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ENGINEERING**



**TECHNOBITE
2018-19**

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Call Details Record Analysis for Police Department

Call Detail Record (CDR) is a detailed record of all the telephonic calls that are done by a certain user of a certain service provider. The record is maintained by the concerned service provider and contains call details such as time of the call, duration of the call, source and destination number, completion status of the call, etc. Call detail records serve a valuable purpose of revenue generation for telephone service providers and are critical for law enforcement, whenever required. CDR may be additionally used for VOIP which is a record containing all usage details such as source of origin and destination point of the call, usage period of the IP and the total amount charged during the billing period. Call Detail records are maintained by telephone exchanges that emit information in the form of tickets, with respect to individual customers/users. Call monitoring and recording applications used by telecommunication companies generate a very big amount of call detail records (CDRs) in real-time, and these corporations have to constantly leverage from this data to boost productivity. Due to the large number of calls and the big amount of the data collected by the call monitoring applications it is impossible to manually analyse and conclude the nature of the network. CDR Analysis & Investigation will help Police Department, Security Agencies and Law Enforcement Agencies to Analyse, Investigate & Work on the Call Data Records and any other such type of records, obtained through various Mobile Operators efficiently and quickly, regardless of difference in File Formats, Column Formats & Operators Layout Formats. So the CDR analysis application is the system which will help Police Department and Security Agencies to Analyse, Investigate and work on call detail records quickly and efficiently. It Provides visualization of the analysed data and generate report in required file format.

The architecture of the CDR analysis application consists of several modules like CDR file parsing and processing, Analysis of newly produced CDR on various aspects, Downloading the result in required format, Tracing the number on map and analysing the pattern and Visualizing the Data. When the CDR data sheet provided by telecom companies will be uploaded in the system, system will process data and show required output on web page. Fetched data contains calling information like calling number, called number, call type, call duration, IMEI number, call date, cell id and circle. System is also able to filter data according to user need. Tables can sort data by call date, call duration, call time etc. For better understanding user can use several charts like Bar chart, Pie chart, Line chart. Tracing the map is another feature in which user can easily navigate the path between calling number and called number.

By using this system, required data can be easily access and analysed, this also boosts the investigation process, and help to avoid human errors. In future we can optimize the system by using pattern recognition with the help of Machine Learning algorithms and analyse the probable relation between two mobile numbers by analysing their call details with respect to their calling pattern.

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Suspect Prediction System for Criminal Investigation

A crime is an illegal action or activity for which a person can be punished by law. Over the recent years, crime rates in India have drastically increased and also the numbers of criminal incidents have been increasing rapidly. Each criminal uses different methods to commit the crime. Hence, each and every case is different than others. When a new case is filed against the crime, investigation always starts from the shreds of evidence found at the crime location and the eyewitnesses present at the crime location. In various police stations or almost all police stations, the criminals who get caught in the past have their details being saved into the files and documents which in the future may lead to missing up of any file and being unable to catch that theft again. In this paperless era, to reduce the manual work and to make the investigation process efficient and transparent "Suspect Prediction System for Criminal Case Investigation" is preferable which is elaborated further in this paper. The system provides predictions about possible suspects based on the pieces of evidence collected from crime locations such as direct evidences, circumstantial evidences, and logical evidences through the investigation process. It is a digitized system that allows the officer to check the status of the case and also to add new information related to the case whenever it is needed. Machine Learning can be used to automate the process of criminal investigation. The system uses the Naïve Bayes algorithm to process the information entered by the officers and compare the parameters in the dataset to predict probable suspects. The system predicts the suspects in the logical order and thus helps to speed up the investigation process.

The system mainly consists of 3 modules login, dataset, and prediction. The login module contains 2 logins namely: Admin login and Police officer login. Admin has the right to assign the case to any particular officer. So after logging in, the admin will add the new case by assigning a unique id to it. Then he has to add an officer to the system by entering details of the officer and assigning id and password for the officer. Then he will be able to assign that officer to the case to be investigated. After receiving the id and password assigned to him by the admin, he can log in to the system. He can see the case assigned to him by the admin. Then the officer has to add the case details such as type of crime, city, weapons used, the vehicle used, and pattern of committing a crime.

After entering the details of the case, they will be compared with the details of the past criminal records stored in a verified dataset. And the probable suspects will get predicted as an output. For the calculation of the probability for the suspect, the Naïve Bayes algorithm is used. When the result of the case will be declared, Admin can add it to the dataset so that it can be used for future criminal cases.

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For now, the system is semi-automated as the officer has to enter some data manually. In the future, we can make this system fully automated using speech recognition. .Further, we can modify the system as crime pattern recognition and analyzer using image processing based on images provided as pieces of evidence to the system. Today, police departments are using surveillance cameras, gunshot detection systems, automated license plate readers, facial recognition software, body cameras, drones, and numerous databases to prevent, respond and investigate crimes. All these systems can be combined to form an “Intelligent Crime Investigation Management System”.

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Email Solution For Enhancement Of Email Service

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Abstract—The (e-mail) Electronic Mail is the evolutionary product that changed the whole perspective of the businesses.

It became easy to send and receive the mails from the customer. Now a days the businesses are growing and new businesses are starting up. These businesses require their private domain name with their own email service. They look for the best value for the money service. There are many such email service providers but some of them have some faults. This paper is about the implementation of the email service which is designed in such a way that it is the best value for the money package to the businesses.

Keywords—e-mail; server; user id; authentication; security; domain name; etc.

I. INTRODUCTION

Electronic Mail or e-mail is the method of exchanging the message between the two people or institutes using the electronic device. The e-mail was invented by the Ray Tomlinson. The electronic mail operates across the internet.

As number of users of the E-Mail continue to increase rapidly, there is increase in the demand of the powerful, reliable and secure E-mail servers and service. According to the study and the research, there are very

few companies which provide the reliable and secure E-Mail service. Also there are very few researches available

on the topic of E-Mail server as compared with the other. In this paper we focus on the quality of the E-Mail service which is provided to the small businesses and also the factors which are related to it such as the security, user friendliness and hardware performance. This paper introduce you to the new aspects of the E-Mail service which can help to improve the service provided to the small businesses.

From our research we came across the following results:
•Inability of the E-Mail service providers to provide the user-friendly user interface :

That is, the user interface provided by the companies is not efficient for the users.

•Lack of the available services and less number of E-Mail addresses with private E-Mail service providers :

The E-Mail service providers provide the E-Mail service to their customers with less numbers of the E-Mails available for creation. Also, they try to use less number of the servers to provide the service to large number of customers.

A• Lack of the security :

Using the same server to provide the service to as much possible customers, it stores unnecessary data on the server. It is the great threat for the server's security.

- Less amount of storage available for the effective amount that is charged.
- Due to hardware problems, unavailability of 24*7 service.

II. EXISTING E-MAIL SERVICE PROVIDERS

[1]The E-Mail service providers are those who provide you E-Mail service with your private domain name. There are many E-Mail service providers with whom you can host your E-Mail with your private domain name. Following are some major companies which provide the E-Mail service with the private domain names :

- Gmail Apps For Work
- Microsoft Office 365 Essentials
- Zoho
- atMail
- GoDaddy

Work of all above companies is same to provide the customer the E-Mail service with their own domain. All these companies charge you as you use their services. There are some fix charges such as, yearly domain name charge, maintenance charge, etc. Excluding these charges customers have to pay extra charges for the every extra E-Mail created.

The customer chooses their service on the basis of different factors. These factors which are taken into account are as follows:

1. Spam Filter - Spam filter is most important factor that is considered while choosing the E-Mail service provider. Everyone don't want to waste their valuable time in deleting the spam messages and hence the spam filter service is provided, which detects the spam mails and filters them out of the inbox.
2. Security - The security is one of the important factor. Now a days there are many hackers who attack on the E-Mail system and steal the crucial information..

Hence the security is the most facility that the service providers should provide to the customers.

3. Reliability - The E-Mail server of the provider

should be always up whenever you need it. Your E-Mail should be always available to your clients. E-Mail

server downtime can result in the loosing of customers.

4. Integration - The E-Mail service should work with the different business tools such as, calendars and productivity tools. The businesses select the service which provide them the better integration service.

5. Ease Of Use - As the business grows more and more the E-Mail accounts are needed to be created for employees. The user interface of the E-Mail should be easy to use i.e. user friendly. The businesses select such a service that require no training to use the E-Mail service.

6. Storage - The storage is one of the most important part while choosing the E-Mail service provider. As every business grows more amount of the data needs to be stored and transferred. E-Mail service which provide less amount of the storage is unusable for the growing businesses.

7. Advance Features - E-Mail service provider needs to provide the advance E-Mail features such as scheduling the task in E-Mail, saving it as a draft, categorising the E-Mails, etc.

8. Archive Capability - The way in which the E-Mail service stores, saves and organize the E-Mails, drafts is very important.

III. DRAWBACKS OF THE EXISTING E-MAIL SERVICES

As mentions earlier, the businesses look for the E-Mail services that have most of above the features. All the existing E-Mail service providers provide almost the same type of the E-Mail service but with different price tag. These E-Mail services have some major drawbacks that should be taken into account.

Drawbacks of the existing E-Mail systems are :

1. Limited number of E-Mails addresses :

This is the major disadvantage of the existing E-Mail services. They provide the customer limited number of

the E-Mail addresses the can be used with the package. If the customer requires more E-Mail addresses then customer

have to buy that addresses buy paying extra charges per E-Mail address. This causes increase in number of the

expenses of the company. Limited number of available E-Mail addresses means limited amount of storage available.

As the business grows the company requires more and more storage and E-Mail addresses for transferring the large amount of data. For the extra storage company have to pay extra charges according to the policy of the provider company.

2. DNS Lookup Time :

The DNS lookup time is the time taken by the DNS server to identify the ip address of the specific website. If the user searches for their domain name then the time

required by the DNS should to find the ip of the E-Mail server should be very small. This ensures the faster connectivity of the server. The shortest lookup time is for the google server, which is 369.75 MS (Milli Second). The google domains are on an average 107.25 MS faster than the other domains. Hence the proper hardware with the secure and stable network is necessary for the shorter DNS lookup time.

3. Security :

The security is the most important factor while choosing the E-Mail service. Also it is the drawback of the existing E-Mail services. Every time the hackers try to penetrate the security of the E-Mail server and tries to access the confidential information which is being shared or stored on the server. Hackers also records the private information of the customers so that it can be used latter. Hence the security of the E-Mail server is important. The security of the E-Mail server depends on the two major

factors -

I. Hardware

II. Software

I. Hardware :

The hardware plays very important role in the security of the E-Mail servers. The hardware security is the protection against the vulnerabilities against the physical devices. Now a day in the IoT environment, many devices are connected in the same network. The server needs the protection against the other physical devices. The condition of the hardware used also affects the security of the E-Mail server. The latest hardware used for the server comes with the self encryption technology which the old hardware systems lack. This can cause great harm to the system. Hence time to time upgradation and maintenance of the hardware is important. Though the hardware of the server can be controlled according to our will using software, it can get damaged by ageing and fluctuating voltage. Also one can corrupt the hardware by using the software also. If the hardware of the server is up to the mark then there are less possibilities that server can get destroyed using the hardware perspective.

II. Software :

Along with the hardware the software is most important part of the E-Mail server system. The E-Mail server system uses linux platform for the execution of the required packages. [2]The E-Mail server uses the different services such as MTA (Mail Transfer Agent), MDA (Mail Delivery Agent) and IMAP/POP3. These software services are essential for the implementation of the E-Mail server. After that the provider can add the features for enabling the business essential applications as extension and many more. The software services used in the E-Mail server needs to be secured. For that not only the hardware firewall but also the special security system is used. The hackers always try to attack the server through the software viruses and malware. In such conditions the software protection system should protect the system against the any hazardous attacks by the hacker. The software used to configure the E-Mail server should be reliable and compatible with the hardware used. If the incompatible hardware is used with the software then

there are higher chances of system getting crashed. For this basically the 32 and 64 bit architecture of the software system and the hardware should be taken into account. The software used is not only for deploying the E-Mail serve but also for providing the security to the customers. The software installed on the server consists of the software

packages which are used for filtering the spams from the E-Mails, scanning the E-Mails for viruses, etc. These are the

important parts that the software system of the E-Mail server should be focused on. If the spam filters are not up to the mark or the virus scanner for mails is not updated with the latest malware then it is a great threat for the privacy of the customer. Due to the fault in the security of the E-Mails, the hackers can attack not only the server but also the customer's private computer. To prevent all these a software system of the E-Mail server is needed to be updated time to time. The customers access their E-Mails through the provider's website. [3] That website should be secured with the SSL certificate. This verifies that the E-Mail server is securely connected to the browser through which the customer is accessing the E-Mail.

4. User Interface :

The user interface is the one of the most part of

providing the E-Mail service. The user accesses their E-Mails through the dedicated website provided by the service

provider. As mentioned earlier that website should be secured with the SSL certificate. Also that website's user interface should be user-friendly. The E-Mails should be easily accessible through the website. Customers should not have to search for the different functionality provided, it should be easily available. The user should easily use the applications provided without any hesitations. Consider the example of the Google's free E-Mail service Gmail, the user interface of the Gmail is easy to use and anyone who is not aware of using the email should be able to use the email. The user interface of the website should be self explanatory.

IV. PROPOSED WORK FOR IMPROVEMENT

As seen earlier the existing E-Mail server systems have drawbacks that can cause harm to the E-Mail system and also to the user. The E-Mail server service can be improved by using the following methods :

•Using authentication for the E-Mails :

The E-Mails are the way to share the important

information and its users are increasing day by day. The E-Mails are shared with the intended user with secure

encrypting technique but the authentication is not used in E-Mails. By using the authentication technique with the E-Mails, the E-Mail service can get more security. By using

the authentication methods such as digital signature and MAC functions can secure from the attacks by hackers.

•Using the user-friendly user interface :

Currently there are many E-Mail services that provide the E-Mail service for the customers with the private domain name. But according to our research, the customers are not satisfied with the type of the service they are getting. Customers are facing the problems while accessing the E-Mails through the dedicated website. The

servers used by these companies are not working well with the webmail also. The service providers have problems in their functionalities such as forwarding emails fails 80% of the time. Hence for seamless experience the user-friendly website with the working functions is essential.

•Updating the servers time to time :

The average lifespan of the server is 3-5 years depending upon its usage. In this time period the server's software system and the packages need to be updated time to time. Many companies use the server even after it's expired. This can cause a threat for the mailing system. At least the server components need to be updated and serviced time to time.

•Using the appropriate spam filters and virus scanner :

The spam filters and the virus scanners are the important part of the E-Mail system. Without the virus scanner there are possibilities of getting the system affected of malware. It can cause losing the customer's private information. Hence with the E-Mail service appropriate spam filters and virus scanners are necessary to use.

FUTURE SCOPE

•Using Artificial Intelligence for the filtering of the spams and viruses.

•Using the machine learning algorithms for improving the service.

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Programming Culture in Engineering Colleges..

As a student of one of the Tier 3 colleges in India, I realized that many students lack programming skills even though they are in their final year. Some students can't clear the technical interviews due to this. Students from these Tier 3 colleges can't get jobs in top MNCs like Google, Amazon, Microsoft etc. As a student from Tier 3 college with a dream to get placed in those prestigious companies, I did some research on where we lack compared to students from top colleges like IITs and NITs and I found that, Problem is not in the teaching methods or students are not giving their 100%. The problem is in the environment and culture that differs top colleges and these colleges. The culture I'm talking about is the culture of programming. The difference between their programming skills is the issue. It is true that top MNCs are going for recruitment in colleges like IITs but students in those colleges are preparing and improving their skills from their first year, keeping in mind that they have to gain knowledge at a certain level so that they can get placed in those MNCs. Where in low tier colleges students don't practice programming at all. They lack it because they haven't tried to solve coding problems. They don't know concepts like Competitive programming, There is no programming culture in existence there. Students in low tier colleges are not excited about programming even though they are in the computer science branch. They are not motivated to solve programming questions and to learn programming concepts like Data structures and Algorithm implementation. MNCs are not on their target list. Everyone says these are my dream companies but no one is trying to get a job there, cause they don't have the required skill set. Absence of Programming culture is the reason. It's not like students are not hardworking, it's just that they are not aware of these things from their first year of engineering. So what is the solution for this problem ?? What can we do ?? Do students have to improve themselves ?? The answer is simple: To create a programming environment / culture in these low tier colleges. And it's not the responsibility of college faculty only but of students also. There must be some programming clubs which will focus on improving coding skills, teachers should encourage students to do competitive programming, student bodies should arrange some coding events in colleges. Teachers and students can work together to develop excitement towards

problem solving and programming. There are many free courses available on youtube to develop the required skill set, But students are not interested in one thing that they have to do for at least 20 years of their life. There are platforms like Codechef, HackerEarth, codeforces and Leetcode with lots of interesting coding problems, different global and country-wise coding contests which provide ratings to users which will help students to get jobs in Top MNCs. One more thing is that some students are working to improve their skills individually but the major drawback is that they don't have anyone with whom they can discuss the problems if they are stuck on something. It's very important to have a group of like minded people. But I think if you don't have a group of like minded people then make a group and fill their minds with things you like. And students can do that by forming coding clubs with help of teachers and creating an environment which will be helpful to compete with students of top colleges.

Article by-
Shashank R. Varnekar

3 Star Programmer on Codechef.

THERMOXIMETER

The invention of microprocessors and hence microcontrollers were a big invention in the fields of technology. Throughout the years the microcontroller family has evolved to provide us with better opportunities of application. Now-a-days, the need for basic 8bit microcontrollers have always been at a high because of their small size, simplicity, ease of use and most importantly they are quite cheap as well. Simple yet providing the opportunity to spread the wings of innovativeness, the basic microcontrollers have found applications in various fields and thus created the concept of Embedded Systems. In our project we have used the AT328P-PU microcontroller to make a digital thermoximeter, providing us with temperature as accurate as 0.5 °C variation. Combining the hardware and software concepts together and interfacing the microcontroller with an analog to digital converter (ADC) chip. Eventually to test its precision, performance and reliability, a virtual microcontroller was simulated. Thermoximeter' which will measure three human body parameters that are temperature, oxygen level of blood and pulse rate. The components will be used for proposed project are LM35 temperature sensor, MAX30100 pulse oximeter, Analog to Digital converter IC (ADC0804), MAX-232 IC chip for serial communication with the microcontroller and LCD display & android application to display the temperature ,pulse-rate & oxygen level . Due to covid-19 pandemic conditions, it is necessary to measure temperature, oxygen level of blood and pulse rate of person. The main aim of the proposed project Thermoximeter is to develop a device which can measure real time human body parameters accurately and output the measured parameters quickly. The proposed project is the design of a non-invasive medical device that is capable of monitoring and measuring the temperature, saturation of peripheral oxygen in a patient's blood as well as their heartbeat rate simultaneously. The proposed device will be based on a microcontroller and uses a transmitting optical sensor and temperature sensor to take input parameters and will display the measured temperature, oxygen level of blood and pulse rate in LCD display as well as on mobile application.

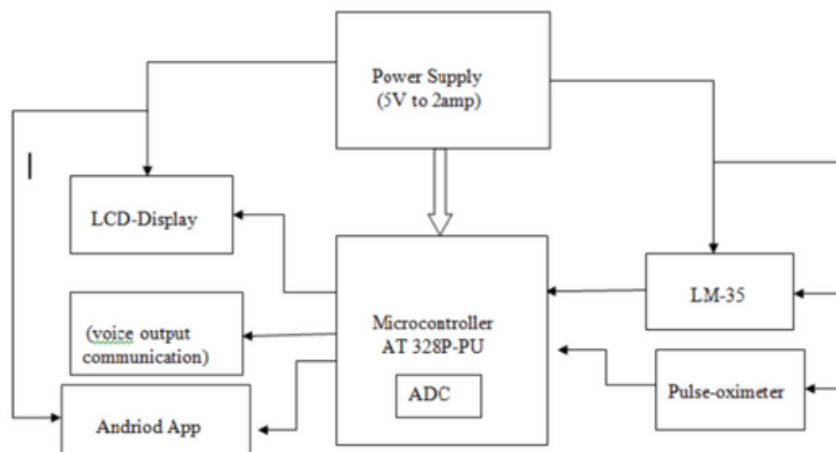


Fig.1 Block Diagram of thermoximeter

The mobile application will be developed for display the measured parameters which will use wi-fi and will be based on concept of cloud computing to store and process the monitored data. The output parameters can be also presented in the form of voice using ESP8266 module. The health-related data i.e. pulse rate, oxygen level of blood and temperature are periodically updated and logged to the mobile application. That data can be further utilized to keep the medical history of the patient. The mobile app is used to represent the recorded data and recorded data is stored on cloud. By using this voice module we can give message whether the parameters are normal or abnormal. The aim of the proposed project is to develop the device which will be small, easy to use, portable.

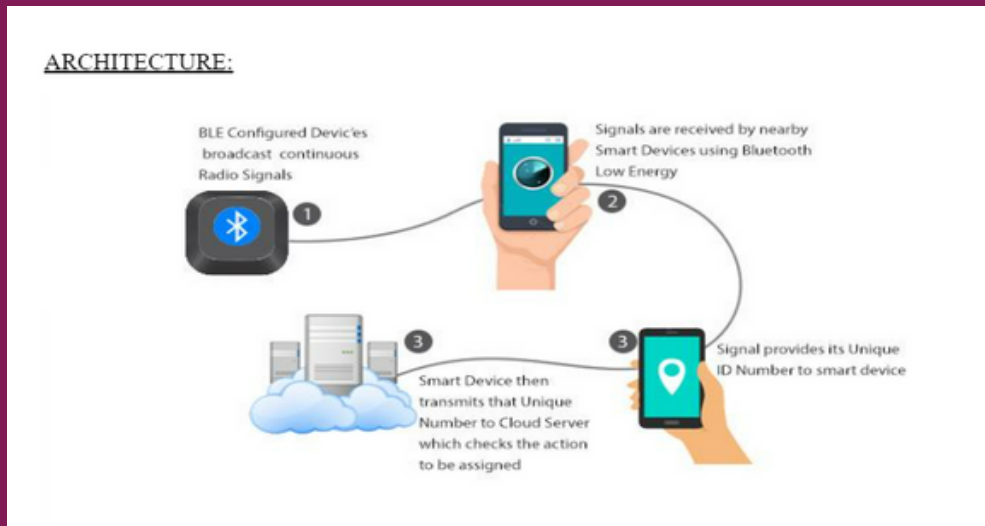
ANDROID APPLICATION SELF-DEFENSE

In this new world, where the woman is playing an outstanding role in each and every field, it is really shameful to know that our country is rising to the top in crimes against woman and children. In a country like India, where woman are considered as goddesses and are being worshiped, woman security has become such a basic issue today. Each day, the nation wakes up to hear the increasing atrocities against the woman. The fear of harassment against women is not only .the condition at outside but it may also happen at homes. Around 80% of the women in our country have fear regarding their safety. It's high time, we should stand up to these by changing the laws and implementing the new technologies. The reason behind these crimes may vary but that doesn't deny a person, her right to live. We have already seen different faces of cruelties from acid attacks to the worst rape deaths. The solution for this is not cutting her wings to fly, but to fight back. Analysing some of these cases, we could see lots of points missing. First thing is that no one is informed about her being in a danger, at the right time. If her parents have started to search for her at the time of kidnap, the attackers wouldn't have gone much far away. Second, the police were not able to locate her for days, before any worst happenings. Sometimes, we hear cases like school students being harassed but they won't inform their parents because of fear.

OBJECTIVES:

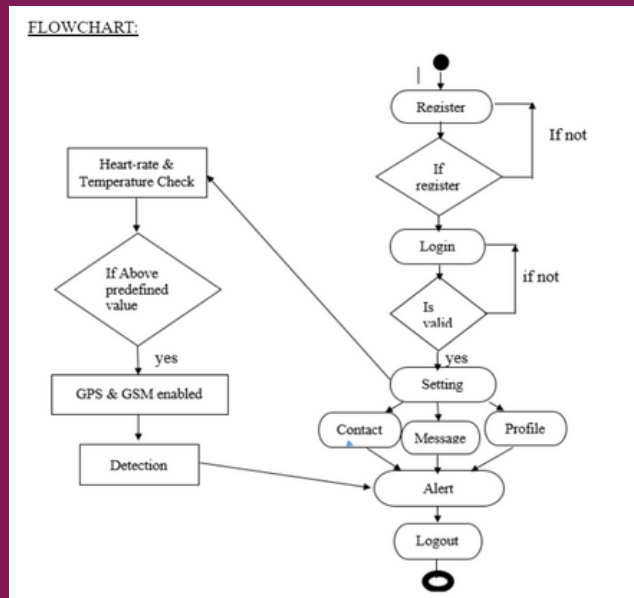
- The main objective of our project is designing such a system to provide a reliable security to Girl/Women, Children and disabled people to rescue them from the dangerous situation.
- Today in the current global scenario, the prime question in every girl's mind, considering the ever rising increase of issues on women harassment in recent past is mostly about her safety and security. So our objective is to create a security device for every girl so they can be able to move freely on the streets even in odd hours without worrying about their security.
- Also in present scenario there is a drastic increase in the number of child kidnapping cases. Since crime against the children in the age of 14 years to 17 years is more popular, so parents are always worried about their children's safety.
- We propose to give a connectivity to the smart watch, which continuously monitors the health condition of user and communicates with Smart phone that has access to the internet.
- The application is programmed and loaded with all the required data which includes temperature, heart beat and also victim motion. This generates a signal which is transmitted to the smart phone. The software or application has access to GPS and Messaging services which is pre-programmed in such a way that whenever it receives emergency signal, it can send help request along with the location co-ordinates to the relatives and the parents. From this device we can take the immediate action on the situation.

ARCHITECTURE:



MODULES:

- 1) **ANDROID APPLICATION-** Modules provide a container for your app's source code, resource files, and app level settings, such as the module-level build file and Android manifest file. Each module can be independently built, tested, and debugged. Android Studio uses modules to make it easy to add new devices to your project.
- 2) **BLE (Bluetooth Low energy):** BLE is designed to connect devices with low power consumption. Study by Beacon software, Aisle labs, reported that peripherals, such as proximity beacons, usually function for a year with a 1,000mAh coin cell battery. This is possible due to the power efficiency of Bluetooth Smart protocol which only transmits small packets as compared to Bluetooth Classic which was compactable for audio and high bandwidth data
- 3) **TEMPERATURE SENSOR:** "A device, used to measure amount of heat energy that allows to detect a physical change in temperature from a particular source and converts the data for a device or user, is known as a Temperature Sensor."
- 4) **GPS MODULE:** Global Positioning System (GPS) is able to determine the latitude and longitude of a receiver on Earth by calculating the time difference for signals from various satellites to reach the receiver. In six different orbits approximately 12,500 miles above the earth, 24 MEO (Medium-Earth Orbit) satellites revolve around the earth 24 hours and transmit location every second as well as present time from atomic clocks and by monitoring blood flow through skin when is in contact with the wrist band at each pulse.
- 5) **HEART RATE SENSOR:** Heart beat sensor gives digital output of heart beat. When heart beat detector is working the led flashes for every heartbeat. This digital output will be connected to microcontroller directly to calculate the beats per minute (BPM) rate. It works on the principle of light modulation of networked satellites and is tracked to uplinks data for synchronization. The system uses four frequencies in the L-band which ranges from 1.2 to 1.6 GHz.



ADVANTAGES

This application will be accessible automatically as well as manually.
 Easy to carry, no need of extra efforts.
 Very effective as useful all over the globe where range is available at any time with high accuracy and efficiency.
 Totally secure and reliable.
 It automatically sends alert even without the victim's consent.
 Can also be used for child safety, accidents, and patient monitoring.

LIMITATIONS

Internet connection is necessary to use GPS or sending alert messages.
 Sometimes to send messages SIM balance may be required.
 Network or range is mandatory to complete action.
 Require at least minimum signal strength to send a SMS alert.
 When power is off, then the total system is off, so always requires a battery.
 The reliability of sensor to real time situation will be a parameter to consider.

CONCLUSION:

We are developing a user friendly android application which is connected to smart watch that will satisfy the need of security and safety of people. This application will be easy to use and can get installed in any android mobile. As the demand for the Women and children Security is increasing the requirement of more secure, safe and portable device is increased. The emergency contact numbers set by the user has maintained in the app that will be used by the user in any danger situation.

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Thermal Imaging System and its Applications in various sectors

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AI. Abstract

Thermal imaging cameras are the devices which translates thermal energy i.e. heat into visible light and creating an image based on that in order to analyze the environment. This paper describes working principle of Thermal imaging cameras and Thermography. Thermography is the technique used for these thermal imaging cameras which includes thermograms. Thermograms are the images produced by radiation of long infrared rays of the electromagnetic spectrum. The amount of radiation emitted by an object increase or decrease with temperature hence this technique of thermography allows us to monitor, analyze temperature gradient. This variation in temperature is determined with the help of RGB colors and various Machine Learning Algorithms. This Paper determines real time applications of thermal imaging system in various fields like Safety and Law Enforcement, Scanning of Wildlife & pests, In Healthcare and Veterinary Applications, for Electricians and Technicians, For Security, For Energy leakage and Insulation Issues etc. Further this paper explains current scenario of Thermal Imaging cameras in India. In India this technology has not been used widely and only in few sectors it has been used like in Indian Railways, some medical fields etc. Indian Railways are using this technique of thermal imaging in the case of COVID19 to detect people with high body temperature to reduce spread of infection. Also, AIIMS (All India Institute of Medical Science) Thermal Cameras were used to detect breast cancer, In diabetics detection with the help of HbA1C and Core body Temperature. In Future there will be wide scope of thermal imaging cameras in every sector also we have discussed applications of the same. Thermal imaging cameras have wide range of applications at present and scope will remain increasing.

II. Introduction

What is a thermal camera?

A thermal camera is a non-contact device that detects infrared energy (heat) and converts it into a visual image. Let's dive into the science of thermal

Cameras and the invisible world of heat they allow us to see. Thermal camera produces the thermal images. Thermal imaging is simply the process of converting infrared (IR) radiation (heat) into visible images that depict the spatial distribution of temperature differences in a scene viewed by a thermal camera. Thermal imaging data is collected at the speed of light in real time from a wide variety of platforms, including land, water, and air-based vehicles. It is superior to visible imaging technologies because thermal radiation can penetrate smokes, aerosols, dust, and mists more effectively than visible radiation so that animals can be detected over a wide range of normally troublesome atmospheric conditions. It is a completely passive technique capable of imaging under both daytime and night-time conditions. This minimizes disruptions and stressful disturbances to wildlife during data collection activities. It is capable of detecting animals which are colder, warmer, or the same as their background temperature because it does not compare temperatures but rather the emissivity of the animal against its background. In general, thermal images are grayscale: with white representing heat, black representing colder regions, and various shades of grey indicating gradients of temperatures between the two. However, newer models of thermal imaging cameras actually add colour to the images they produce, in order to help users better identify distinct objects more clearly – using colours such as orange, blue, yellow, red and purple.

III. History

History of Thermal Imaging Technology: Thermal imaging technology was first invented by Kalman Tihanyi during the world war¹. This technology was purposely invented to defend against the British Aircrafts. In 1800th century it was discovered as a radiation beyond light. Thermal camera captures the invisible infrared lights, hence this technology acted as it was a night

Electrical systems and electrical distribution equipment can benefit from the application of infrared cameras and thermography technology. Not only does it prevent humans from having direct contact with these systems and circuits, testing and detection can be conducted without interrupting the flow of power. Common problems that can be detected in the electrical field courtesy of infrared imaging include:

- Loose connections
- Poor contacts
- Overheated bushings
- Blocked cooling passages

Manufacturing industries can also benefit from electrical thermography to monitor possible overheating, keep a close eye on tank levels, process line inspections, and even assess the condition of circuit boards.

F. Civil Structures Inspections:

Bridges, roads, airports, hotels, buildings, are the main parts of everyone's daily lives. Therefore information about these civil structures is very essential to avoid the sudden accidents and the loss from it. With the help of Thermal Imaging technology one can scan the civil structures thoroughly in a short time. Thermal imaging technology is capable to find out the air leaks near the windows and doors, roof leakages, badly insulated areas, faulty electrical supply lines. It is also used to find out the cracks, holes, and moisture in walls. Hence this technology is a very important tool and it can save valuable time and money.

G. Animals:

Generally, animals try to maintain constant body temperature according to surrounding weather. Blood circulation and respiration of body is the reason for the uneven temperature distribution over the entire body. For animals too thermal cameras are used to identify the hot and cold spots on their bodies. From this data, doctors can predict the problems in joints, veins and skin of animals without performing unnecessary surgery. Thermal imaging can be utilized as a diagnostic tool for finding out some diseases in animals. Thermal cameras can work in complete darkness; therefore it can be utilized to track animals in forest during night.

VI. Future Scope

In future the performance of requirements of image processing applications will increase the computing power of implementation platforms, especially when they are executed under real time constraints.

The Army is pushing night vision technology into the digital. In Future night vision goggles are being designed not just to see better at night but also to

allow soldiers to share images of what they see with other soldiers who may be miles away. The night vision industry is making itself available to the non-military consumer market. While prices are still high, as demand increases, the price may decrease until the technology is fairly affordable. The technology is already being used by law enforcement and search-and-rescue teams. As the products become more in the price range of consumers, and because the images viewed can be recorded by video cameras or as photographs, more photographers, wildlife watchers, boaters, campers, and many others may begin to use night vision technology in more innovative ways. And also in future we extract a periodic signal from noise. And develop software applications, GUI models, and Echo detection in linear acoustic, Speech analysis and pitch.

VII. Limitations

1. Thermal camera's detection systems are not as widely used as those of visible-light cameras.
2. Thermal imaging components are more expensive and will increase the initial cost.
3. Thermal images can't be captured through certain materials like water and glass. Hence visible light, infrared radiation cannot go through water or glass. Infrared radiation is reflected off of glass, with the glass acting like a mirror.
4. Thermal cameras are Undesirable individuals that are detected but not identified.
5. Thermal cameras cannot identify individuals because infrared radiation does not create detailed enough images.
6. And also thermal imaging cameras cannot see through walls.

VIII. Conclusion

In this paper we discussed about the brief idea of Thermal camera, Thermographs, its History also the future scope and different types of applications. Thermal imaging has a wide range of application at present and also the scope will remain increasing is explained in this paper.

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Warning System for Drivers using Raspberry Pi

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Abstract

Nowadays the countless accidents are occurring due to many reasons. But most of them the reason is the Over speed. For avoiding road accidents to develop a new module.

The aim is the safety of drivers utilizing the Internet of things (IoT). They can use GPS tracking the location and check there is a residential area / school/temple are there then check their speed when speed is over the limit they convey message. Furthermore, the ultrasonic sensor checks the objects are near or not and the temperature sensor checks the Engine temperature then gives a message.

Keywords- Internet of things (IoT), Raspberry pi, Python, GPS Ublox Neo 6m, Ultrasonic sensor, Temperature sensor

Introduction

Warning System is part of the active safety systems that interact much more with drivers to help them avoid traffic accidents, indeed, its goal is to contribute to

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ISSN: 223-7857 IJFGCN
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the reduction of traffic accidents, by adopting new technologies; that is, incorporating new systems for increasing vehicle security, and at the same time, decreasing the desperate situation that may arise during driving, due to human errors.

India accounts for the most considerable number of dates in the world, according to the Geneva-based International Road Federation(IRF).[2] The position in respect of road accidents, numbers reduced and injured in the last five years is given in the Table. [1]

Year	Total Number of Road Accidents (in numbers)	% change	Total Number of Persons Killed (in numbers)	% change	Total Number of Persons Injured (in numbers)	% change
2015	5,01,423		1,46,133		5,00,279	
2016	4,80,652	-4.14	1,50,785	3.18	4,94,624	-1.13
2017	4,64,910	-3.28	1,47,913	-1.90	4,70,975	-4.78
2018	4,67,044	0.46	1,51,417	2.37	4,69,418	-0.33
2019	4,49,002	-3.86	1,51,113	-0.20	4,51,361	-3.85

From the given table road, accidents will be the increased. The project domain is are mainly two parts cloud and IoT.

IoT

The execution of the project will simultaneously remain three parts. There is the ultrasonic sensor, GPS, and temperature sensor.

Ultrasonic sensors check the within 1m not any object otherwise that will be inform the Driver. GPS firstly checks the location is residential area/school/temple etc. and second checks the speed of the vehicle if speed is high out of limit then alert to the driver. Temperature sensors check the temperature of the Engine they can be out of the limit then alert the driver.

Existing Systems:-

Vehicle Security System using Motion System:-

A lot of advancements in science and technology have been observed last decade. Children used to play in cars and by mistake, they lock themselves in the car. As the parents were unaware of this, children face the problem of suffocation which may lead to their death. This concept is developed to avoid this kind of disaster by using advanced technology such as motion sensors. When the sensor detects any abnormal motion in the vehicle, the oxygen is supplied inside the vehicle through oxygen cylinders.

Intelligent Safety Warning and Alert System for Car Driving:

At the point when it transformed into the 20th century different sorts of vehicles have acquainted with give comfort in human day by day life and the improvements of new advancements make the vehicle running quick and speeding up without any problem. It, in actuality, acquires a few issues, for example, the happenings of mishaps because of driver's weariness after a long excursion of movement, the lack of parking spots, the terrible perceivability around evening time or the driving in weighty downpour days,

and so forth. The mishaps once in a while get the casualty of living souls and loss of properties, in this way numerous actions to implement safe driving and the advancement of models to screen driver's practices have been proposed and acquired many promising outcomes. An examination directed by Mercedes Benz reports that in the event that it can get an extra 0.5 seconds in the notice time frame it will stay away from 60% of the overwhelm mishaps and it will arrive at 90% if 1.5 seconds is added into the notice time frame.

Intelligent Night Vision System (INVS):-

In driving around evening time or in substantial downpour, the driver's noticeable reach will be confined, and furthermore the light enlightening territory will be restricted to keep the driver from unmistakably seeing any common along the side of the road or the individual is in fixing his in a bad way vehicle the INVS will display the front street condition on the LCD screen of the vehicle sound framework by utilizing the infrared camera to screen the street condition to present to the driver a total information on the front street condition to extraordinarily lessen the potential events of mishaps.

Video Parking Assist System:-

This framework utilizes a camera framework to separate the pictures of the vehicle toward the back and side headings and in its organizing with the impact aversion radar framework and the powerful helper straight framework to educate the driver regarding the wheel pivot course and point to help the driver to finish the turning around or leaving activity.

Proposed Work:

1. GPS tracking and a speed detecting module

In this GPS module, we predict the car location using the Ublox NEO-6M GPS module. It can track up to 22 satellites on 50 channels and achieves the industry's highest level of sensitivity i.e. -161 dB tracking while consuming only 45mA supply current. Unlike other GPS modules, it can do up to 5 location updates a second with 2.5m Horizontal position accuracy.[3] Once the user's position has been determined, the GPS unit can calculate other information, such as speed, bearing, track, trip distance, distance to destination, sunrise and sunset time, and more. So by using the Ublox NEO-6M GPS module also it will detect the current speed of the car to avoid accidents because of the high speed of a vehicle. [6] After detecting the location it will check the residential area is there like school, college or hospitals near to car within 100 meters. If the car is in the residential area and its speed is more than 80 then the system will give an alert as a voice message to the driver.

2. Distance measure using ultrasonic sensor

Numerous mishaps at expressways are occurring because of the nearby running of vehicles, all of a sudden, on the off chance that the in front vehicle driver lessens the speed or applied breaks, it is very hard for the accompanying vehicle driver to control his vehicle, coming about mishap. To keep away from this sort of mishap, the notice framework, which contains caution and alarm by voice message can orchestrate at all sides of each vehicle. In this module, by utilizing the ultrasonic sensors we measure the item or another vehicle inside a distance of 1 meter. It produces ultrasound at 40 000 Hz which goes through the air and if there is an item or hindrance on its way it will ricochet back to the module. Considering the movement time and the speed of the sound you can compute the distance.[7] The circuit is planned to such an extent that at whatever point the if there is any vehicle close to our vehicle in the middle of set distances of 1 meter then rationale high sign is produced and it is taken care of to a microcontroller, on receipt of this sign, the regulator will actuate the ringer and caution to driver by enacting voice message and alert consequently.

3. Engine temperature detection

In this module, the temperature of a vehicle will identify by utilizing a Temperature sensor. The proposed module in this undertaking is based on consistently observing the constant temperature savvy path. The setting is defined as follows [4] Here, the observing hub is raspberry pi. The Sensor used here is the DS18B20 1-wire digital temperature sensor. This sensor arrives in a small three-pin bundle. The sensor is associated with the raspberry pi unit utilizing a jumper wire. [5] The raspberry pi unit can be utilized to store and show the constant temperature. The raspberry unit is customized utilizing python language. The base temperature level of the motor is set and in the event that the temperature will expand more than the base temperature, the device sets ready by a bell. The square graph of the proposed technique is appeared in figure

Fig Block Diagram

Advantages & Limitations: -

Advantages: -

- To improve safety and control speed to prevent accidents in a hospital, a school area. •
- To improve car security driver safely and also other peoples safety.
- Temperature sensors maintain the Engine temperature and give alerts so it is very secure • and prevents the car burning and save human beings life.

Limitations:-

- Power failure
- Network failure
- Hardware failure
- Limited space obstacle detecting

Future Scope:-

In the future, we can implement temperature detection in the car and automatically set the A/C temperature. In the future, we can implement air pressure detection in tires.

Conclusion:-

Speed is one of the most significant causes of an accident, so this project Warning System for Drivers provides facilities to drive a vehicle safely. Using the Ublox Neo 6-M GPS

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ISSN: 223-7857 IJFGCN

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Vol. 14, No. 1, (2021), pp. 2798–2802

module allows to detection of vehicle current location and track residential areas like schools/colleges, hospitals and detect the current speed limits are breached it gives the alert to a driver using voice message via a speaker. The ultrasonic distance sensor was able to discover the distance of a more limited range accurately and inform the driver if the vehicle is in danger of collisions. We designed and implement the engine temperature monitoring module which very useful for peoples who are disabled.

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IoT based Smart Agriculture using Raspberry Pi

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Abstract- Since now a day the system of irrigation practice is not based on maximizing output for plants when compared to traditional mode of practice. The only solution to this problem is smart agriculture by modernizing the current traditional methods of agriculture. Hence the proposed method aims at making agriculture smart using automation and IoT technologies. Controlling the parameters are through any remote device or internet services and the operations are performed by interfacing sensors with microcontroller. The combination of wireless sensors and raspberry pi through web server and water pump, fertilizer sprayer is proposed to support the smart agriculture. The farmer will come to know about the field scenario through messages and can smartly do farming. This project includes various features like LTE module based remote controlled monitoring, moisture, humidity, ph & temperature sensing, and proper irrigation facilities. This is created as a product and given to the farmer's welfare.

Key Words: Raspberry pi, Wireless Sensors, Web Server, Spray Fertilizer, Smart Agriculture.

1.INTRODUCTION

India is earning major income from agriculture sector and 70% of farmers and general people depend on the agriculture. In India most of the farming systems are operated manually. The Indian farmer faces many problems about productivity of agricultural product. It is due to unbalance feeding of water, pesticides and fertilizers without knowing the specific requirement of nutrient to a crop. Hence, we are going to use Internet of Things (IoT). We are going to use Internet of Things (IoT), IoT sensors can deliver farmers about crop yields, soil nutrition. In this

proposed work, We are going to

collect the data from different sensors. Then, we are going to process the data. These data would produce important information which would be useful for farmers to predict the suitable conditions for farming. The farmer will come to know about the field scenario through messages and can smartly do watering to the field in very efficient manner without overdoing it and quality of the crops is saved.

2.LITERATURE REVIEW

IoT Based Smart Agriculture Monitoring System(2017)[1]. In this system, GPS based remote controlled monitoring, moisture & temperature sensing, intruders scaring, security, leaf wetness and proper irrigation facilities are implemented.

IoT based Smart Agriculture(2016)[2]. In this, Smart GPS based remote controlled robot to perform tasks like spraying, moisture sensing, bird and animal scaring, keeping vigilance, etc.,

IoT Based Smart Crop-Field Monitoring And Automation Irrigation System(2018)[3]. In this system, crop development at low quantity water consumption, In order to focus on water available to the plants at the required time with cloud computing and analyzing the weather conditions of the field.

Development of IoT for Smart Agriculture a Review(2019)[4]. In this, applications of IoT on agriculture and forestry has been studied and analyzed, list of some potential applications domains where IoT is applicable in the agriculture sector, benefits of IoT in agriculture is studied.

Soil pH by Probe Sensor based on Android(2018)[5]. In this, an automatic soil pH detecting system is developed for Farmer to visualize the soil pH demand of smart farmer using the microcontroller and smartphone.

3.EXISTING SYSTEM

The usage of WSN system in agriculture were used by many researchers. Then updation has been made to sensors and with the combination of WSN system increased to help the irrigation system of agriculture. The Introduction of Wireless Sensor Network (WSN) and Wireless Sensor and Actuation Network (WSAN) technologies has been used along with the sensors to sense the water levels and to know about soil content level.

4.PROPOSED SYSTEM

The block representation of the agricultural intelligent management is represented fig1. In this system, raspberry pi acts as the master source. The combination of Temperature, Humidity, pH and soil moisture sensors are together added to input pins. Water monitor, spray fertilizer and web server are coupled together as output pins.



Fig.1 Architecture Diagram

5.METHODOLOGY

In this project, we are using sensors which include

humidity, ph, temperature and soil moisture. This system is regarded as IoT gadget focusing on Live Monitoring of Environmental data in terms of Temperature, Moisture, ph & Humidity. The system provides the concept of "Plug & Sense" in which farmers can directly implement smart farming by as such putting the System on the field and getting Live Data feeds on various devices like Smart Phones, Tablets etc. Data are sent to the web application server through communicating wireless. The sensors are used to sense the temperature, humidity, moisture & ph for crop monitoring. The irrigation is automated when the sensor reading goes below the threshold values. We maintain water level and flow it as required by relay switch on off the Pump. The sensors are interfaced with Microcontroller, data from the sensor is displayed on the mobile app of the user. Whenever any sensor reaches a threshold value, message alert is sent to the user and action is taken according to it. Mobile app provides an access to the continuous data from sensors and accordingly helps farmer to take action to fulfill the requirements of the soil.

6.CONCLUSION

The sensors and microcontroller are successfully interfaced and wireless communication is achieved between various nodes. Implementation of such a system in the field can definitely help to improve the yield of the crops and overall production & for monitoring different farm activities. Using monitoring information, farmer can access or control his farm activities. It helps to increase a crop yield and reduces wastage of water. Our system is cost effective and user friendly.

7.FUTURE SCOPE

For future developments, a desperate need for a program that could provide reliable and precise information about the needs for crop cultivation. Extensible features of sensors, we could add as per our crop specific needs. The

system can be integrated to check the quality of the soil and the growth of crop in each soil. Also, we could add motion sensors for monitoring behavior of animals. We could implement this system for wide range and add multiple pumps.

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A CROP DISEASE DETECTION AND PREVENTION USING ANDROID APPLICATION

In this COVID-19 situation vegetables are one of the daily needed products. So, we decided to provide some facilities to our farmers. So they can easily get crop related information from their home. This is a mobile app developed to help farmers by providing relevant information to them quickly. With the click of a button, they can get information on the weather of the current day. This app will provide forecasts to farmers relating to temperature, rainfall, humidity, and wind speed and direction, which play critical roles in agricultural operations. In this android app there are various helpful videos related to the various crops.

In this article there are many times farmers can not recognize the disease on the crop and they can not get the proper guidance so to overcome this problem we have provided an image processing system in which farmers have to scan diseased crops through our application and our server will diagnose that disease and will suggest appropriate cure on it. In this we provide them the disease name, fertilizers, etc.

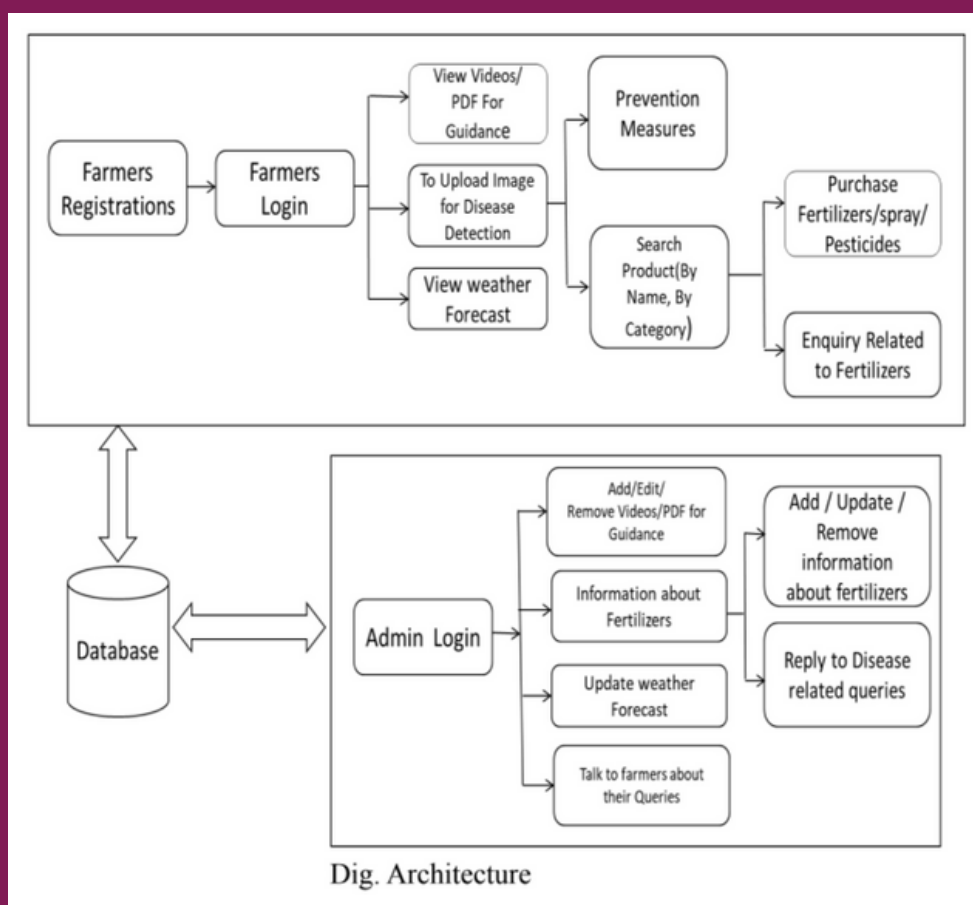


Fig. Architecture

In this android application farmer registration then farmer login. In the registration page farmers have to provide their information (name, profile image, mobile no, address, email address, create password).After registration, farmers have to enter their mobile number and password. In this module users can view videos/articles, weather forecasts Farmers can identify the disease and will take preventive measures.In disease detection farmer has to scan diseased part of a plant through our app and admin will provide name of the disease and information about that disease and also name of fertilizers and spray to prevent the disease on crop. Users/farmers can purchase products/fertilizers from our app.