DESIGN AND IMPLEMENTATION OF INTEGRATED eVACCINATION CHIP FOR COVID-19

Ms.B.Deepa Assistant professor,

SRI SAIRAM INSTITUTE OF TECHNOLOGY, Chennai

Miss.S.Deepa , Miss.S.Abinaya , Miss V. Nithyasri

SRI SAIRAM INSTITUTE OF TECHNOLOGY, Chennai

ABSTRACT:

Scientist and Researchers found Covid-19 becomes an endemic for the near decade each time different mutations of Corona Virus makes different variants, Medicines and vaccinations done for previous variants and mutations does not show much effect on the newly identified Variants of Corona Virus. So as a precautionary measure for not getting effected to Covid-19 each time different booster shots of Covid-19 Vaccination should be Taken for avoiding isolation/quarantined and disease spreading to others.

International travellers or international working persons facing problems in Vaccination based entry security checking in Airports, Cinema Theatres, Malls and other public places where the crowd gatherings are there. There is no common platform to identify the persons who got different vaccine dose from different countries due to the Citizens personal data sharing restriction policy of different Governments.

Different countries will be following different standards so for an International traveller after taking the Complete Vaccination dose from different countries on reaching back to his home country he might be showing as Unvaccinated category in order to avoid this kind of problems a global solution need to be proposed as International Vaccination Chip which can be scanned anywhere globally and make the Vaccination based entry.

For Security checking of Vaccination based entry in the existing system corrupted people will show some body's vaccination certificate and get entry into these crowd gathering places, these people sometimes may carry covid-19 Virus and may lead to a massive spread , so in our proposed system person who carries a Vaccination Chip stand in front of the security person he will be having a unit which will shows the Photo Identity and the Vaccination details fetched from the International Vaccine Page with live body temperature of the person standing in front of the security check in.

This project comprises four different modules, 1. Digital Vaccination CHIP module for the public.2. Vaccination status checking unit for all the vaccination checking places like Restaurants and malls.3.Vaccination status update Server Page for the govt and private medical sectors 4. Mobile scanner app.

Digital Vaccination chip contains IoT enabled controller with QR display unit to show the QR at the entry places of the vaccination checking. Vaccination Checking Unit contains

wireless receiver to receive the code from scanner app and TFT display to display the Name, Age, photo, Vaccination status like partial, fully and booster etc. of the respective public. Vaccination status updater page is for update the vaccination details for every public who is taken the dose every time.

INTRODUCTION

Scientist and Researchers found Covid-19 becomes an endemic for the near decade each time different mutations of Corona Virus makes different variants, Medicines and vaccinations done for previous variants and mutations does not show much effect on the newly identified Variants of Corona Virus. So as a precautionary measure for not getting effected to Covid-19 each time different booster shots of Covid-19 Vaccination should be Taken for avoiding isolation/quarantined and disease spreading to others.

International travellers or international working persons facing problems in Vaccination based entry security checking in Airports, Cinema Theatres, Malls and other public places where the crowd gatherings are there. There is no common platform to identify the persons who got different vaccine dose from different countries due to the Citizens personal data sharing restriction policy of different Governments.

Different countries will be following different standards so for an International traveller after taking the Complete Vaccination dose from different countries on reaching back to his home country he might be showing as Unvaccinated category in order to avoid this kind of problems a global solution need to be proposed as International Vaccination Chip which can be scanned anywhere globally and make the Vaccination based entry. [4] discussed that Automatic liver tumor segmentation would bigly influence liver treatment organizing strategy and follow-up assessment, as a result of organization and joining of full picture information. Right now, develop a totally programmed technique for liver tumor division in CT picture.

1.1 EMBEDDED SYSTEM:

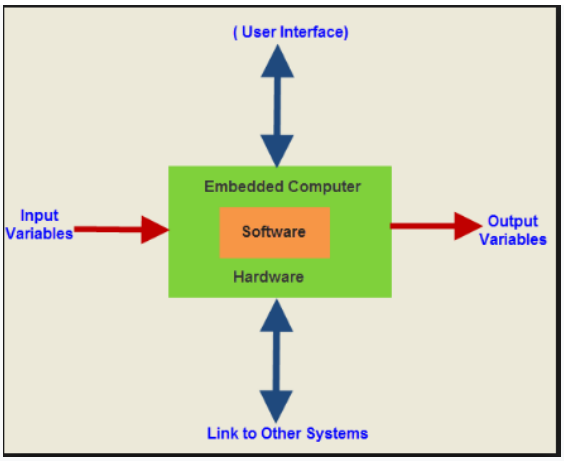
EMBEDDED SYSTEM:

An embedded system is a controller programmed and controlled by a real-time operating system (RTOS) with a dedicated function within a larger mechanical or electrical system, often with real-time consumption of embedded systems computing constraints.

It is embedded as part of a complete device often including hardware and mechanical parts. Embedded systems control many devices in common use today. Ninety-eight percent of all microprocessors are manufactured to serve as embedded system component.

Examples of properties of typical embedded computers when compared with general-purpose counterparts are low power consumption, small size, rugged operating ranges, and low per-unit cost. This comes at the price of limited processing resources, which make them significantly more difficult to program and to interact with.

However, by building intelligence mechanisms on top of the hardware, taking advantage of possible existing sensors and the existence of a network of embedded units, one can both optimally manage available resources at the unit and network levels as well as provide augmented functions, well beyond those available. For example, intelligent techniques can be designed to manage power.



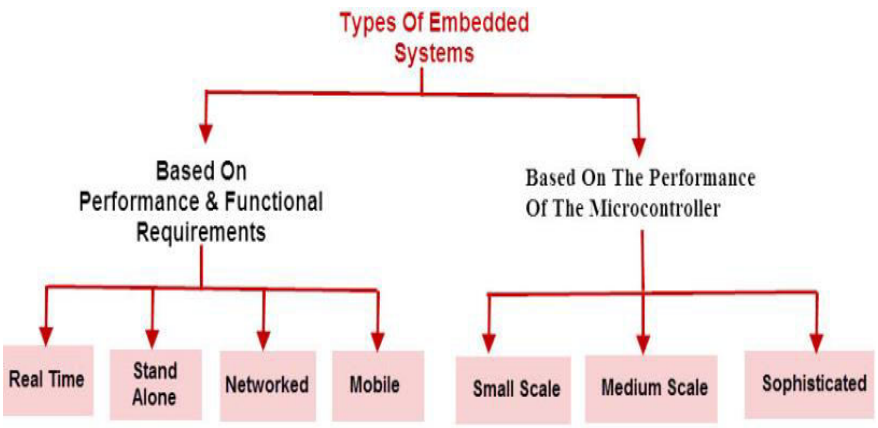
Embedded Computer Sub-Assembly for Electronic Voting Machine

Embedded systems are commonly found in consumer, industrial, automotive, medical, commercial and military applications.

Telecommunications systems employ numerous embedded systems from telephone switches for the network to cell phones at the end user. Computer networking uses dedicated routers and network bridges to route data.

Consumer electronics include MP3 players, mobile phones, video game consoles, digital cameras, GPS receivers, and printers. Household appliances, such as microwave ovens, washing machines and dishwashers, include embedded systems to provide flexibility, efficiency and features.

CLASSIFICATIONS OF EMBDDED SYSTEMS:

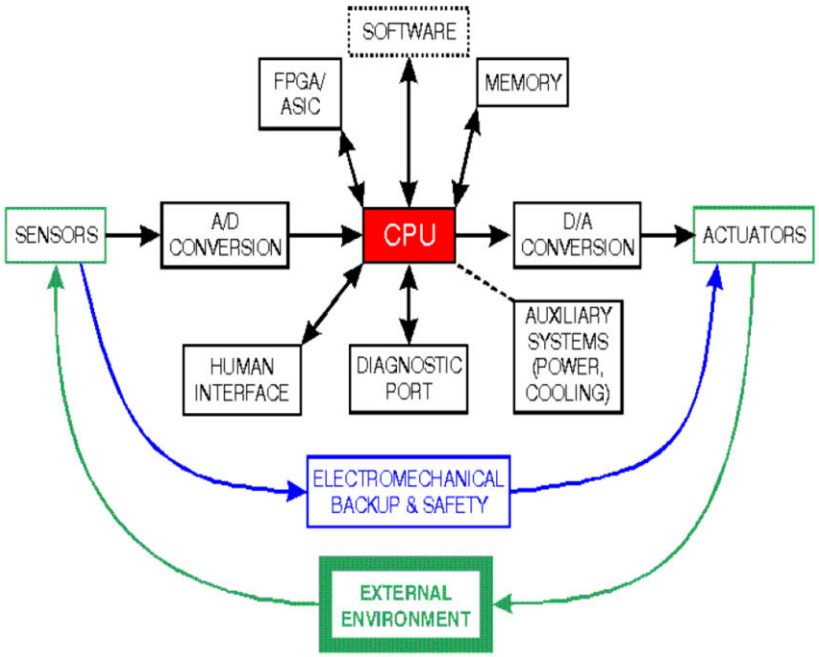


Advanced HVAC systems use networked thermostats to more accurately and efficiently control temperature that can change by time of day and season. Home automation uses wired- and wireless-networking that can be used to control lights, climate, security, audio/visual, surveillance, etc., all of which use embedded devices for sensing and controlling.

like traffic lights, factory controllers, and largely complex systems like hybrid vehicles, MRI, and avionics Embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations. Complexity varies from low, with a single microcontroller

Block diagram of an embedded system:

An embedded system usually contains an embedded processor. Many appliances that have a digital interface microwaves, VCRs, cars utilize embedded systems. Some embedded systems include an operating system. Others are very specialized resulting in the entire logic being implemented as a single program. These systems are embedded into some device for some specific purpose other than to provide general purpose computing.



Block diagram of a typical embedded system

EMBEDDED SYSTEMS APPLICATIONS:

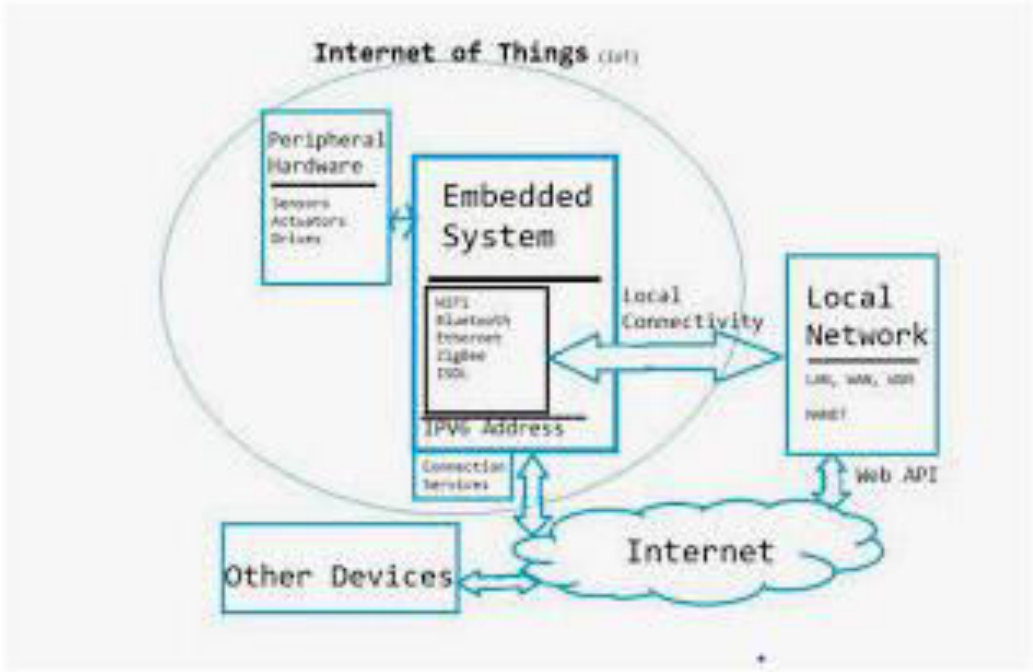
Embedded systems in automobiles include motor control, cruise control, body safety, engine safety, robotics in an assembly line, car multimedia, car entertainment, E-com access, mobiles etc.

- Embedded systems in telecommunications include networking, mobile computing, and wireless communications, etc.

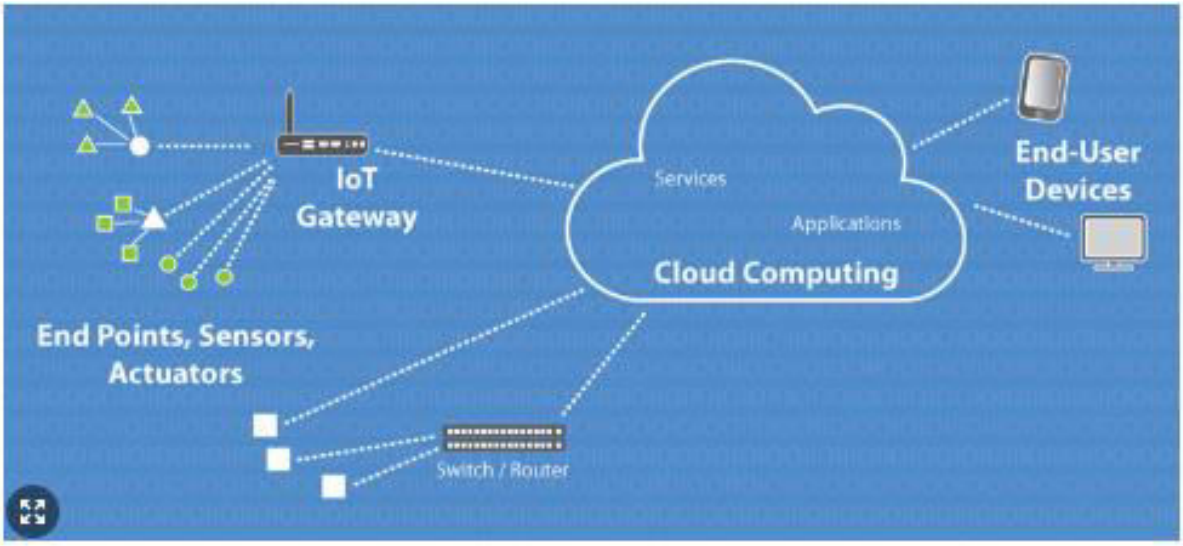
- Embedded systems in smart cards include banking, telephone and security systems.
- Embedded Systems in satellites and missiles include defense, communication, and aerospace
- Embedded systems in computer networking & peripherals include image processing, networking systems, printers, network cards, monitors and displays
- Embedded Systems in digital consumer electronics include set-top boxes, DVDs, high-definition TVs and digital cameras

1.2 INTERNET OF THINGS:

- The term Internet of Things generally refers to scenarios where network connectivity and computing capability extends to objects, sensors and everyday items not normally considered computers, allowing these devices to generate, exchange and consume data with minimal human intervention. There is, however, no single, universal definition.
- Enabling Technologies: The concept of combining computers, sensors, and networks to monitor and control devices has existed for decades. The recent confluence of several technology market trends, however, is bringing the Internet of Things closer to widespread reality. These include Ubiquitous Connectivity, Widespread Adoption of IP-based Networking, Computing Economics, Miniaturization, Advances in Data.
- Connectivity Models: IoT implementations use different technical communications models, each with its own characteristics. Four common communications models described by the Internet Architecture Board include: Device-to-Device, Device-to-Cloud, Device-to-Gateway, and Back-End Data-Sharing. These models highlight the flexibility in the ways that IoT devices can connect and provide value to the user.



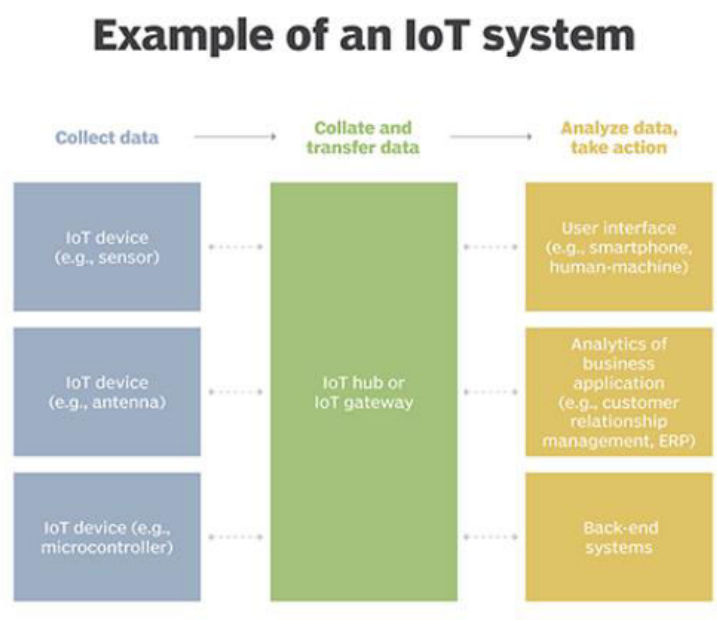
IoT devices are implemented using both hardware and software components. Dedicated hardware components are used to implement the interface with the physical world, and to perform tasks which are more computationally complex. Microcontrollers are used to execute software that interprets inputs and controls the system. This module discusses the roles of both the hardware and software components in the system. The functions of common hardware components are described and the interface between the software and hardware through the microcontroller is explained. IoT devices often use an operating system to support the interaction between the software and the microcontroller. We will define
the role of an operating system in an IoT device and how an IoT operating system differs from a standard one.



How IoT works

An IoT ecosystem consists of web-enabled smart devices that use embedded processors, sensors and communication hardware to collect, send and act on data they acquire from their environments. IoT devices share the sensor data they collect by connecting to an IoT gateway or other edge device where data is either sent to the cloud to be analyzed or analyzed locally. Sometimes, these devices communicate with other related devices and act on the information they get from one another. The devices do most of the work without human intervention, although people can interact with the devices -- for instance, to set them up, give them instructions or access the data.

The connectivity, networking and communication protocols used with these web-enabled devices largely depend on the specific IoT applications deployed.



Benefits of IoT

The internet of things offers a number of benefits to organizations, enabling them to:

- monitor their overall business processes;
- improve the customer experience;
- save time and money;
- enhance employee productivity;
- integrate and adapt business models;
- make better business decisions; and
- generate more revenue.

IoT encourages companies to rethink the ways they approach their businesses, industries and markets and gives them the tools to improve their business strategies.

Consumer and enterprise IoT applications

There are numerous real-world applications of the internet of things, ranging from consumer IoT and enterprise IoT to manufacturing and industrial IoT (IoT). IoT applications span numerous verticals, including automotive, telco, energy and more.

In the consumer segment, for example, smart homes that are equipped with smart thermostats, smart appliances and connected heating, lighting and electronic devices can be controlled remotely via computers, smartphones or other mobile devices. [2] discussed that

Live wire with Active Appearance model (AAM) strategy is called Oriented Active Appearance Model (OAAM). The Geodesic Graph-cut calculation creates much better division results than some other completely programmed strategies distinguished in writing in the expressions of exactness and period preparing. This strategy besides viably consolidates the Dynamic Appearance Model, Live Wire and Graph Cut tips to abuse their integral focal points. [12] brought out an invention which discloses a system and method of representing health data of a patient. The invention comprises of a device 100 including a display module 102, a three dimensional sensor camera 101, a processor 107, a temperature sensor, a plurality of modules configured in the device including a template module 103, a healthcare provider module 104, a patient module 105, a processor 107, a server 108 connected to the device 100. The three dimensional sensor camera 101 is configured for capturing a three dimensional image of the patient, the template module 103 is configured for storing three dimensional graphical anatomical templates, the healthcare provider module 104 is configured for providing access to a healthcare provider and the patient module 105 is configured for providing access to a patient

Wearable devices with sensors and software can collect and analyze user data, sending messages to other technologies about the users with the aim of making users' lives easier and more comfortable. Wearable devices are also used for public safety -- for example, improving first responders' response times during emergencies by providing optimized routes to a location or by tracking construction workers' or firefighters' vital signs at life-threatening sites.

In healthcare, IoT offers many benefits, including the ability to monitor patients more closely to use the data that's generated and analyze it. Hospitals often use IoT systems to complete tasks such as inventory management, for both pharmaceuticals and medical instruments.

LITERATURE SURVEY

NEW SECURE HEALTHCARE SYSTEM USING CLOUD OF THINGS

Modern healthcare services are serving patients' needs by using new technologies such as wearable devices or cloud of things. The new technology provides more facilities and enhancements to the existing healthcare services as it allows more flexibility in terms of monitoring patients records and remotely connecting with the patients via cloud of things. However, there are many security issues such as privacy and security of healthcare data which need to be considered once we introduce wearable devices to the healthcare service. Although some of the security issues were addressed by some researchers in the literature, they mainly addressed cloud of things security or healthcare security separately and their work still suffers from limited security protection and vulnerabilities to some security attacks. The proposed new healthcare system combines security of both healthcare and cloud of things technologies. It also addresses most of the security challenges that might face the healthcare services such as the man in the middle (MITM), eavesdropping, replay, repudiation, and modification attacks. Scyther verification tool was also used to verify the robustness and correctness of the proposed system.

COEXISTENCE OF ZIGBEE-BASED WBAN AND WIFI FOR HEALTH TELEMONITORING SYSTEMS

The development of telemonitoring via wireless body area networks (WBANs) is an evolving direction in personalized medicine and home-based mobile health. A WBAN consists of small, intelligent medical sensors which collect physiological parameters such as electrocardiogram, electroencephalography, and blood pressure. The recorded physiological signals are sent to a coordinator via wireless technologies, and are then transmitted to a healthcare monitoring center. One of the most widely used wireless technologies in WBANs is ZigBee because it is targeted at applications that require a low data rate and long battery life. However, ZigBee-based WBANs face severe interference problems in the presence of WIFI networks. This problem is caused by the fact that most ZigBee channels overlap with WIFI channels, severely affecting the ability of healthcare monitoring systems to guarantee reliable delivery of physiological signals. To solve this problem, we have developed an algorithm that controls the load in Wi-Fi networks to guarantee the delay requirement for physiological signals, especially for emergency messages, in environments with coexistence of ZigBee-based WBAN and Wi-Fi. Since Wi-Fi applications generate traffic with different delay requirements, we focus only on WIFI traffic that does not have stringent timing requirements. In this paper, therefore, we propose an adaptive load control algorithm for ZigBee-based WBAN/WIFI coexistence environments, with the aim of guaranteeing that the delay experienced by ZigBee sensors does not exceed a maximally tolerable period of time. Simulation results show that our proposed algorithm guarantees the delay performance of ZigBee-based WBANs by mitigating the effects of WIFI interference in various scenarios.

SMART HEALTH MONITORING SYSTEMS: AN OVERVIEW OF DESIGN AND MODELLING

Health monitoring systems have rapidly evolved during the past two decades and have the potential to change the way health care is currently delivered. Although smart health monitoring systems automate patient monitoring tasks and, thereby improve the patient workflow management, their efficiency in clinical settings is still debatable. This paper presents a review of smart health monitoring systems and an overview of their design and modelling. Furthermore, a critical analysis of the efficiency, clinical acceptability, strategies and recommendations on improving current health monitoring systems will be presented. The main aim is to review current state of the art monitoring systems and to perform extensive and an in-depth analysis of the findings in the area of smart health monitoring systems. In order to achieve this, over fifty different monitoring systems have been selected, categorized, classified and compared. Finally, major advances in the system design level have been discussed, current issues facing health care providers, as well as the potential challenges to health monitoring field will be identified and compared to other similar systems.

THE INTERNET OF THINGS FOR HEALTH CARE: A COMPREHENSIVE SURVEY

The Internet of Things (IoT) makes smart objects the ultimate building blocks in the development of cyber-physical smart pervasive frameworks. The IoT has a variety of application domains, including health care. The IoT revolution is redesigning modern health care with promising technological, economic, and social prospects. This paper surveys advances in IoT-based health care technologies and reviews the state-of-the-art network architectures/platforms, applications, and industrial trends in IoT-based health care solutions. In addition, this paper analyses distinct IoT security and privacy features, including security requirements, threat models, and attack taxonomies from the health care perspective. Further, this paper proposes an intelligent collaborative security model to minimize security risk; discusses how different innovations such as big data, ambient intelligence, and wearables can be leveraged in a health care context; addresses various IoT and eHealth policies and regulations across the world to determine how they can facilitate economies and societies in terms of sustainable development; and provides some avenues for future research on IoT-based health care based on a set of open issues and challenges.

IOT-BASED HEALTH MONITORING VIA LORAWAN

In this paper, we present a new IOT-based health monitoring approach in which collected medical sensor data is sent to an analysis module via low-cost, low-power and secure communication links provided by a Lora WAN network infrastructure. We mainly focus on monitoring blood pressure, glucose and temperature in rural areas where cellular network coverage is either absent or does not allow data transmission. The main objective is to reduce the burden of long trips for people living in these areas to visit healthcare facilities, while minimizing the communication cost. Several experiments have been conducted to evaluate the area covered by the LoRa network and the power consumption of our system. The results indicate that the average area covered is around 33 km^2 when the LoRa Gateway is placed outdoor on a 12-meter altitude. Moreover, the results demonstrate that the power consumption of our monitoring system is at least ten times lower than other long range cellular solutions, such as GPRS/3G/4G.

RESOURCE-AWARE MOBILE-BASED HEALTH MONITORING

Monitoring heart diseases often requires frequent measurements of electrocardiogram (ECG) signals at different periods of the day, and at different situations (e.g., traveling, and exercising). This can only be implemented using mobile devices in order to cope with mobility of patients under monitoring, thus supporting continuous monitoring practices. However, these devices are energy-aware, have limited computing resources (e.g., CPU speed and memory), and might lose network connectivity, which makes it very challenging to maintain a continuity of the monitoring episode. In this paper, we propose a mobile monitoring solution to cope with these challenges by compromising on the fly resources availability, battery level, and network intermittence. In order to solve this problem, first we divide the whole process into several subtasks such that each subtask can be executed sequentially either in the server or in the mobile or in parallel in both devices. Then, we developed a mathematical model that considers all the constraints and finds a dynamic programming solution to obtain the best execution path (i.e., which sub-step should be done where). The solution guarantees an optimum execution time, while considering device battery availability, execution and transmission time, and network availability. We conducted a series of experiments to evaluate our proposed approach using some key monitoring tasks starting from pre-processing to classification and prediction. The results we have obtained proved that our approach gives the best (lowest) running time for any combination of factors including processing speed, input size, and network bandwidth. Compared to several greedy but nonoptimal solutions, the execution time of our approach was at least 10 times faster and consumed 90% less energy. [8] brought out present disclosure which provides an electrocardiogram remote monitoring system based on artificial intelligence including a patient 5 monitoring unit with a sensor system and a microcontroller . A server unit is connected to the patient monitoring unit , wherein the server unit includes a database and an artificial intelligence module. A patient module, a hospital module and a guardian module is connected to the server unit through a communication network .

CHAPTER-3

PROJECT DESCRIPTION

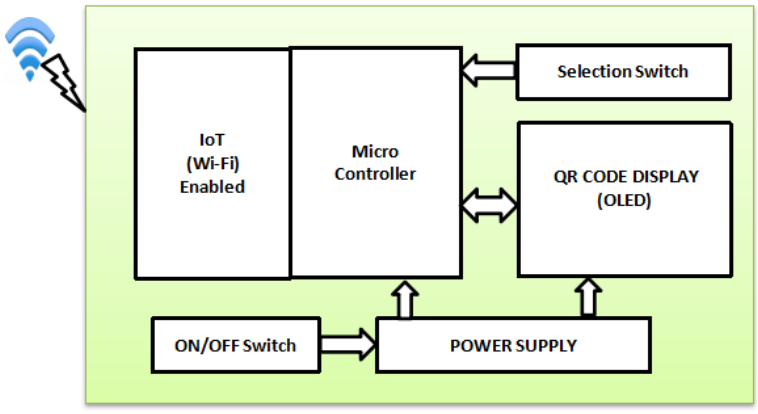
EXISTING SYSTEM:

- There is no common platform to identify the persons who got different vaccine dose from different countries due to the Citizens personal data sharing restriction policy of different Governments.
- International travellers or international working persons facing problems in Vaccination based entry security checking.
- Present day shouldn't have any proper display methods , data is not being fetched from server , so time consuming and malpractice possible in many entry places easily.

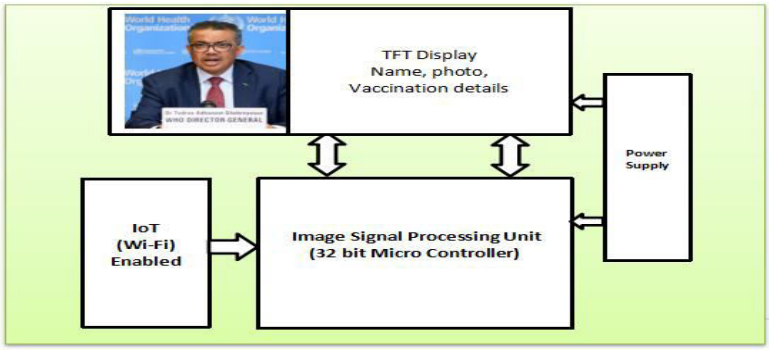
PROPOSED SYSTEM:

- problems a global solution need to be proposed as International Vaccination Chip which can be scanned anywhere globally and make the Vaccination based entry.
- The proposed vaccination chip enables faster and authenticated reliable data from the server keeps track on people as live.
- TFT display to display the Name, Age, photo, Vaccination status like partial, fully and booster etc. of the respective public.

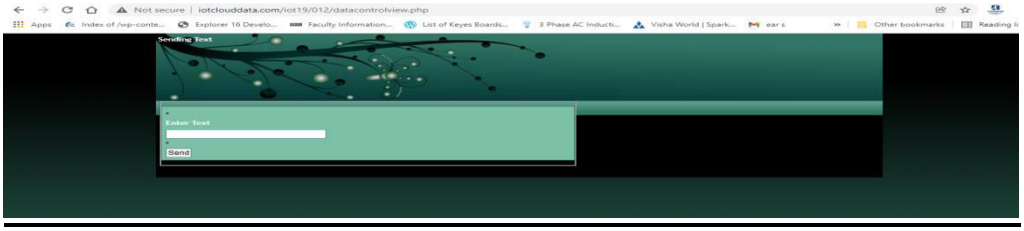
Vaccination CHIP unit:



Vaccination Status Display Unit



Global Vaccination Status updating Page



QR code Scanner Application

HARDWARE REQUIREMENTS:

1. QR Scanner
2. TFT Display
3. Wi-Fi
4. OLED Display
5. Microcontroller

SOFTWARE REQUIREMENTS:

1. Embedded C
2. IDE

3. php

4. Android app

HARDWARE DESCRIPTIONS

4.1 ARDUINO UNO:

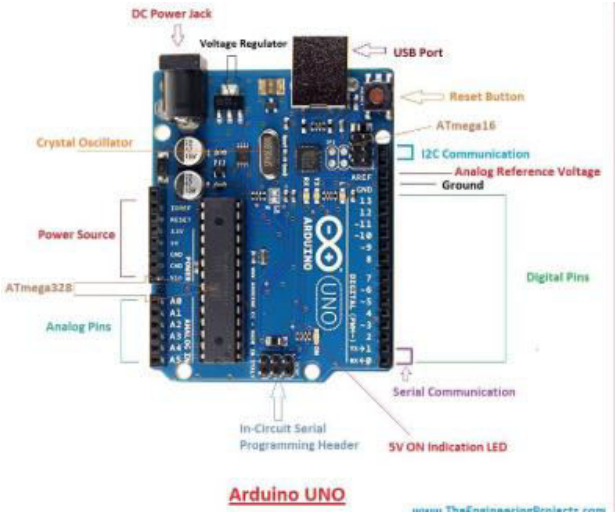
The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode. Revision 3 of the board has the following new features:

• 1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V. The second one is a not connected pin, that is reserved for future purposes.

• Stronger RESET circuit.

• Atmega 16U2 replace the 8U2. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

ARDUINO UNO:



POWER:

VIN. The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.

• 5V. This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.

• 3V 3. A 3.3-volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

• GND. Ground pins.

Memory

The ATmega328 has 32 KB (with 0.5 KB used for the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library). Input and Output Each of the 14 digital pins on the Uno can be used as an input or output, using pin Mode (), digital Write (), and digital Read () functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kilo Ohms. [6] discussed that Tumor segmentation required also the identical automatic initialization as regarding the liver. This phase was applied only in order to liver volume, obtained following automatic delineation of lean meats surface: this latter, used to original dataset quantity, was used as a new mask in order to be able to prevent processing overloads and even avoid errors related to be able to arsenic intoxication surrounding tissues delivering similar gray scale droit.

In addition, some pins have specialized functions:

• Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.

• External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attach Interrupt () function for details.

• PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analog Write () function.

• SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.

• LED: 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off. The Uno has 6 analog inputs, labeled A0 through A5, each of which provide 10 bits of resolution (i.e., 1024 different values). By default, they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analog Reference () function. Additionally, some pins have specialized functionality:

• TWI: A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library. There are a couple of other pins on the board:

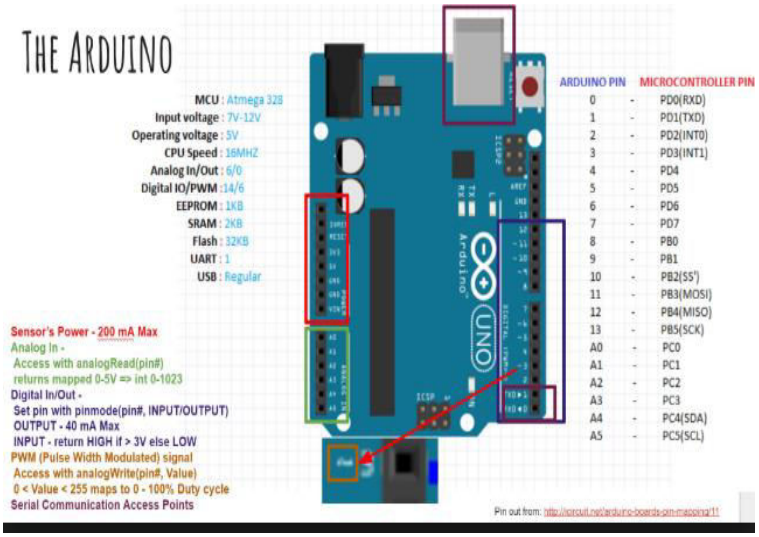
• AREF. Reference voltage for the analog inputs. Used with analog Reference ().

• Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board. See also the mapping between Arduino pins and ATmega328 ports. The mapping for the Atmega8, 168, and 328 is identical. Communication the Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers.

The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '16U2 firmware uses the standard USB COM drivers, and no external driver is needed.

However, on Windows, a .inf file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Uno's digital pins. The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus; see the documentation for details. For SPI communication, use the SPI library.

PIN CONFIGURATION:



USB Overcurrent Protection

The Arduino Uno has a resettable poly fuse that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

Physical Characteristics

The maximum length and width of the Uno PCB are 2.7 and 2.1 inches respectively, with the USB connector and power jack extending beyond the former dimension. Four screw holes allow the board to be attached to a surface or case. Note that the distance between digital pins 7 and 8 is 160 mil (0.16"), not an even multiple of the 100-mil spacing of the other pins.

4.2 TFT DISPLAY:

A thin-film-transistor liquid-crystal display (TFT LCD) is a variant of a liquid-crystal display that uses thin-film-transistor technology[1] to improve image qualities such as addressability and contrast. A TFT LCD is an active matrix LCD, in contrast to passive matrix LCDs or simple, direct-driven (i.e. with segments directly connected to electronics outside the LCD) LCDs with a few segments. TFT LCDs are used in appliances including television sets, computer monitors, mobile phones, handheld devices, video game systems, personal digital assistants, navigation systems, projectors. and dashboards in automobiles.

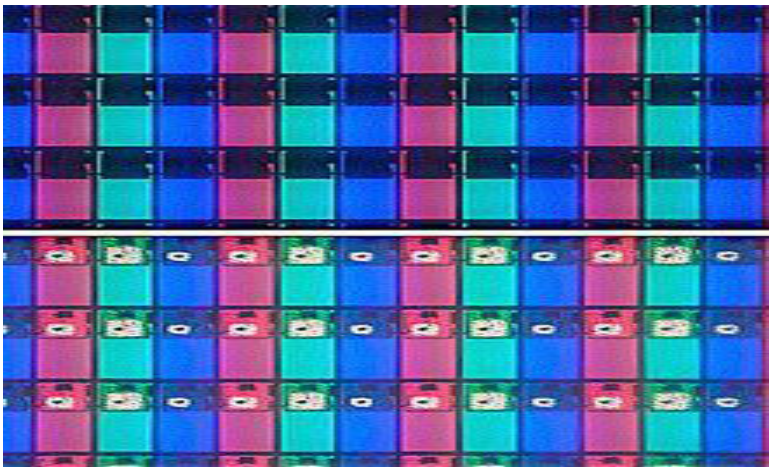
CONSTRUCTION:

The liquid crystal displays used in calculators and other devices with similarly simple displays have direct-driven image elements, and therefore a voltage can be easily applied across just one segment of these types of displays without interfering with the other segments. This would be impractical for a large display, because it would have a large

number of (color) picture elements (pixels), and thus it would require millions of connections, both top and bottom for each one of the three colors (red, green and blue) of every pixel. To avoid this issue, the pixels are addressed in rows and columns, reducing the connection count from millions down to thousands. The column and row wires attach to transistor switches, one for each pixel. The one-way current passing characteristic of the transistor prevents the charge that is being applied to each pixel from being drained between refreshes to a display's image. Each pixel is a small capacitor with a layer of insulating liquid crystal sandwiched between transparent conductive ITO layers.

The circuit layout process of a TFT-LCD is very similar to that of semiconductor products. However, rather than fabricating the transistors from silicon, that is formed into a crystalline silicon wafer, they are made from a thin film of amorphous silicon that is deposited on a glass panel. The silicon layer for TFT-LCDs is typically deposited using the PECVD process. Transistors take up only a small fraction of the area of each pixel and the rest of the silicon film is etched away to allow light to easily pass through it.

Polycrystalline silicon is sometimes used in displays requiring higher TFT performance. Examples include small high-resolution displays such as those found in projectors or viewfinders. Amorphous silicon-based TFTs are by far the most common, due to their lower production cost, whereas polycrystalline silicon TFTs are more costly and much more difficult to produce.



4.3 ESP8266 MODULE:

The **ESP8266** is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by manufacturer Espressif Systems in Shanghai, China.

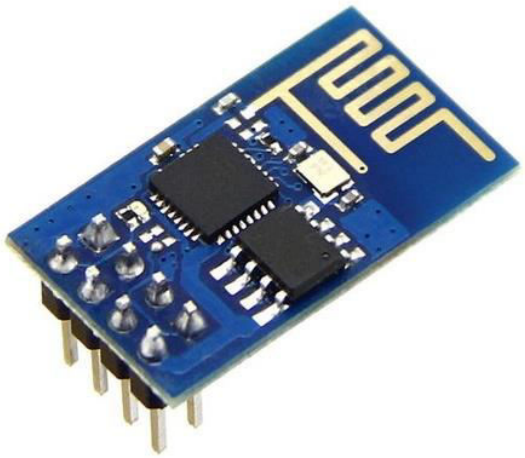
The chip first came to the attention of western makers in August 2014 with the **ESP-01** module, made by a third-party manufacturer Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at first there was almost no English-language

documentation on the chip and the commands it accepted.https://en.wikipedia.org/wiki/ESP8266 - cite note-2 The very low price and the fact that there were very few external components on the module, which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation

FEATURE:

- Memory:
  - 32 KiB instruction RAM
  - 32 KiB instruction cache RAM
  - 80 KiB user-data RAM
  - 16 KiB ETS system-data RAM
- External QSPI flash: up to 16 MiB is supported (512 KiB to 4 MiB typically included)
- IEEE 802.11 b/g/n Wi-Fi
  - Integrated TR switch, balun, LNA, power amplifier and matching network
  - WEP or WPA/WPA2 authentication, or open networks
- 16 GPIO pins
- SPI
- I²C (software implementation)https://en.wikipedia.org/wiki/ESP8266 - cite note-EspressifBBS I2C-6
- I²S interfaces with DMA (sharing pins with GPIO)
- UART on dedicated pins, plus a transmit-only UART can be enabled on GPIO2
- 10-bit ADC (successive approximation ADC)

ESP8266 is Wi-Fi enabled system on chip (SoC) module developed by Espressif system. It is mostly used for development of IoT (Internet of Things) embedded applications.



ESP8266-01 WIFI Module

ESP8266 comes with capabilities of

- 2.4 GHz Wi-Fi (802.11 b/g/n, supporting WPA/WPA2),
- general-purpose input/output (16 GPIO),
- Inter-Integrated Circuit (I²C) serial communication protocol,
- analog-to-digital conversion (10-bit ADC)
- Serial Peripheral Interface (SPI) serial communication protocol,
- I²S (Inter-IC Sound) interfaces with DMA (Direct Memory Access) (sharing pins with GPIO),
- UART (on dedicated pins, plus a transmit-only UART can be enabled on GPIO2), and
- pulse-width modulation (PWM).

It employs a 32-bit RISC CPU based on the Tensilica Xtensa L106 running at 80 MHz (or overclocked to 160 MHz). It has a 64 KB boot ROM, 64 KB instruction RAM and 96 KB data RAM. External flash memory can be accessed through SPI.

ESP8266 module is low-cost standalone wireless transceiver that can be used for end-point IoT developments.

To communicate with the ESP8266 module, microcontroller needs to use set of AT commands. Microcontroller communicates with ESP8266-01 module using UART having specified Baud rate.

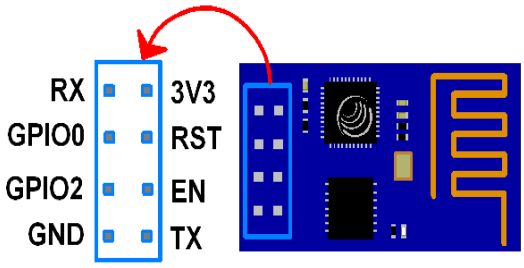
There are many third-party manufacturers that produce different modules based on this chip. So, the module comes with different pin availability options like,

- ESP-01 comes with 8 pins (2 GPIO pins) – PCB trace antenna. (shown in above figure)
- ESP-02 comes with 8 pins, (3 GPIO pins) – U-FL antenna connector.
- ESP-03 comes with 14 pins, (7 GPIO pins) – Ceramic antenna.
- ESP-04 comes with 14 pins, (7 GPIO pins) – No ant.

etc.

For example, below figure shows ESP-01 module pins

ESP8266-01 Module Pin Description



ESP8266-01 Module Pins

3V3: - 3.3 V Power Pin.

GND: - Ground Pin.

RST: - Active Low Reset Pin.

EN: - Active High Enable Pin.

TX: - Serial Transmit Pin of UART.

RX: - Serial Receive Pin of UART.

GPIO0 & GPIO2: - General Purpose I/O Pins. These pins decide what mode (boot or normal) the module starts up in. It also decides whether the TX/RX pins are used for Programming the module or for serial I/O purpose.

To program the module using UART, Connect GPIO0 to ground and GPIO2 to VCC or leave it open. To use UART for normal Serial I/O leave both the pins open (neither VCC nor Ground).

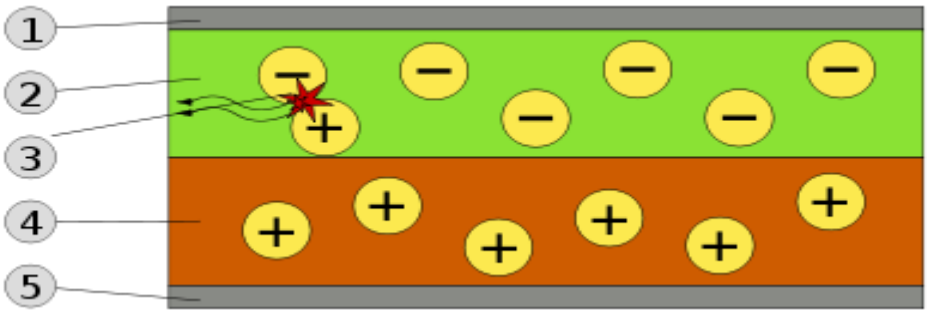
An organic light-emitting diode (OLED or organic LED), also known as organic electroluminescent (organic EL) diode, is a light-emitting diode (LED) in which the emissive electroluminescent layer is a film of organic compound that emits light in response to an electric current. This organic layer is situated between two electrodes; typically, at least one of these electrodes is transparent. OLEDs are used to create digital displays in devices such as television screens, computer monitors, and portable systems such as smartphones and handheld game consoles. A major area of research is the development of white OLED devices for use in solid-state lighting applications.

There are two main families of OLED: those based on small molecules and those employing polymers. Adding mobile ions to an OLED creates a light-emitting electrochemical cell (LEC) which has a slightly different mode of operation. An OLED display can be driven with a passive-matrix (PMOLED) or active-matrix (AMOLED) control scheme. In the PMOLED scheme, each row (and line) in the display is controlled sequentially, one by one,https://en.wikipedia.org/wiki/OLED - cite note-6 whereas AMOLED control uses a thin-film transistor (TFT) backplane to directly access and switch each individual pixel on or off, allowing for higher resolution and larger display sizes.

Although its name looks similar, OLED is fundamentally different from LED. The LED is based on a p-n diode structure. In an LED, doping is used to create p- and n- regions by changing the conductivity of the host semiconductor. OLEDs do not employ a p-n structure. Doping of OLEDs is used to increase radiative efficiency by direct modification of the quantum-mechanical optical recombination rate. Doping is additionally used to determine the wavelength of photon emission.

An OLED display works without a backlight because it emits visible light. Thus, it can display deep black levels and can be thinner and lighter than a liquid crystal display (LCD). In low ambient light conditions (such as a dark room), an OLED screen can achieve a

higher contrast ratio than an LCD, regardless of whether the LCD uses cold cathode fluorescent lamps or an LED backlight. OLED displays are made in the same way as LCDs, but after TFT (for active matrix displays), addressable grid (for passive matrix displays) or indium-tin oxide (ITO) segment (for segment displays) formation, the display is coated with hole injection, transport and blocking layers, as well with electroluminescent material after the first 2 layers, after which ITO or metal may be applied again as a cathode and later the entire stack of materials is encapsulated. The TFT layer, addressable grid or ITO segments serve as or are connected to the anode, which may be made of ITO or metal. OLEDs can be made flexible and transparent, with transparent displays being used in smartphones with optical fingerprint scanners and flexible displays being used in foldable smartphones.



QR SCANNER:

A QR code (an initialism for quick response code) is a type of matrix barcode (or two-dimensional barcode) invented in 1994 by the Japanese automotive company Denso Wave. A barcode is a machine-readable optical label that can contain information about the item to which it is attached. In practice, QR codes often contain data for a locator, identifier, or tracker that points to a website or application. A QR code uses four standardized encoding modes (numeric, alphanumeric, byte/binary, and kanji) to store data efficiently; extensions may also be used.

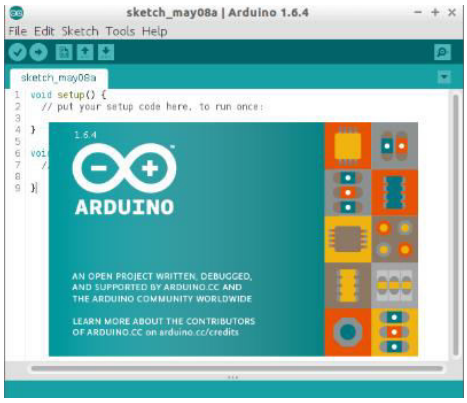
The Quick Response system became popular outside the automotive industry due to its fast readability and greater storage capacity compared to standard UPC barcodes. Applications include product tracking, item identification, time tracking, document management, and general marketing.

A QR code consists of black squares arranged in a square grid on a white background, which can be read by an imaging device such as a camera, and processed using Reed–Solomon error correction until the image can be appropriately interpreted. The required data is then extracted from patterns that are present in both horizontal and vertical components of the image.

SOFTWARE DESCRIPTIONS

5.1ARDUINO IDE:

The Arduino IDE is incredibly minimalistic, yet it provides a near-complete environment for most Arduino-based projects. The top menu bar has the standard options, including “File” (new, load save, etc.), “Edit” (font, copy, paste, etc.), “Sketch” (for compiling and programming), “Tools” (useful options for testing projects), and “Help”. The middle section of the IDE is a simple text editor that where you can enter the program code. The bottom section of the IDE is dedicated to an output window that is used to see the status of the compilation, how much memory has been used, any errors that were found in the program, and various other useful messages.



Projects made using the Arduino are called sketches, and such sketches are usually written in a cut-down version of C++ (a number of C++ features are not included).

Because programming a microcontroller is somewhat different from programming a computer, there are a number of device-specific libraries (e.g., changing pin modes, output data on pins, reading analog values, and timers). This sometimes confuses users who think Arduino is programmed in an "Arduino language." However, the Arduino is, in fact, programmed in C++. It just uses unique libraries for the device.

The 6 Buttons

While more advanced projects will take advantage of the built-in tools in the IDE, most projects will rely on the six buttons found below the menu bar.

The button bar

1. The **check mark** is used to verify your code. Click this once you have written your code.
2. The **arrow** uploads your code to the Arduino to run.
3. The **dotted paper** will create a new file.
4. The **upward arrow** is used to open an existing Arduino project.
5. The **downward arrow** is used to save the current file.
6. The far-right button is a **serial monitor**, which is useful for sending data from the Arduino to the PC for debugging purposes.

The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures.

User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU toolchain, also included with the IDE

distribution. The Arduino IDE employs the program avrdude to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware

Projects made using the Arduino are called sketches, and such sketches are usually written in a cut-down version of C++ (a number of C++ features are not included). Because programming a microcontroller is somewhat different from programming a computer, there are a number of device-specific libraries (e.g., changing pin modes, output data on pins, reading analog values, and timers). This sometimes confuses users who think Arduino is programmed in an “Arduino language.” However, the Arduino is, in fact, programmed in C++. It just uses unique libraries for the device.

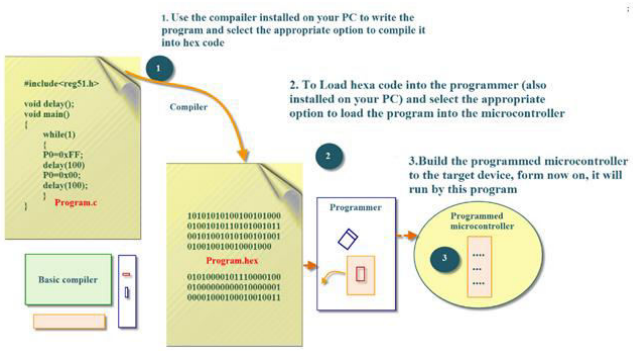
The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution.

The Arduino IDE employs the program avrdude to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

5.2 EMBEDDED C:

Embedded C is most popular programming language in software field for developing electronic gadgets. Each processor used in electronic system is associated with embedded software.

Embedded C programming plays a key role in performing specific function by the processor. In day-to-day life we used many electronic devices such as mobile phone, washing machine, digital camera, etc. These all-device working is based on microcontroller that are programmed by embedded C.



The Embedded C code written in above block diagram is used for blinking the LED connected with Port0 of microcontroller.

In embedded system programming C code is preferred over other language. Due to the following reasons:

- Easy to understand
- High Reliability
- Portability
- Scalability

Function is a collection of statements that is used for performing a specific task and a collection of one or more functions is called a programming language.

Most consumers are familiar with application software that provide functionality on a computer. Embedded software however is often less visible, but no less complicated. Unlike application software, embedded software has fixed hardware requirements and capabilities, and addition of third-party hardware or software is strictly controlled.
Embedded software needs to include all needed device drivers at manufacturing time, and the device drivers are written for the specific hardware. The software is highly dependent on the CPU and specific chips chosen. Most embedded software engineers have at least a passing knowledge of reading schematics, and reading data sheets for components to determine usage of registers and communication system. Conversion between decimal, hexadecimal and binary is useful as well as using bit manipulation.

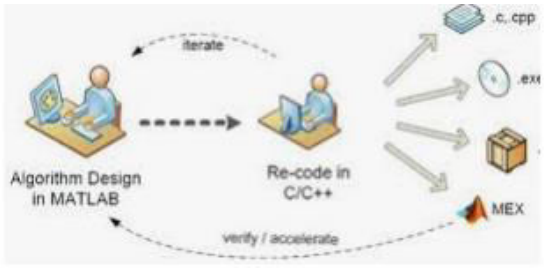
Web applications are rarely used, although XML files and other output may be passed to a computer for display. File systems with folders are typically absent as are SQL databases.

Software development requires use of a cross compiler, which runs on a computer but produces executable code for the target device. Debugging requires use of an in-circuit emulator, JTAG or SWD. Software developers often have access to the complete kernel (OS) source code.
Size of the storage memory and RAM can vary significantly. Some systems run in 16 KB of Flash and 4 KB of RAM with a CPU operating at 8 MHz, other systems can rival contemporary computers.https://en.m.wikipedia.org/wiki/Embedded_software_-_cite_note-8 These space requirements lead to more work being done in C or embedded C++, instead of C++. Interpreted languages like BASIC (while e.g. Parallax Propeller can use compiled BASIC) and Java (Java ME Embedded 8.3[9] is available for e.g. ARM Cortex-M4, Cortex-M7 microcontrollers and older ARM11used in Raspberry Pi and Intel Galileo Gen. 2) are not commonly used; while an implementation of the interpreted Python 3 language – MicroPython – is however available expressly for microcontroller use, e.g. 32-bit ARM-based (such as BBC micro:bit) and 16-bit PIC microcontrollers.

Communications between processors and between one processor and other components are essential. Besides direct memory addressing, common protocols include I²C, SPI, serial ports, and USB.

Communications protocols designed for use in embedded systems are available as closed source from companies including InterNiche Technologies and CMX Systems. Open-source protocols stem from uIP, lwip, and others

- This program explains how to use structure within structure in C using normal variable. “student_college_detail’ structure is declared inside “student_detail” structure in this program. Both structure variables Please note that members of “student_college_detail” structure are accessed by 2 dot(.) operator and members of “student are normal structure variables.
- _detail” structure are accessed by single dot(.) operator.



Embedded C Program with Examples ...

A Keyword is a special word with a special meaning to the compiler (a C Compiler for example, is a software that is used to convert program written in C to Machine Code). For example, if we take the Keil’s Cx51 Compiler (a popular C Compiler for 8051 based Microcontrollers) the following are some of the keywords:

- bit
- sbit
- sfr
- small
- large

These are few of the many keywords associated with the Cx51 C Compiler along with the standard C Keywords.

5.3 PHP

PHP started out as a small open source project that evolved as more and more people found out how useful it was. Rasmus Lerdorf unleashed the first version of PHP way back in 1994.PHP is a recursive acronym for "PHP: Hypertext Preprocessor". PHP is a server side scripting language that is embedded in HTML. It is used to manage dynamic content, databases, session tracking, even build entire e-commerce sites.It is integrated with a number

of popular databases, including MySQL, PostgreSQL, Oracle, Sybase, Informix, and Microsoft SQL Server.

PHP is pleasingly zippy in its execution, especially when compiled as an Apache module on the Unix side. The MySQL server, once started, executes even very complex queries with huge result sets in record-setting time. PHP supports a large number of major protocols such as POP3, IMAP, and LDAP. PHP4 added support for Java and distributed object architectures (COM and CORBA), making n-tier development a possibility for the first time.PHP is forgiving: PHP language tries to be as forgiving as possible.PHP Syntax is C-Like.

1. PHP is an acronym for "PHP: Hypertext Preprocessor"
2. PHP is a widely-used, open source scripting language
3. PHP scripts are executed on the server
4. PHP is free to download and use
5. PHP files can contain text, HTML, CSS, JavaScript, and PHP code
6. PHP code is executed on the server, and the result is returned to the browser as plain HTML
7. PHP files have extension ".php"

CHARACTERISTICS OF PHP

Five important characteristics make PHP's practical nature possible −

Simplicity

Efficiency

Security

Flexibility

Familiarity

STRUCTURE

```
<!DOCTYPE html>

<html>

<body>


<?php
```

```
echo "My first PHP script!";
?>

</body>
</html>
```

REFERENCE

[1] Ebrahim Al Alkeem1, Dina Shehada1, Chan Yeob Yeun1,M. Jamal Zemerly ,Jiankun Hu "New secure healthcare system using cloud of things", Springer Science+Business Media New York 2017.

[2] Christo Ananth, Ruchin Jain, "Enhancing Segmentation Approaches from Oaam to Fuzzy K-C-Means", The Journal of Research on the Lepidoptera, Volume 51, No. 2, 2020,(1086-1108).

[3] Mirza Mansoor Baig & Hamid Gholamhosseini "Smart Health Monitoring Systems: An Overview of Design and Modeling", Springer Science+Business Media New York 2013

[4] Christo Ananth, D.R.Denslin Brabin, "ENHANCING SEGMENTATION APPROACHES FROM GAUSSIAN MIXTURE MODEL AND EXPECTED MAXIMIZATION TO SUPER PIXEL DIVISION ALGORITHM", Sylwan, Volume 164, No. 4, 2020,(15-32).

[5] Afef Mdhaffar, Tarak Chaari , Kaouthar Larbi, Mohamed Jmaiel and Bernd Freisleben "IoT-based Health Monitoring via LoRaWAN", IEEE EUROCON 2017.

[6] Christo Ananth, Bindhya Thomas, Priyanka Surendran, Dr.A.Anitha, "Enhancing Segmentation Approaches from GC-GGC to Fuzzy K-C-Means", Annals of the Romanian Society for Cell Biology, Volume 25,Issue 4, April 2021,pp. 2829 – 2834.

[7] Ayush Bansal , Sunil Kumar, Anurag Bajpai, Vijay N. Tiwari, Mithun Nayak, Shankar Venkatesan, Rangavittal Narayanan, "Remote health monitoring system for detecting cardiac disorders", IET Syst. Biol., 2015, Vol. 9, Iss. 6, pp. 309–314.

[8] Christo Ananth, Praghash K, Niha K, Narendran S, Marshiana D, Nanjesh BR, Ahila A, G.Victor Emmanuel, D. Angeline Ranjithamani, Selina Annie Retna V "ELECTROCARDIOGRAM REMOTE MONITORING SYSTEM BASED ON ARTIFICIAL INTELLIGENCE", Patent number: 2020101682, Australian Patent, 26th August 2020.

[9] Muthuraman Thangaraj Pichaiah Punitha Ponmalar Subramanian Anuradha, "Internet Of Things (IOT) Enabled Smart Autonomous Hospital Management System – A Real World Health Care Use Case with the Technology Drivers", 2015 IEEE International Conference on Computational Intelligence and Computing Research.

[10] Maradugu Anil Kumar, Y.Ravi Sekhar, "Android Based Health Care Monitoring System" IEEE Sponsored 2nd International Conference on Innovations in Information Embedded and Communication Systems ICIIECS'1.

[11] "Coronavirus COVID-19 Global Cases by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University." [Online]. Available: https://gisanddata.maps.arcgis.com/apps/opsdashboard [Accessed: Apr. 2, 2020].

[12] Christo Ananth, D.R. Denslin Brabin, P Narasimman, K Niha, T C Subbu Lakshmi, R Muthulakshmi, Stalin Jacob, Jenifer Darling Rosita, "A SYSTEM AND METHOD OF REPRESENTING HEALTH DATA", Patent number: 2020100445, Australian Patent, 15th April 2020.

[13] The Guardian, "No 10 seeks to end coronavirus lockdown with 'immunity passports.'" [Online].