

Vax-Trac Online System

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Abstract— It is necessary to reduce infant mortality rate that arises due to improper vaccination programmes. The proposed system creates personal record of each infant at the time of birth and is linked to a Central Computer. The thumb impression of every human being is unique, so it can utilize as a unique ID. Thus the proper biometric authentication of a child and matching them to their health records ensures that they receive only the required vaccines, avoiding situations where health workers administer unnecessary vaccines. Along with this, database of every child in a constituency is done. Parent's finger prints can be used as an ID for a new born baby for a period of 2 years. Alert messages are sent to the guardians of the child via GSM to remind about vaccination.

Index Terms—GSM.

I. INTRODUCTION

Every year, 24 million children do not receive life-saving vaccines and as a result, 2 million children die from diseases that we have the ability to prevent. Recently in Kerala, the outbreak of Diphtheria was due to improper vaccination and

lack of records of vaccines given to a child. In Africa, VaxTrac collaborates with frontline health workers and had implemented a mobile vaccine registry system ensuring each child has access to life saving vaccines.

This project is designed for electronic vaccination tracking machine by using the biometric identification method. VaxTrac system uses mobile technology and biometrics to empower health workers to deliver vaccine services. The data collected enables health decision makers to better manage vaccine programs, increasing coverage levels and reducing vaccine wastage. Here thumb impression is used for identifying users. During vaccination when the user keeps his/her thumb in the scanner, the system will check whether it matches with pre stored impressions in the database. If it matches then system will display the health records and other information of user. Once vaccination is done, the details are updated to the database.

II. BLOCK DIAGRAM

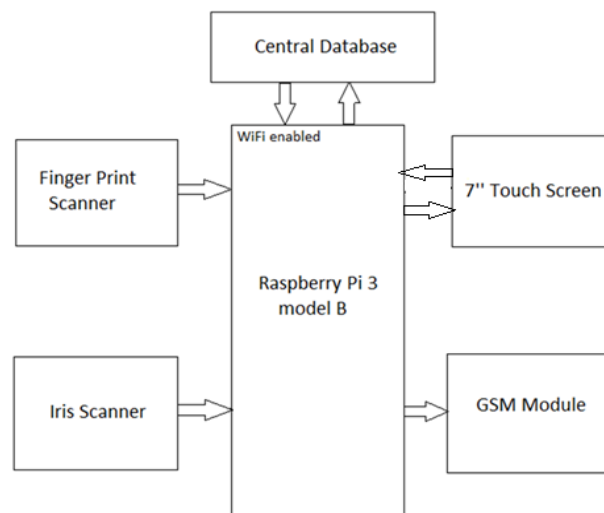


Fig 1. Block Diagram

III. SYSTEM OPERATIONS

VaxTrac-Online System, creates personal record of each infant at the time of birth, and is linked to a central computer. The details of an infant can be obtained from the database. That includes finger print data, retinal information, vaccination details, health records, personal and contact details. The data's

like newly given vaccines, can be updated and is uploaded to the central database.

Here, we create a website as a key to database and is linked with the processor by enabling wifi. Through one time registration in this website, we could keep the personal record

of each infant at the time of birth and their parent’s is linked to a Central Computer. Raspberry Pi is the microprocessor used. All other components, that is, finger print scanner, retinal scanner touch screen are interfaced with it. The thumb impression and retinal image are utilised as a unique ID. Parent’s finger prints can be used as an ID for a new born baby

for a period of 2 years, and up to this stage retina scanners are also used. All the details in the database are secured. When one approach PHC’s their finger print or retina are scanned and if it matches to records in database, vaccination is done and the records are updated. Touch screen is utilized to display and update data. GSM module is used to send alert messages to the guardians of the child to remind about vaccination.

A. Raspberry pi

The RaspberryPi is a series of credit card-sized single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of basic computer science in schools and developing countries. The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This powerful credit-card sized single board computer can be used for many applications and supersedes the original Raspberry Pi Model

B+ and Raspberry Pi 2 Model B. Whilst maintaining the popular board format the Raspberry Pi 3 Model B brings you a more powerful processor, 10x faster than the first generation Raspberry Pi. Additionally it adds wireless LAN & Bluetooth connectivity making it the ideal solution for powerful connected devices

Specifications

- Processor: Broadcom BCM2387 chipset. 1.2GHz Quad-Core ARM Cortex-A53 802.11 b/g/n Wireless LAN and Bluetooth 4.1 (Bluetooth Classic and LE)
- GPU: Dual Core VideoCore IV Multimedia Co-Processor. Provides Open GL ES 2.0 hardware-accelerated Open VG, and 1080p30 H.264 high-profile decode. Capable of 1Gpixel/s, 1.5Gtexel/s or 24GFLOPs with texture filtering and DMA infrastructure
- Memory 1GB LPDDR2
- Operating System Boots from Micro SD card, running a version of the Linux operating system or Windows 10 IoT
- Dimensions 85 x 56 x 17mm
- Power Micro USB socket 5V1, 2.5A

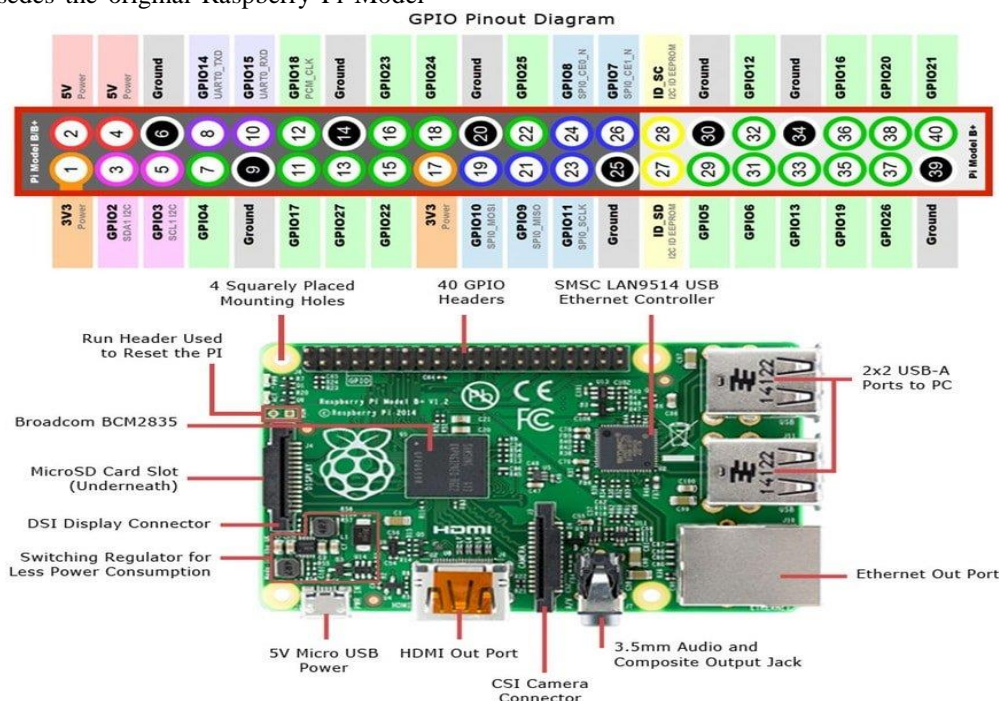


Fig. 2. Pin out of Raspberry Pi

Connectors

- Ethernet 10/100 BaseT Ethernet socket.
- Video Output HDMI (rev 1.3 & 1.4 Composite RCA (PAL and NTSC).
- Audio Output Audio Output 3.5mm jack, HDMI USB 4 x USB 2.0 Connector.
- GPIO Connector 40-pin 2.54 mm (100 mil) expansion header: 2x20 strip Providing 27 GPIO pins as well as +3.3 V, +5 V and GND supply lines.

- Camera Connector 15-pin MIPI Camera Serial Interface (CSI-2).
- Display Connector Display Serial Interface (DSI) 15 way flat flex cable connector with two data lanes and a clock lane.
- Memory Card Slot Push/pull Micro SDIO.

Key Benefits

- Low cost
- Consistent board format
- 10x faster processing

- Added connectivity

Key Applications

- Low cost PC/tablet/laptop
- IoT applications
- Robotics
- Industrial/Home automation
- Security monitoring
- Web camera
- Gaming

B. Fingerprint Scanner

This is a finger print sensor module with TTL UART interface. The user can store the finger print data in the module and can configure it in 1:1 or 1: N mode for identifying the person. The finger print module can directly interface with 3v3 or 5v Microcontroller. A level converter (like MAX232) is required for interfacing with PC

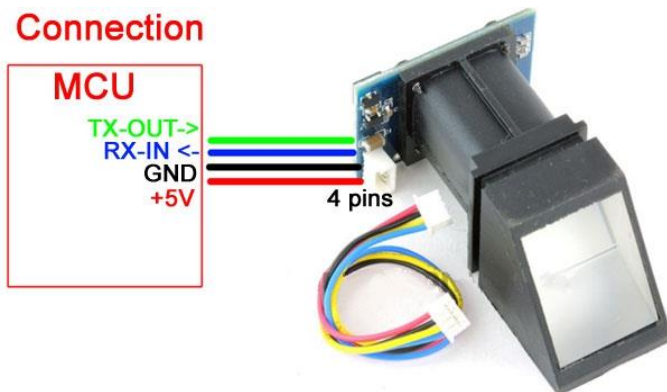


Fig. 3. R305 Finger print scanner

Features:

- Power DC : 3.6V-6.0V
- Interface : UART (TTL logical level)/ USB 1.1
- Working current : 100mA
- Peak Current : 150mA
- Matching Mode: 1:1 and 1:N
- Baud rate (9600*N)bps, N=1-12 (default N=6 57600bps)
- Character file size: 256 bytes
- Image acquiring time : <0.5s
- Template size : 512 bytes
- Storage capacity: 256
- Security level : 5 (1, 2, 3, 4, 5(highest))
- FAR : <0.001%
- FRR: <0.1%
- Average searching time: < 0.8s (1:880)
- Window dimension : 18mm*22mm

Working Environment:

- Temp: -10°C - +40°C

- Storage environment Temp: -40°C - +85°C
- RH: 40%-85% RH: <85%

C. Touch Screen

The 7" Touchscreen Monitor for Raspberry Pi gives users the ability to create all-in-one, integrated projects such as tablets, infotainment systems and embedded projects. The 800 x 480 display connects via an adapter board which handles power and signal conversion. Only two connections to the Pi are required; power from the Pi's GPIO port and a ribbon cable that connects to the DSI port present on all Raspberry Pi's. Touchscreen drivers with support for 10-finger touch and an on-screen keyboard will be integrated into the latest Raspbian OS for full functionality without the need for a physical keyboard or mouse.

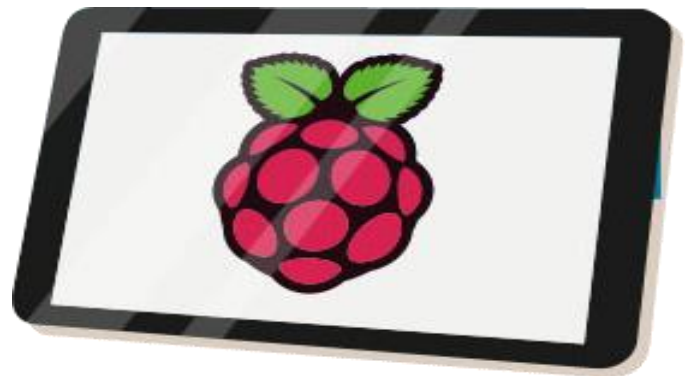


Fig. 4. 7" Touch screen

Technical Specifications

- 7" Touchscreen Display
- Screen Dimensions: 194mm x 110mm x 20mm (including standoffs)
- Viewable screen size: 155mm x 86mm
- Screen Resolution 800 x 480 pixels
- 10 finger capacitive touch
- Connects to the Raspberry Pi board using a ribbon cable connected to the DSI port
- Adapter board is used to power the display and convert the parallel signals from the display to the serial (DSI) port on the Raspberry Pi

D. GSM Module

GPRS/GSM Module is an ultra compact and reliable wireless module. It is a breakout board and minimum system of SIM900 Quad-band GSM/GPRS module. It can communicate with controllers via AT commands (GSM 07.07, 07.05 and SIMCOM enhanced AT Commands). This module support software power on and reset. The GPRS is configured and controlled via its UART using simple AT commands. Just connect on the Arduino/Raspberry Pi/AVR/PIC/ARM/FPGA board, you could easy to use AT command control it. This board can be connect to PC via FT232RL or USB-to-Serial Bridge Controller.

Features:

- Quad-Band GSM(2G)
GPRS/EDGE 850/900/1800/1900 MHz
- GPRS multi-slot class 10/8
- GPRS mobile station class B
- Compliant to GSM phase 2/2+
- Control via AT commands (GSM 07.07 ,07.05 and SIMCOM enhanced AT Commands)
- Supply voltage range : 3.1-4.8V
- Low power consumption: 1.5mA (sleep mode)
 - Dimension:60 mm x 53 mm



Fig. 5. GSM module

E. Website designing and interfacing

The tools used for website development and interfacing the components with the website are:

1.LAMP

LAMP stack is a group of open source software used to get web servers up and running. The acronym stands for Linux, Apache, MySQL, and PHP. Since the virtual private server is already running Ubuntu, the Linux part is taken care of. Here we use LAMP for the interfacing of Fingerprint scanner and Raspberry Pi with the Website. It is also provided with MySQL system for database management.

2.phpMyAdmin

phpMyAdmin is a free and open source tool written in PHP intended to handle the administration of MySQL with the use of a web browser. It can perform various tasks such as creating, modifying or deleting databases, tables, fields or rows; executing SQL statements; or managing users and permissions.

3. Linux Terminal

Interfacing of fingerprint scanner can also be done through this Linux terminal. All the root works are executed through

the Linux terminal. Enrolment and searching of fingerprint data is done using this Linux terminal with the help of desired python codes.

When a person approaches the PHC, we first consider whether he/she is new user or registered user.

When an infant is new user:

The register option is selected from the homepage. This page moves into a new form. All the user details including personal information, contact details, finger print, medical records are saved into it. All the details are saved into the database. Database is created using php My Admin. Database named VaxTrac is created with three tables: fingerprint , patients and vaccination.

The table fingerprint has two columns: pid and finger. Pid is an identification number of the finger print. Pid is auto incremented as the data enters into it. The characteristic feature of the finger is the finger print value, which is stored in the finger column. The finger print value is saved as blob- Binary Large Object. Once new user is registered corresponding finger details is saved and pid is auto incremented.

The table named patients saves all the users personal and health details. The different columns in this table are: pid, first name, last name, gender, country, Date of Birth, age, physical disabilities (if any), email, nearest PHC, address, pin code, landline, mobile no. All the above details of the user are saved in the above table.

The vaccination table saves the details of vaccination given. There is a column of pid and a column of various vaccines to be given. The various vaccines are hepatitisB, DTaP, PCV 13, MMR, HPV. Once the infant is given a particular vaccine, the date at which the vaccine given is entered under respective vaccine column. So once the new user registers, all the details are saved into above tables. Here pid is the common connecting points of three tables. Once the new user is registered, we can easily obtain the details of the infant.

When an infant is registered:

The update option of the homepage is selected. This is to update or edit the details of the user. This page first authenticates the user by verifying the fingerprint . Once the finger print is verified, the corresponding pid is found and page containing personal details and vaccination details is displayed. The details can be updated. All the details are saved into the database.

Using GSM, we send the messages to the parents about the upcoming vaccination dates. The date of birth of the infant is the basis to run GSM. Each infant takes the vaccines at different time. When the infant needs to take vaccine, the message is sent two days prior to vaccination.

IV. ACKNOWLEDGMENT

We express our deep gratitude to almighty, the supreme guide, for bestowing his blessings up on us in our entire endeavor.

We owe a great deal to the faculty of department of Electronics & Communication Engineering, MES College of Engineering, Kuttippuram for the successful completion of this project.

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V. RESULTS

In this proposed scheme we have obtained these following results. Fig 4.1 shows the real time image of our website , as you see it is having two options register and update as discussed earlier.

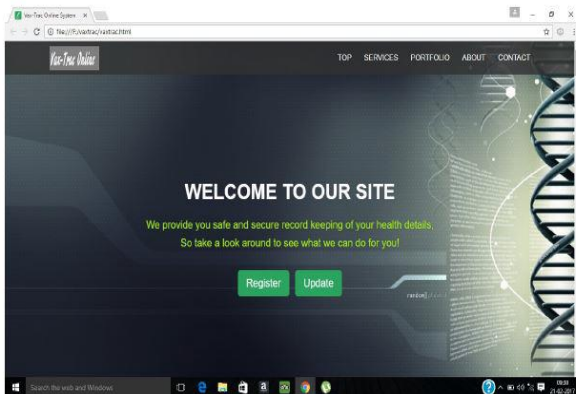


Fig. 6. Home page of the website

Fig.7 shows the prototype of the proposed system. It has the finger print scanner which is used for biometric authentication. The system controlled by the Raspberry Pi.GSM is also placed near to the system which helps to send alert messages to the guardians.



Fig. 7. Prototype model

VI. CONCLUSION

Vax-Trac ensures that each and every child in a constituency is immunized. The data collected enables health decision makers to better manage vaccine programs, increasing coverage levels and reducing vaccine wastage. so we go for the project.

REFERENCES

- [1] Electronics Magazine For You.
- [2] www.raspberrypi.org
- [3] www.w3school.com
- [4] www.tutorialspoint.com
- [5] www.circuitsbasics.com