERPRINT MODULE 2014

The anti-abortion system includes two units a hospital unit and server unit .the pregnant women has to be registered using fingerprint connected to software which is linked to server PC via GSM. Thus progress of all babies of pregnant women monitored by regulatory authority. No killing of female fetus and no illegal abortion. Keywords-Hospital Unit, Server Unit, GSM, FINGURE PRINT MODULE.

3. CHAPTER 3
PROPOSED METHODOLOGY

3.1 .BLOCK DIAGRAM

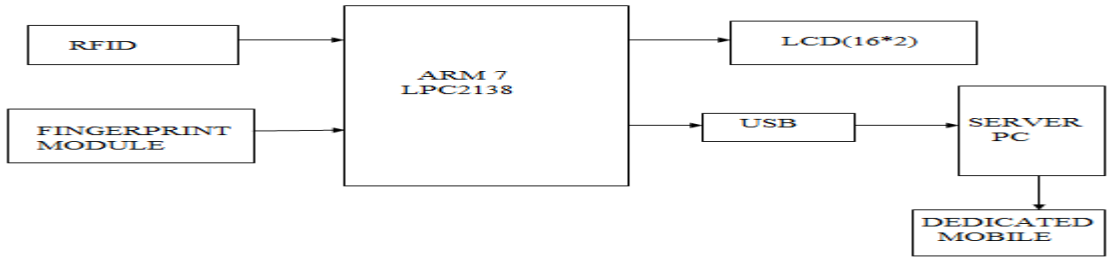


Figure 3.1 block diagram

3.2 BLOCK DIAGRAM DESCRIPTION:

Our system consists of two main units, which coordinates with each other. Thus our system is divided into following two units,

- Hospital unit
- Server unit

In our project we have 2 units, Hospital unit and the server unit. Whenever the couple comes to the doctor for their registration in the 1st month of pregnancy the mother has to register using a fingerprint connected to software which is linked to the server pc via SMS gateway**.** The mother and father details (such as name address mobile no etc.) filled in the software also the mothers fingerprint template is also registered. All this information is then sent to the server unit. The server unit will store this information in its data base. Whenever the mother comes for a checkup or the sonography, she has to first press the fingerprint on to the fingerprint module. The µc sends a SMS with the fingerprint template to the server. The server will then receive the fingerprint template and compare it with the ones stored in its database. If the fingerprint template matches the remaining info is sent to the hospital unit indicating that this patient is registered.

If the patient is not registered then the hospital/doctor will not accept such cases as they are considered illegal. If any patient would not update information up to specific months then message will send to the nearer police station. In this way abortion can track.

SOFTWARE SYSTEM EXPLANATION: Total circuit required dc power supply +5V & 3.3V.The circuit incorporate microcontroller.(ARM 2138), LCD(16*2),FINGERPRINTMODULE(R305),RFID(EM18). UART0 and

UART1 is used for connecting FINGURE PRINT module & RFID to microcontroller. USB cable is use for serial interface between microcontroller and local PC.

PC should have **XAMPP** software, SUBLINE TEXT software. XAMPP is software which having multiple software like APPACHE, MYSQL DATABASE. SUBLINE TEXT editor is like notepad use only for editing coding. HTML is use for create the web pages .Using this web pages patient details can fill. PHP coding is used to send patients details on database. Here MYSQL database is used.

Also **GATEWAY** is used for message sending purpose. GATEWAY access took. Multiple types of messages are send using gateway. Messages are registration completed message, invitation for monthly check up , warning message and message to police station. Police station message is used for tracking purpose.

Cloud is an Internet.**Cloud Computing** refers to **manipulating, configuring,** and **accessing** the hardware and software resources remotely. It offers online data storage, infrastructure, and application.Cloud computing offers **platform independency,** as the software is not required to be installed locally on the PC. Hence, the Cloud Computing is making our businessapplications **mobile** and **collaborative.**

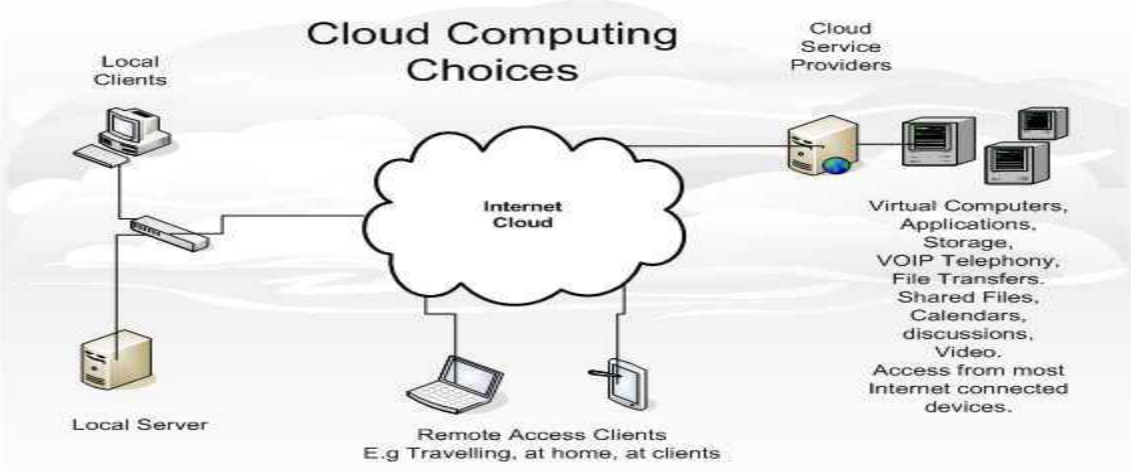
Basic Concepts
There are certain services and models working behind the scene making the cloud computing feasible and accessible to end users. Following are the working models for cloud computing:
Deployment Models
Service Models

Deployment Models
Deployment models define the type of access to the cloud, i.e., how the cloud is located? Cloud can have any of the four types of access: Public, Private, Hybrid, and Community.

Public Cloud
The **public cloud** allows systems and services to be easily accessible to the general public. Public cloud may be less secure because of its openness.

Private Cloud
The **private cloud** allows systems and services to be accessible within an organization. It is more secured because of its private nature.

Service Models
Cloud computing is based on service models. These are categorized into three basic service models which are -Infrastructure-as–a-Service (IaaS),Platform-as-a-Service (PaaS),Software-as- aService (SaaS)



4. CHAPTER 4
SYSTEM DESCRIPTION

4.1 CIRCUIT SCHEMATIC:

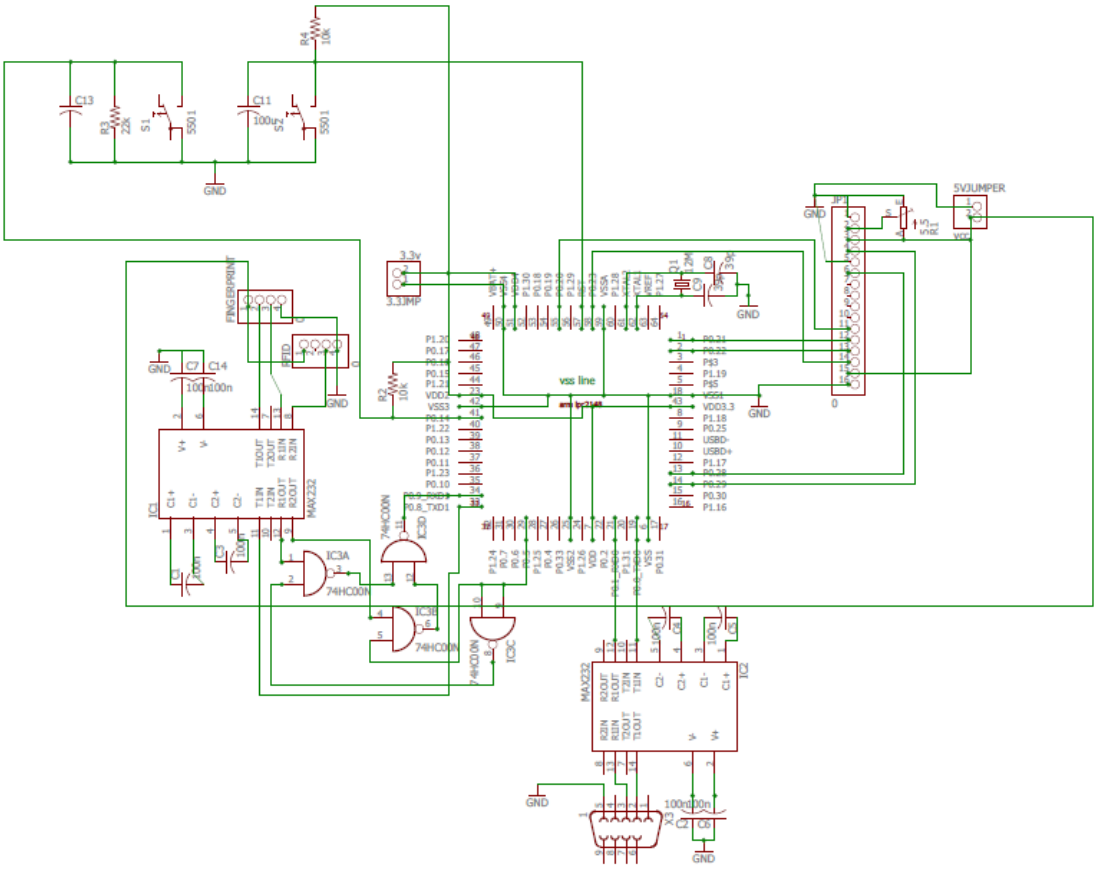


Fig.4.1. Circuit Diagram

DESCRIPTION:
Total circuit required dc power supply +5V & 3.3V.The circuit incorporate microcontroller(ARM 2138), LCD(16*2), FINGERPRINT Module(R305),RFID(EM18). UART0 and UART1 is used for connecting FINGURE PRINT module & RFID to microcontroller. USB cable is use for serial interface between microcontroller and local PC.

4.2 HARDWARE REQUIRED:

4.2.1 ARM-7(LPC 2138) MICROCONTROLLER

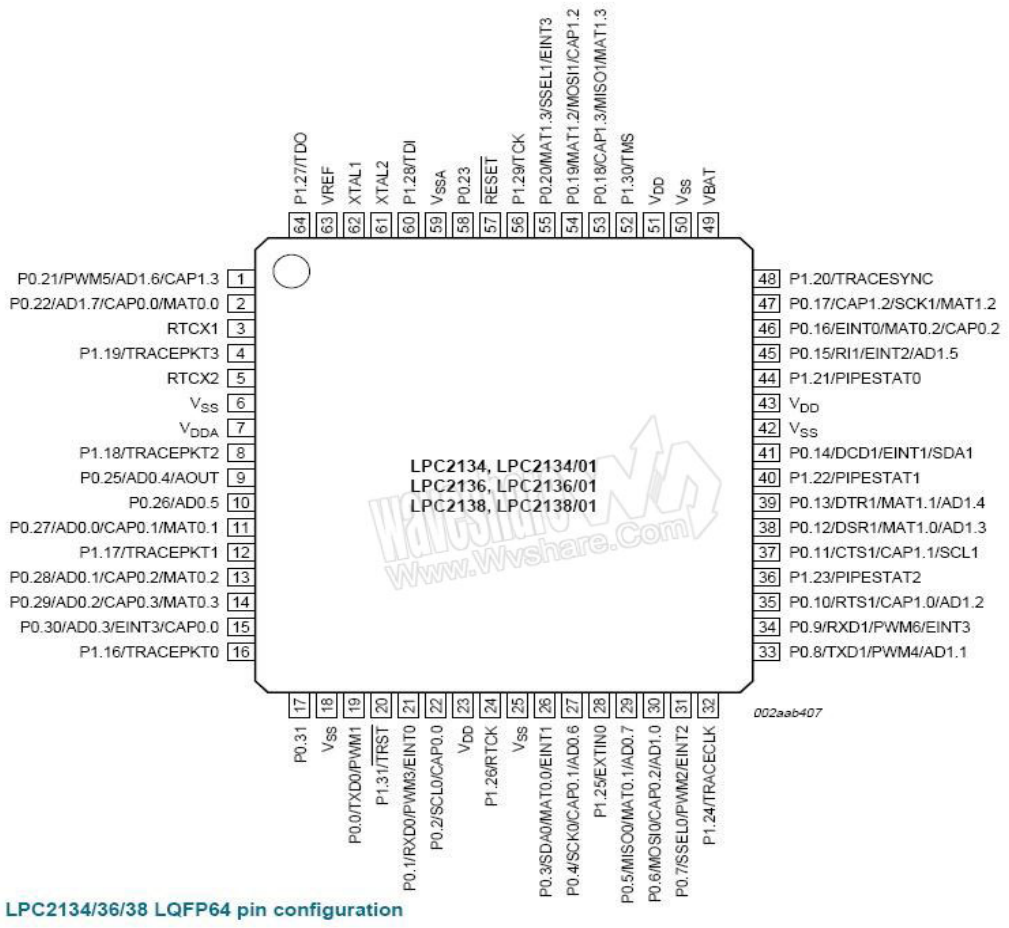


Figure 4.2.1 LPC2138 microcontroller

DESCRIPTION:

The LPC2131/32/34/36/38 microcontrollers are based on a 16/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine the microcontroller with 32 kb, 64 kb, 128 kb, 256 kb and 512 kb of embedded high-speed flash memory. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. Due to their tiny size and low power consumption, these microcontrollers are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. With a wide range of serial communications interfaces and on-chip SRAM options of 8 kb, 16 kb, and 32 kb, they are very well suited for communication gateways and protocol converters, soft modems, voice recognition and low-end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit 8-channel ADC(s), 10-bit DAC, PWM channels and 47 GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers particularly suitable for industrial control and medical systems.

FEATURES:

1. Fast GPIO ports enable port pin toggling up to 3.5 times faster than the original LPC213x. They also allow for a port pin to be read at any time regardless of it's function.
2. Dedicated result registers for ADC(s) reduce interrupt overhead.
3. UART0/1 include fractional baud rate generator, auto-bauding capabilities and handshake ,flow-control fully implemented in hardware.

4. Additional BOD control enables further reduction of power consumption.
5. 16/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 or HVQFN package.
6. 8/16/32 kb of on-chip static RAM and 32/64/128/256/512 kb of on-chip flash program memory. 128-bit wide interface/accelerator enables high-speed 60 MHz operation.
7. In-System Programming/In-Application Programming (ISP/IAP) via on-chip boot loader software. Single flash sector or full chip erase in 400 ms and programming of 256 B in1 ms.
8. Embeded ICE RT and Embedded Trace interfaces offer real-time debugging with the on-chip Real Monitor software and high-speed tracing of instruction execution

.

4.2.2 RFID:

Radio frequency identification (RFID) is a rapidly growing technology that has the potential to make great economic impacts on many industries. While RFID is a relatively old technology, more recent advancements in chip manufacturing technology are making RFID practical for new applications and settings, particularly consumer item level tagging. These advancements have the potential to revolutionize supply-chain management, inventory control, and logistics.

At its most basic RFID systems consist of small transponders, or *tags*, attached to physical objects. RFID tags may soon become the most pervasive microchip in history. When wirelessly interrogated by RFID transceivers, or *readers*, tags respond with some identifying information that may be associated with arbitrary data records. Thus, RFID systems are one type of automatic identification system, similar to optical bar codes.

TAGS:

Tags are attached to all objects to be identified in an RFID system. A tag is typically composed of an antenna or coupling element, and integrated circuitry. An important distinction that will be discussed later is a tag's power source. Often tags carry no on-board power source and must passively harvest all energy from an RF signal

READER:

RFID readers communicate with tags through an RF channel to obtain identifying information. Depending on the type of tag, this communication may be a simple *ping* or may be a more complex multi-round protocol. In environments with many tags, a reader may have to perform an *anti-collision* protocol to ensure that communication conflicts to not Reader A,Reader B,Tag 1, Tag 2, Tag 3 occur. Anti-collision protocols permit readers to rapidly communicate with many tags in serial order.Readers often power what are called *passive* tags through their RF communication channel.

These types of tags carry no on-board power and rely solely on a reader to operate. Since these tags are so limited, may subsequently rely on a reader to perform computation as well. Readers come in many forms, operate on many different frequencies, and may offer a wide range of functionality. Readers may have their own processing power and internal storage, and may offer network connectivity. Readers might be a simple conduit to an external system, or could store all relevant data locally.

4.2.3. FINGERE PRINT MODULE:

R305 Finger Print Module With RS232 Output:

R305 Fingerprint Module is a serial fingerprint scanner which can be directly connected to the Uc port. R305 Fingerprint Sensor can easily be connected to ARM controller via MAX232 IC. This Fingerprint scanner is capable of storing and comparing the fingerprint and accordingly giving the desired output.

Fingerprint processing includes two parts: fingerprint enrollment and fingerprint matching (the matching can be 1:1 or 1: N). When enrolling, user needs to enter the finger two times. The system will process the two time finger images, generate a template of the finger based on processing results and store the template. When matching, user enters the finger through optical sensor and system will generate a template of the finger and compare it with templates of the finger library. For 1:1 matching, system will compare the live finger with specific template designated in the Module; for 1: N matching, or searching, system will search the whole finger library for the matching finger. In both circumstances, system will return the matching result, success or failure.

R305 Fingerprint Module Features:

Basic Power: 8-12v AC/DC

Interface: RS232.

Matching Mode: 1:1 and 1:N
Baud rate: 9600 – 115200. Default: 57600.
Storage Capacity: 256.
Average Search Time: <1sec
Image Acquire Time: <0.5sec.

4.2.4 POWER SUPPLY DESIGN

TRANSFORMER:-

A varying current in the transformer's primary winding creates a varying magnetic flux in the core and a varying magnetic field impinging on the secondary winding. This varying magnetic field at the secondary induces a varying electromotive force (EMF) or voltage in the secondary winding. Making use of Faraday's Law in conjunction with high magnetic permeability core properties, transformers can thus be designed to efficiently change AC voltages from one voltage level to another within power networks.

Transformers range in size from RF transformers less than a cubic centimetre in volume to units interconnecting the power grid weighing hundreds of tons. A wide range of transformer designs is encountered in electronic and electric power applications. Since the invention in 1885 of the first constant potential transformer, transformers have become essential for the AC transmission, distribution, and utilization of electrical energy.

REGULATED POWER SUPPLY :

7805 is a 5V fixed three terminal positive voltage regulator IC. The IC has features such as safe operating area protection, thermal shut down, internal current limiting which makes the IC very rugged. Output currents up to 1A can be drawn from the IC provided that there is a proper heat sink. A 9V transformer steps down the main voltage, 1A bridge rectifies it and capacitor C1 filters it and 7805 regulates it to produce a steady 5Volt DC. The circuit schematic is given below.The circuit diagram of power supply which gives output of 5V, as only that much is required for microcontroller. Its circuit diagram and designing calculation are given below.

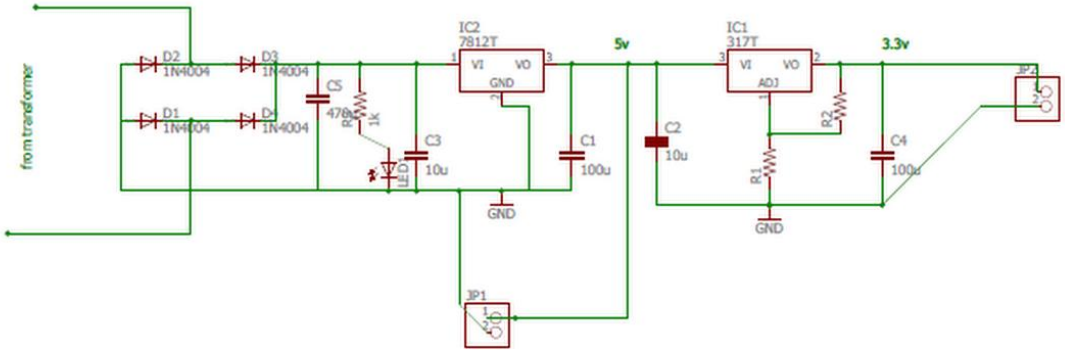


Fig 4.2.2: Circuit diagram of power supply

The +5 volt power supply is based on the commercial 7805 voltage regulator IC. This IC contains all the circuitry needed to accept any input voltage from 8 to 18 volts and produce a steady +5 volt output, accurate to within 5% (0.25 volt). It also contains current-limiting circuitry and thermal overload protection, so that the IC won't be damaged in case of excessive load current.

The advantage of a bridge rectifier is you don't need a centre tap on the secondary of the transformer. A further but significant advantage is that the ripple frequency at the output is twice the line frequency(i.e. 50Hz) and makes filtering somewhat easier.

The use of capacitor c1 and c2 is to make signal ripple free. The capacitor used before the regulator is to make ac signal ripple free and then later which we are using is for safety, if incase there is a ripple left after regulating, then c2 will remove it.

Power Supply Component Design:

We require 5V at the o/p of the regulator.

The drop out voltage of the regulator is **2V** As per the data sheet)

Vdc = 5+2 = 7V

So at the regulator input, the voltage applied should be of **7V**.

According to the formula,

Vdc = 2Vm/Pi

Assuming there is no ripple Capacitor from

Vm= Vdc .pi/2

=7 x 3.14)/2

=10.99V

Vm= 10.99V

During one cycle , two diodes are conducting .

Drop out voltage of one diode = **0.7V**

Drop out voltage of two diode = **1.4V**

Vim = Vm+ 1.4V

=10.99+1.4= 12.39V

Vim=12.39V

Vrms = Vim/sqrt(2)

= 12.39/sqrt(2)

= 8.76V

Vrms = 8.76V

So we select transformer of **9V.**

Similarly

Im=Idc x pi/2

Im=400m x 3.14/2

= 628mA.

Irms= Im/sqrt(2)

= 628mA/sqrt(2)

= 444.06mA

Irms = 444.06mA

So we select the transformer of current rating **500mA.**

Considering the above transformer rating.

We take the transformer **of 0-9V/500mA**

TRANFORMER – 0-9V/500mA Stepdown transformer.

Rectifier Design:

PIV of diode = Vm = **12.39V**

Im= **628 mA**

BRIDGE RECTIFIER -So, we select the bridge IC of 1Ampere rating.

Filter Capacitor Design:

R = Vdc/Idc

= 7 / 400m

= 17.5Ohms.

Vr = 2(Vim – Vdc)

= 2(12.39 – 7)

= 10.78V

C = Vdc/ (FxRxVr)

= 7/ (100x17.5x10.78)

= 371.05uF

So for Safe working we select capacitor of 1000uF

C = 1000uF / 35V

C1= Electrolytic Capacitor.

C2,C4 = 0.1uF Ceramic Capacitor.

C3 = 220uF/25V Electrolytic Capacitor.

So the power supply made from the above mentioned components gives the output of **5V.**

IC LM 317 used for getting 3.3V output which is needed for ARM7 IC.

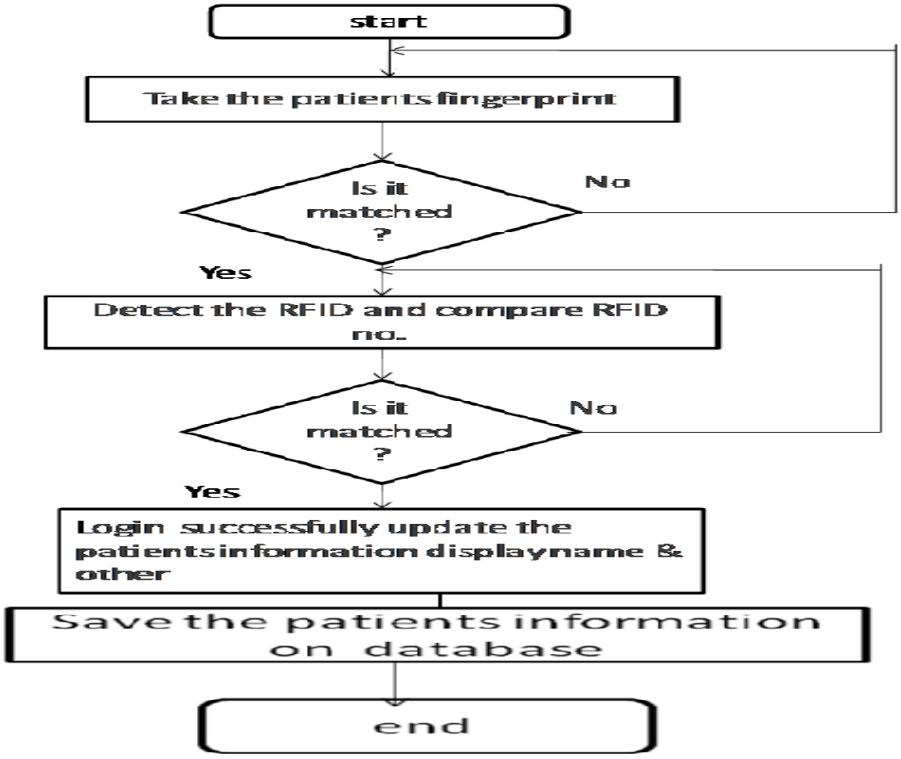
The formula for calculationn of i/p voltage of ARM using LM317

++Vout=1.25v(1+R2/R1)+Iadj(A2)

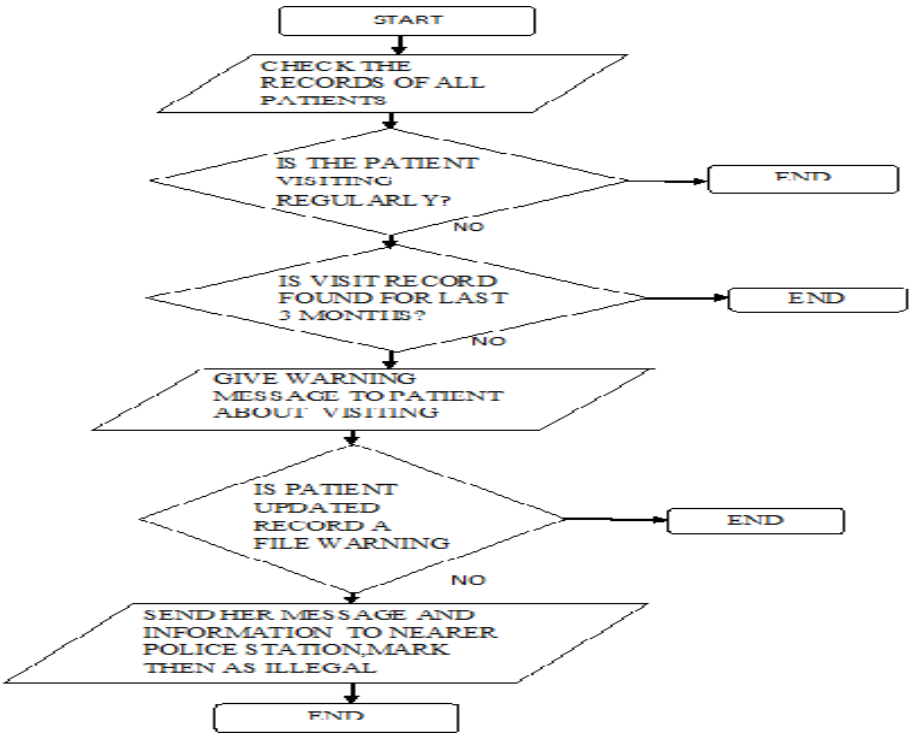
Assuming
R2=470 ohm AND Iadj=0 then
Vout=3.3V=1.25(1+R2/450)
3.3V/1.25=(450+R2)/450
2.64*0.45Kohm=0.45Kohm+R2
1.18-0.45Kohm=R2
R2=738ohm
Nearest value of Resistance is 750ohm
Therefore with R1=450ohm AND R2=750ohm
We get an o/p of 3.3V

4.3 SOFTWARE IMPLEMETATION

4.3.1 FLOWCHART: New registration

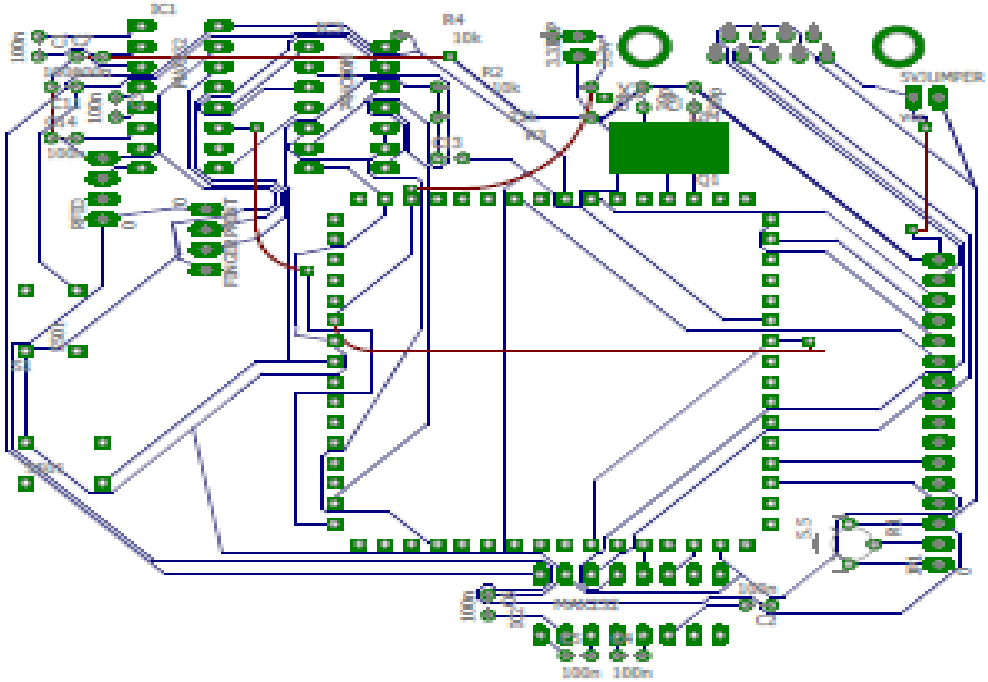


Flowchart:2

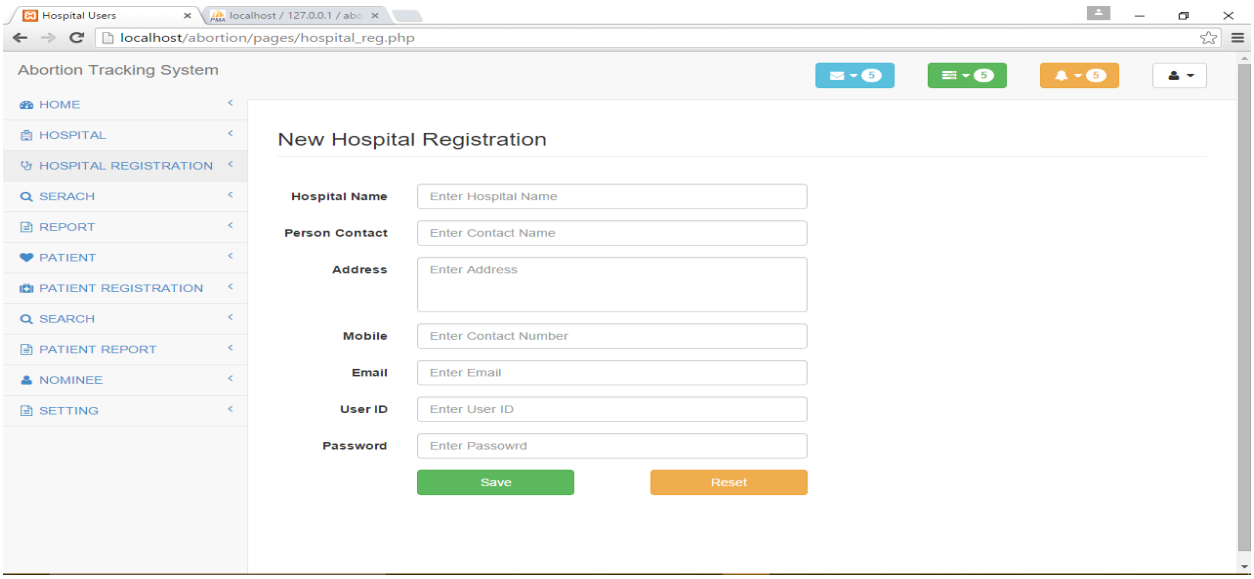


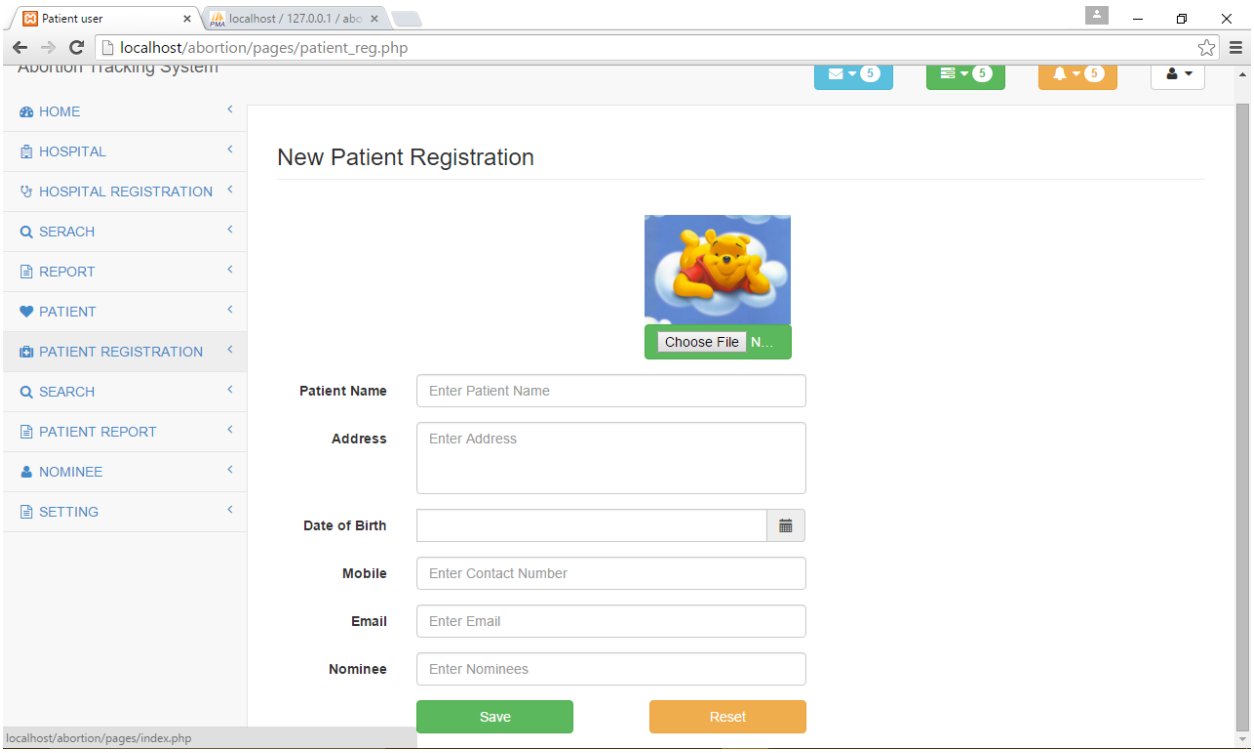
5. CHAPTER 5
WORK IMPLEMENTED

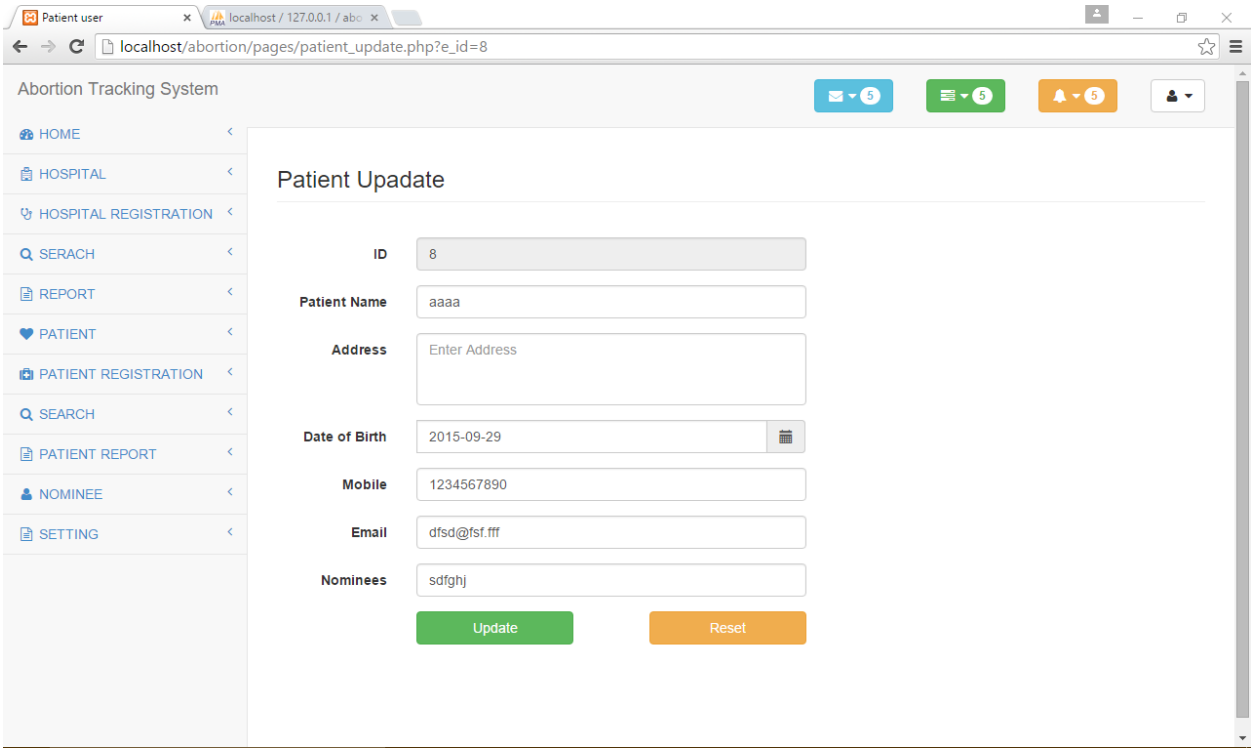
5.1 PCB LAYOUT:



5.2 SCREENSHOTS :
(ENROLLMENT PROCESS & LOCAL DATABASE)






Patient user
localhost / 127.0.0.1 / abo
localhost/abortion/pages/patient_update.php?e_id=8
Abortion Tracking System
HOME
HOSPITAL
HOSPITAL REGISTRATION
SERACH
REPORT
PATIENT
PATIENT REGISTRATION
SEARCH
PATIENT REPORT
NOMINEE
SETTING
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8
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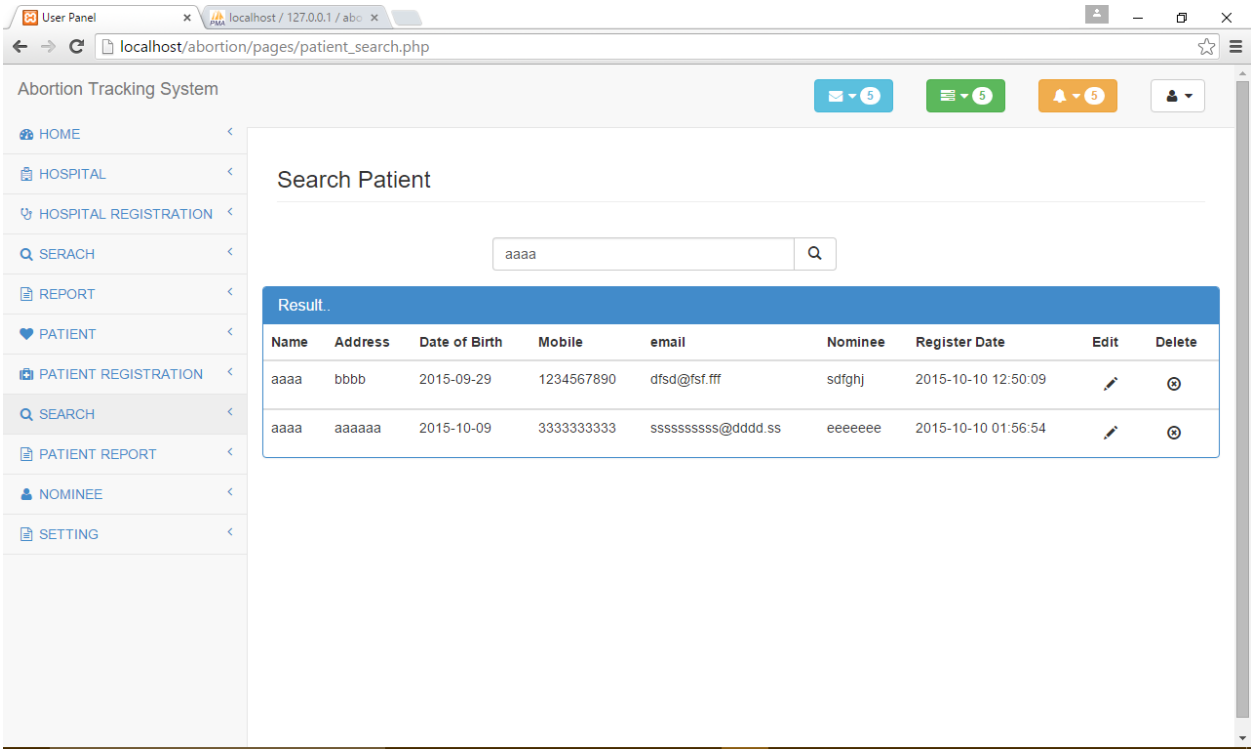
User Panel
localhost / 127.0.0.1 / abo
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Abortion Tracking System
HOME
HOSPITAL
HOSPITAL REGISTRATION
SERACH
REPORT
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PATIENT REGISTRATION
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Search Patient
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6. CHAPTER 6 ADVANTAGES

- All the pregnancy cases are registered and monitored by a regulatory authority.
- All hospitals have to accept only registered pregnancy cases. The couple which is not registered will be considered illegal.
- All the Hospitals/doctors have to report the sonography results to the server I the 3rd 6th and the 9th month. Thus the Regulatory authorities can monitor the progress of all the babies
- In this way we make sure there are no illegal abortions and especially no killing of female fetus which is a major concern in India today.

LIMITATIONS:

1. Every hospital should have hardware module seperately to track in which hospital abortion done. In our project we can't use separate hardware because of cost.

2. This system should be compulsory for every hospital.Ifhospital is not registered for this system, illegal abortion can happen And we can't trace that patient and hospital.

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6) *Trends in selective abortions of girls in India: analysis of nationally representative birth histories from 1990 to 2005 and census data from 1991 to 2011 by Prabhat Jha, Maya A Kesler, Rajesh Kumar, Faujdar Ram, Usha Ram, Lukasz Aleksandrowicz, Diego G Bassani, Shailaja Chandra, Jayant K Banthia in www.thelancet.com Vol 377 USING FINGERPRINT MODULE*

7) *Sagar Shinde, Dhanashri Patil / International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com Vol. 3, Issue 2, pp.1764-1766 using GSM&FINGERPRINT MODULE 2014*