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Research Article

A State-of-the-Art CONTACT TRACER device to identify Covid infections and secure persons through social distancing

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ABSTRACT

The main area of research all around the world during this pandemic is finding a cure for COVID-19 disease. The pandemic has put up immense pressure on doctors and other medical personnel to work diligently. Their main aim is to treat all patients with utmost care as well as carry out research to find out a vaccine and cure. So, a definite protocol is to be developed which ensures safety for all. COVID-19 creates a chain and spreads to all people within a proximity circle. This is approximately estimated to be around 6 feet and that too for a very prolonged period. This spread is effected when an infected person either coughs, sneezes or even if he simply talks. Saliva droplets due to the above mentioned actions are forcibly launched into air, which can now easily land on other people nearby. The splattered droplets can be unknowingly inhaled into the lungs from where the infection originates. A recent survey indicates that all people who are infected do not necessarily display the symptoms. These persons now act as active carriers ands play a predominant role in spreading the virus.

This proposed model is designed in such a way that it is very compact and its primary feature is to give an automatic announcement to the user, whenever the user is out in public areas. The proposed contact tracer is an intelligent system that is mainly designed around an Arduino Uno processor that forms the primary component. The Arduino Uno processor is readily and easily compatible with both a Bluetooth as well as a zigbee module that play major roles in detection. ZigBee module used to transfer the persons numbers to nearby people, Bluetooth module will send that received number to mobile number and buzzer will hoot when we go near to anyone so we will maintain social distance as well. There are many ways to educate the people but maintaining the app and hardware is the combination to give the very fast accurate information to people, here we are proposing the new technique to trace the covid19 patients very quickly and they can view the positive cases around his current location.

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Covid19 chain is very fast in spread we have to break the chain, on this way we are having the only way is to keep them in the quarantine, it is difficult to find the people who are in the covid19

chain. By our application very easy and fastest way to track the people and thus secure people from infection through social distancing. Also infected persons can be identified and quarantined. All data can be stored as reference in a cloud database, which can be used later for the effective functioning of the contact tracer device through comparative data analysis.

KEYWORDS:COVID-19 Contact Tracer, Covid19 chain, Aurdino Uno, Social distancing, Mobile API,UV sensor.

INTRODUCTION

Since COVID-19 break out, entire world went into isolation, offices were closed, factories were shut down, airports are locked down. This brings the fear of big financial crisis and recession. People started realizing locked down helped to flatten the curve but they can't afford to continue any longer. It's time to face it and live with it.

As governments and states are considering to lift the lock down and employers are planning to bring their workforce back, our safety is the foremost priority for everyone. We need a smart mechanism to trace someone who was exposed to COVID-19 to stop the spread in entire workforce plus a mechanism to enable/enforce social distancing guidelines recommenced by CDC. Social distancing, also called “physical distancing,” means keeping space between yourself and other people outside of your home. In addition to everyday steps to prevent COVID-19, keeping space between you and others is one of the best tools we have to avoid being exposed to this virus and slowing its spread locally and across the country and world. Limit close contact with others outside your household in indoor and outdoor spaces. Since people can spread the virus before they know they are sick, it is important to stay away from others when possible, even if you—or they—have no symptoms. Social distancing is especially important for people who are at higher risk for severe illness from COVID-19. COVID-19 spreads mainly among people who are in close contact (within about 6 feet) for a prolonged period. Spread happens when an infected person coughs, sneezes, or talks, and droplets from their mouth or nose are launched into the air and land in the mouths or noses of people nearby. The droplets can also be inhaled into the lungs. Recent studies indicate that people who are infected but do not have symptoms likely also play a role in the spread of COVID-19.

EXISTING METHOD

COVID19 is a respiratory disease and World health organization has classified this disease as pandemic because of its high mortality rates among people with poor medical history conditions. It is important to identify such individuals, who are not safe and to avoid severe complications if get exposed to COVID19. There is no system, which can alert the person based on his health condition.

Internet of Things (IoT) development brings new opportunities in many applications, including smart cities and smart healthcare. Currently, the primary usage of the IoT in healthcare can be categorized as remote monitoring and real-time health systems. Controlling and managing dire situations, such as the one in 2020 when the coronavirus disease (COVID-19) took over the world, can be achieved with the help of IoT systems, without imposing severe restrictions on people and

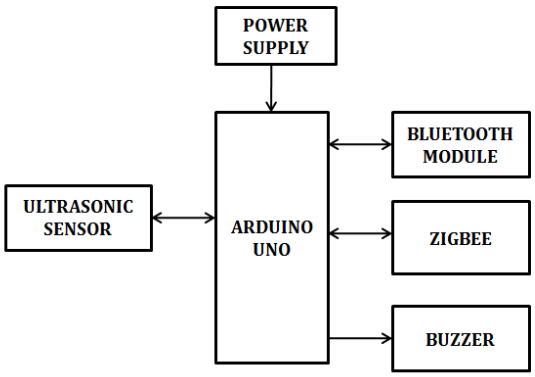
industries. COVID-19 causes respiratory symptoms and appears to be more contagious in comparison. In the early months of the COVID-19 pandemic with no designated cure or vaccine, the only way to break the infection chain is self-isolation and maintaining the physical distancing. In this article, we present a potential application of the Internet of Things (IoT) in healthcare and physical distance monitoring for pandemic situations. The proposed framework consists of three parts: a lightweight and low cost IoT node, a smartphone application (app), and fog-based Machine Learning (ML) tools for data analysis and diagnosis. The IoT node tracks health parameters, including body temperature, cough rate, respiratory rate, and blood oxygen saturation, then updates the smartphone app to display the user health conditions. The app notifies the user to maintain a physical distance of 2 m (or 6 ft), which is a key factor in controlling virus spread. In addition, a Fuzzy Mamdani system (running at the fog server) considers the environmental risk and user health conditions to predict the risk of spreading infection in real time. The environmental risk conveys from the virtual zone concept and provides updated information for different places. The COVID-SAFE framework can assist in minimizing the coronavirus exposure risk.

The existing android application is Arogya-settu app by our Indian government. Every app has a separate ID. This app works by sharing the id's of each other whenever they come near. After any one person has tested positive the id's stored in the database who came contact get the notification as you are in danger

PROPOSED SYSTEM

Today the entire world has come almost to a stand-still, un doubtedly due to the raging pandemic Covid-19. This deadly disease has in fact impacted on all sections of the human society. The scenario that prevails before, during and after pandemic will no longer be the same, but very different. The severity and impact will be mainly affected through social distancing, isolation and complete reduction of people meeting each other. Our proposed application is to primarily keep track of the spreading covid-19 chain and break it by making people aware of infected persons in their proximity. This incorporated social distancing automatically, thus reducing the spread and severity of the pandemic disease.

ARCHITECTURE



Hardware Block diagram

The hardware of the proposed system can be detailed as follows. Arduino Uno processor form the heart of the device, commanding and controlling all peripherals connected to it. It works on a portable power supply such as a battery or adapter which can be carried along with it. The ultrasonic sensor is for proximity detection of infected persons. once detected the Arduino will signal the buzzer to on, which alerts us of the impending danger. The Bluetooth module is used to connect with our mobile app that gives the details of how many people infected in our proximity. The zigbee module transfers this data to the nearby database, enabling us to identify number of infected persons in a particular locality.

Working

The project is designed to be simple, compact and work under all practical situations. The system is designed to give us an automatic announcement of infected persons in vicinity, which has to be quickly intimated to the user in a simple understandable way. The contact tracer is built around a Arduino Uno microprocessor board that comes with a wide variety of programmable as well as in-built functions. ZigBee module used to transfer the persons numbers to nearby people, Bluetooth module will send that received number to mobile number and buzzer will hoot when we go near to anyone so we will maintain social distance as well..

Here ultrasonic sensor continuously checks any person is there in front if there is it will hoot buzzer and sent that person number to others though ZigBee module then Bluetooth will send the number to mobile app what it received by near people. Hence, contact tracing that is a very lengthy detection process, involving many steps. But our designed smart, intelligent compact device helps effectively in interrupting the infection chain thus reducing the spread of the pandemic effectively

Here we are implementing the android app, which can be show the positive cases around the person who are using the app. The mechanism behind the system is user need to carry the hardware which can be share the user date to another user whenever they meet, then the Bluetooth can send the data to the android app.

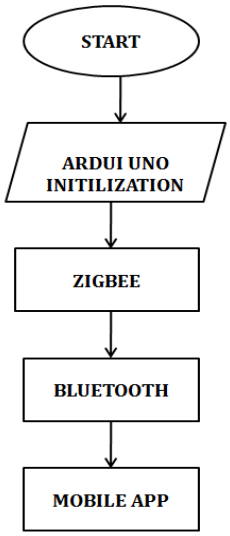
Android app can be viewing the covid19 positive tested patients around him in the Google map.in such a way user can be aware of positive tested cases and there is the chances to stay at home who tested positive.

Our project is designed using Arduino Uno microcontroller to maintain people social distance as well as it helps people to protect from effected people. in this system ultrasonic sensor continuously checking for is there any people come nearby if anyone come it will send signal to the micro controller then microcontroller will hoot the buzzer. That means we have to maintain social distance and we have to give particular number to every device based on that corona affected people. when ultrasonic sensor detects any people It will send particular unique number to the air medium If any devices receives that number then there is one more Bluetooth help us to send that number to mobile app(serial Bluetooth terminal). After that people get to that number belongs to whom either effected people or not. if effected people then we have to be care full.

Functionality through Flow Diagram

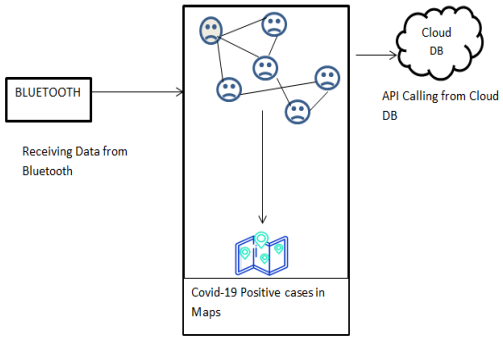
The proposed system can be well understood and its working can be explained clearly through the below presented flow diagram. The working of the device starts with the initialization of the main

component, the Arduino Uno microprocessor. The Ultrasonic sensor interfaced to the Arduino Uno, detects any proximity infections and triggers the Arduino Uno. The microprocessor now commands the zigbee module to initiate the mobile application. The Bluetooth enables to connect all the messages of the contact tracer with our mobile. Simultaneously, the Uno triggers a buzzer, that gives a physical alarm to the person carrying it for maintaining social distancing.



Flow Diagram of Contact Tracer

SOFTWARE ARCHITECTURE

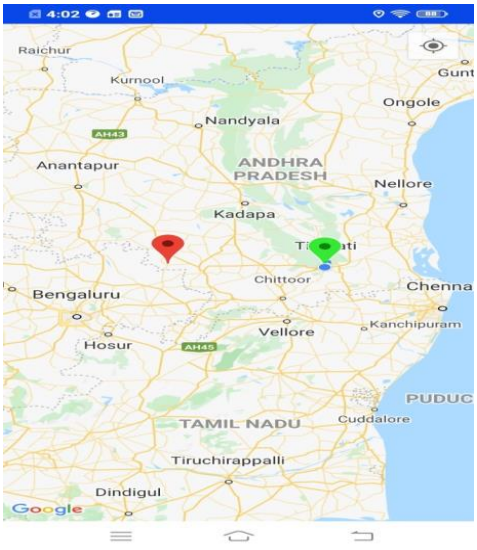


Block Diagram of Software Architecture

The outlined working of the API is shown as a sketch in the above figure. The Bluetooth module plays a major role in interfacing the device with the mobile application. The outputs from the device are instantly communicated to the mobile application. The API on receiving the data from the bluetooth module, initiates a calling function, that connects to a cloud database Now the API can either send data to the cloud or receive data from the cloud through the calling function. Any data can be referred from the cloud database and compared with the obtained data. If the data

exists, then it will identify it as an infection and sends the necessary alarm data back to the API. The API in turn displays the necessary data to the user. The mobile app displays the infected persons in the vicinity. The buzzer in the device is now triggered by the Arduino upon receiving the alarm and goes off, which warns the user. If the data received by the cloud database is new it is stored in the database and used for future references.

Mobile App Home screen



Tracking Positive Cases

The above 2 figures are screen shots from the mobile app to depict its working. On viewing the home screen it is evident that it is user friendly and even a lame man can use it. The Connect Bluetooth button enables interfacing of the device with the mobile API. The View Maps option displays the end result of the device as well as mobile app. When the View Maps option is being chosen, it displays the map of the particular locality as shown in the second figure. This display is obtained after the mobile app interconnects with the cloud database through the zigbee module. Hence, the locality map is displayed with reference to the data obtained from the cloud database.

Thus, it can be concluded that the positive cases in users locality is immediately and effectively displayed to the user. With the data obtained social distancing can be strictly followed. This secures the individual from any infections from proximity, thus making the device an inevitable part of our lives.

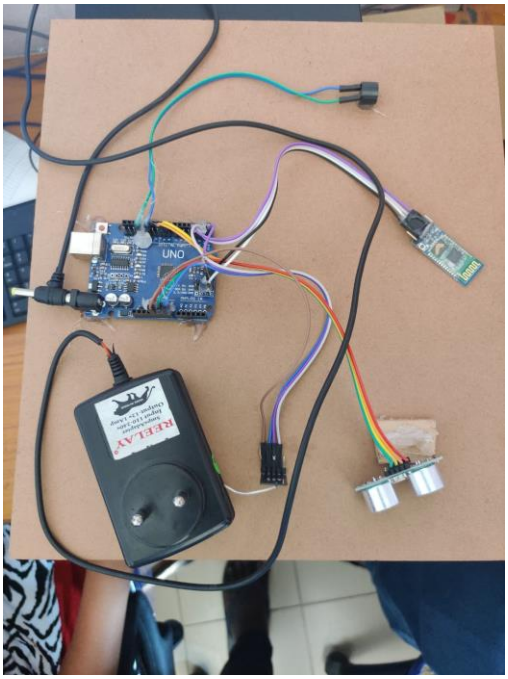
Merits

Discussing upon the merits of the propose system, our device is small, compact and light-weight. This in-turn makes it extremely potable and easily blends with anyone carrying it. The device is highly reliable and responds very quickly with the desired outputs. The durability of the device is quite high and provides an added advantage of consuming very less battery power. All these advantages combines the device to be readily available at a low cost, enabling the common man to own one.

Applications

The device after its advantages listed out, is very evident that it is mandatory to be carried out whenever a person steps out. It is expected to be put to full use in places where people tend to gather in quite considerable numbers. Thus, the device effectively functions in public places like shopping malls, Movie theatres and public gathering functions etc.

PROTOTYPE



Contact Tracer Kit

The prototype displayed in the image above clearly indicates to all that the kit is compact and has a very high degree of mobility. The prototype is designed and laid out with the primary aim that it has to fit into one's pocket, enabling the user to easily carry it around. Arduino Uno is highly efficient processor with several in-bult capabilities and is highly compatible. It comes with a very

big advantage that it is very compact in size. The zigbee and Bluetooth modules are readily compatible with this board which further increases the utility.

All the modules are small and hence the device is of great use. The adapter that is the power supply of the entire unit can be easily replaced with ordinary AA batteries, when the unit is to be carried around. In case the unit is kept stationary at any place, the batteries can be exchanged with the power adapter as shown. This evidently proves that Arduino is compatible with both the adapter and battery. Switching between the power supplies appropriately increases battery life, which in turn reduces the maintenance cost of the device.

CONCLUSION

From the above study and through the use of the proposed contact tracer device, automatic detection of corona infected personnel can be done instantly and one can distance themselves, preventing the spread of the disease. This inculcates automatic social distancing, that is the prime factor to stop the spread of infections. Thus, the novel contact tracer system provides protection from corona. There are many ways to educate the people but maintaining the app and hardware is the combination to give the very fast accurate information to people, here we are proposing the new technique to trace the covid19 patients very quickly and they can view the positive cases around his current location. Covid19 chain is very fast in spread we have to break the chain, on this way we are having the only way is to keep them in the quarantine , it is difficult to find the people who are in the covid19 chain. By our application very easy and fastest way to track the people.

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