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IOT (Internet of Things) for Current Corona Virus

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Abstract: *In few years, the (IoT) has shooted a convincing field of analysis as replacement analysis topic in an increasing type of tutorial and industrial fields, particularly in healthcare sector. The increasing use of IoT re-creates fashionable health care systems by engaging technical, economic and social prospects. It upgrades general health care system to private health care system where every patient is located, treated, and slowly monitored. The present international challenge caused due to the novel coronavirus reveals the best people ill health since the happening of the respiratory disorder in 1918. Since the virus has gained momentum, there has been Associate in nursing imperative effort in numerous analysis communities to use numerous instrumental technologies to combat this worldwide threat, and IoT technology is the one which leads the race against this virus. With the increase in cases of the virus, IoT enabled systems area unit want to cut back the double unfold of CORONA VIRUS to others by early diagnosing, patient observation, and implementation of post-patient recovery procedures. This paper examines the role of IoT based technologies used during Corona virus and shows technological structures, platforms, applications, and industrial solutions for IoT anti-CORONA VIRUS in 3 main phases, together with pre-diagnosis, quarantines, and recovery.*

I. INTRODUCTION

Internet of Things (IoT) was at first presented by Kevin Ashton so the viewers can see how implementing radio-frequency identification (RFID) within the Procter can be done to enable chain management. IoT has and will always be a complicated technology which will connect all sensible things along among a server without any human to human contact. additionally, associate degree object which will be connected to the web for more observance or transferring information will be an IoT system or its device. In the past few years, IoT has succeeded in gaining convincing analysis ground as a replacement analysis topic having included a wide range of educational and industrial disciplines, particularly for health. The IoT is reshaping trendy healthcare systems, engaging technological, economical, and social prospects in day to day life. it's evolving systems from typical to more advanced and new customized health systems which allows the patients be diagnosed, treated, and monitored very cautiously.

It is progressively changing into significant power in health system wherein the cost is low, the quality of service is better, and helps develop new user experiences. As a results of its wide capabilities as well as chase, identifying and authenticating the patients, and assorting the information, the severe growth in IoT devices in health is anticipated to rise rapidly.

The existing challenge of the world which has been caused by the novel coronavirus presents unwanted but similar unwellness, symptoms because the contagious disease like mild fever, dry cough, and headache, are quite negligible for recovery. The recovery from this virus on average takes from one to fourteen days. Astonishingly, a patient who is asymptomatic will be a transmitter of the virus to the general public. this can be once quarantining such individuals is critical. However, the recovery time of the patient varies and depends on the age, body conditions, co-morbidity, etc. whereas this virus contains a high potential to cause problems compared with similar diseases among the coronavirus family. during this context, IoT technology has been shown to be a secure and economical method of addressing the CORONA VIRUS pandemic.

The following research paper is as follows. Part two shows significance of IoT during coronavirus time. Part three shows IoT technologies with their classes for the part of "Early Analysis", "Quarantine Time" and "Recovery" parts. In the end, we define near future, and then end in part four

II. ROLE

Early days of 2020 have been hard for the world to take as we have been fighting the against the epidemic and several research institutions are working for its vaccine. As the efforts are increasing in search of a treatment, the unfold of the coronavirus haven't displayed great inferences up to now as there's a high demand for international observation of patients with symptomatic and symptomless corona infection.

The primary part of the virus, that is early analysis, there is a high requirement for quicker diagnosing where every symptomless patient will simply transmit the virus to others. As early as the patient is tested and he or she has contracted the virus, higher are the chances that the cases can be controlled, and the patient receives the treatment he/she requires. In general, IoT devices/systems will boost the process of detecting the virus in patients, or symptoms. This can be done by taking body temp of the people, using different devices, taking samples from symptomatic/suspicious cases, etc.

The next part, referred to as quarantine, is a very important phase of this illness once the patient has been contracted with the corona virus, and the same should ought to be isolated during treatment until his or her report turns out to be negative. IoT devices monitors patients privately with relevance of the course of their treatment and the govt authorities lodge an in home isolation. they'll sanitize the areas where there has been spread of the virus and ensure lockdown so that human interactions are minimal.

The general public with gentle symptoms will while not obtaining treatments may suffer, however there's no guarantee those individuals won't be reinfected post recovery. Reinfection is possible and the government is still ominous that people should wear a mask. The probabilities of the return of the symptoms and then contraction of the virus are often high. To avoid and control the increasing cases from the virus, social distancing ought to be enforced, and that can also be done by the help of IoT devices, altogether with bands and crowd observation devices, to trace individuals to confirm a suitable distance(6 feet) is maintained. In general, IoT during the coronavirus pandemic has shown its quality in helping patients, health care suppliers, and asserted the authorities. We want to justify how and what exactly does the IoT devices bring to table in terms of helping the public at large during this terrible time.

III. PHASE I: EARLY ANALYSIS OF VIRUS

When CORONA VIRUS was relatively a new virus about which no one had any idea. Along with studying its symptoms it was important to diagnose it and analyse the spreading pattern to stop the infection from spreading. This may well facilitate health workers to rearrange higher treatment plans, save a lot of lives, and reduce the spread and infections. The primary step within the early research of CORONA VIRUS is knowing its indication. a big selection of symptoms together with fever or chills, fatigue, muscle or body aches, headache, the new loss of style or smell, raw throat, cough, shortness of breath or problem respiratory, congestion or liquid nose, nausea or emesis, and diarrhoea.

Fever or high temperature(measured temperature exceeds thirty eight degree Celsius) is one of the major symptoms of CORONA VIRUS which has been seen in almost all cases. One of the way to cope with CORONA VIRUS is by making an IOT device that will make detection quicker, cheaper and easier by capturing information using sensors then analysing the information for patients, health workers, and authorities to diagnose, control, and ultimately stop the spread of the disease, leading to end of coronavirus. Different IOT devices could be made to capture a number of the same symptoms at an early stage, which are mentioned in the next subsections.

A. Wearing of Devices on body parts/Wearables

By making use of the bands etc is taken into account at an economical cost due to requirement for early analysis throughout this corona virus times. Making use of these and further updating them have been a great positive for detecting any person for corona virus. For instance, this device will help provide any information about the immune system of the person, metabolism, etc. Making use of this information, when and where the patient or person is noticing any changes in his or her body, or having any symptoms, the health care authorities are notified and they take suitable action against the erraticism in the body of the patient.

B. Thermometer Readings

A variety of IoT sensible thermometers have been made and are suitable to record measurements of body temperature. These are accurate, low-price and handy since it can be worn to check temperature. There are different forms like bit, radiometric and patch. the utilization of these devices could be very useful for the early analysis and testing of cases. The usage of IR thermometers for measuring temperature will be a helping hand in detecting the spread of virus and also help in awaking patients and healthcare workers about the spread of the virus, therefore usage of thermometers is extremely suggested.

C. Drones

Finding infected individuals is very important in early analysis and controlling the spread of corona virus. Usage of remote-controlled (UAV) particularly those IoT-based drones is other path in the method of looking for contaminated individuals and areas throughout this epidemic. Drone technique will help in scaling back human interactions and will help in reaching locations that are hard-to-access.

The thermal imaging drone was designed to measure the temperature of people in public areas and may be employed during first analysis part. It may be combined with a video game so that it can help spot individuals with fever. Hence, this device will reduce human contacy (less chance of spread), and moreover it requires a less amount of time compared to measuring instrument gun devices.

D. Robots

Using robots with the help of IoT to facilitate early analysis of the spread could be an important use of such devices and as a result this will help doctors by completing the treatment in an easier and safer way. This will also help in reducing work-life balance stress. Without human interaction, the auto robot mechanism will facilitate to hammer all CORONA VIRUS phases. During the initial part, it will facilitate the method of analysis by collecting samples of patients from throat, by making use of the famous PPE kits so that lives of medical employees are not risked since they come in close contact with patients. For ex the Intelligent Care robot mechanism (shown in figure), has been made through a collaboration between 2 corporations, Vayyar Imaging and meditemi. This Iot system helps in detection of corona virus symptoms in less than 10 sec by fast scanning someone who is at a distance of one mtr.

E. Mobile Apps

Mobile app employed with IoT softwares like (GPS) and (GIS) to track down people with infections have been used from the beginning of CORONA VIRUS pandemic. Implementing these apps by exploring the net (IoMT) can provide an aid to the patients by providing them with correct treatments from their home. It also permits health and medical workers to observe patients from a distance. Individuals, using these apps can send their health details to the cloud services & find suitable healthcare recommendation from medical staff in hospital on-line reducing the contact. By exploring all facets of this platform, patients will be cured easily and also the contamination of the virus will be controlled. These apps are pocket friendly and so it avoids any physical entry of people at hospitals & hence provides a way to restore normalcy during the corona virus epidemic.

F. Aarogya Setu App

Once the account is made on the appliance by the user, the app asks for permissions such as demanding Bluetooth access and location of the person. The application then requests the user to kindly fill all the details regarding immune system, co-morbidity, international travel, etc to have the information saved. Following these steps, the appliance asks if the person is suffering from or has contracted the corona virus in this time.

The person will share his or her travel history in the app. For doctors, app will let you know if you are exposed to an infected person. It will also act as a medium of counselling.

Giving permission to access the Bluetooth is essential this software to maintain a safe distance between 2 people. Once two smartphones with this app are in each others Bluetooth range, information is collected. So if 1 of them has tested positive or is having symptoms, the government is notified and further actions are taken.

IV. PHASE II: QUARANTINE TIME

After applying several methods and completion of detection, it's a requirement to isolate and further monitor the patients when they are at a hospital or at their homes. The quarantine period not only applies to the people who have contracted the virus but also those who are suspected to have come in contact with the infected patients, no matter where they reside in completely different areas or cities or countries.

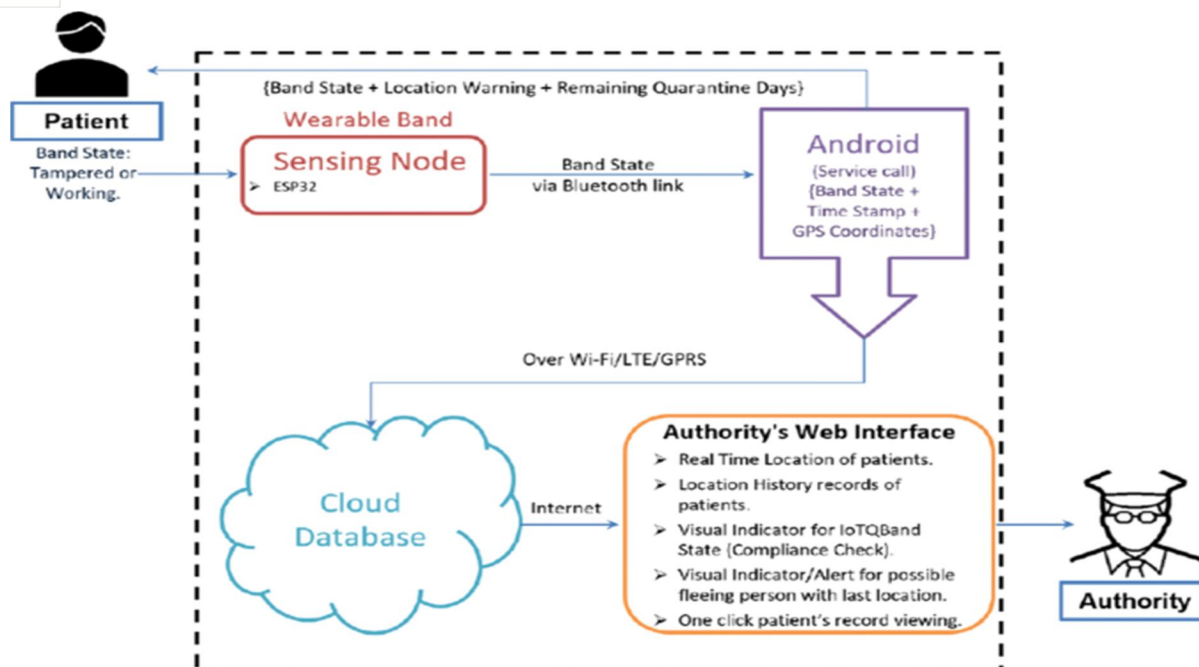
This can be done to further stop or control the increasing number of corona cases. Exploring IoT devices throughout this part might help find and mitigate serious challenges ahead of us, like spreading the virus, by observing different patients with efficiency and concentrate on their body temperatures, heart rate, pressure, etc

Wearing of devices on body parts/Wearables:

Isolation time for the covid patient and suspected covid patients is very significant as there is always a risk of spreading the virus to people across the globe. IoT wearable bands have already displayed positive results to control patients to not break the rules of isolation.

The IoT device is connected to, mobile app by using Bluetooth during the time of quarantine, and health authorities will typically check all cases each a pair of minutes by employing a net interface. Furthermore, if a patient doesn't have the device on his or her body part, or if he or she escapes the isolation space, the device IoT will display an alert to apprise the govt for further investigation. Figure shows the device, or the band.

This methodology has been seen in Hong Kong, wherever healthcare workers use associate electronic wristband coupled with a mobile app so as to trace those who have recently arrived at the airports for fourteen days.



A. Surveillance Drones

Drones have always played a crucial role during the time of isolation to decrease the quantity of CORONA VIRUS cases by lowering the interaction of care staff with patients and contaminated zones. For instance, drones will assist care staff and patients by using superspreaders or deploying medical aid to public and patients.

B. Disinfectant Drone

Having areas disinfected and further sanitized during the course of quarantine is very much essential, and so, it can be achieved by having a specific sort of drone, referred to as a super spreader drone/dis-infectant drone. This type of drones will lower down the spreading of the virus and foresee the danger for the healthcare workers staff from obtaining the virus. The drone has successfully been deployed in Spain to ensure sanitization.



C. Robots

During isolation, robot play a very important role in keeping the medical staff distant from the quarantined patients. For instance, robots may be employed in other ways, like taking metastasis signs and medicating contracted patients with their medications or food.

D. Telerobots

Telerobots square measure sometimes operated remotely by an individual's and may offer completely different services like remote identification, private surgeries, and rare medications for the patients without any human contact until the process of recovery comes to an end. For instance, a nurse will record and update patients' temperature while not interacting with any other human being by making use of these robots. This further helps to stop infections by remotely monitoring every single thing happening around the patient.



E. Mobile App

The utmost vital phase of isolation is tracing of the patients while they are isolating or are in home-quarantine. Trailing suspicious patients or patients who have come in contact with the infected person using mobile apps during isolation is again a widely used technique to control the coronavirus from spreading.

F. Observance

In Russia, a compulsory police work app referred to as Social observance has been deployed by govt to trace patients who have been contracted with the corona virus and tells them that they should be isolated in their homes. By making use of this process, healthcare workers can track patients when the app is installed on the patients' mobile phones. People have to compulsorily require to scan a QR code everytime they step out of their homes or isolation areas.

V. PHASE III: POST RECOVERY/AFTER GETTING NEGATIVE TEST RESULT FOR CORONA:

The lockdown has had a strong impact on businesses, travel, health, etc in the past few months and it still looks like the virus hasn't stopped spreading. this is often the section throughout that everybody has to expertise with further respect and caution. Maintaining safe distancing and restrictions on physical services have to be compelled to be enforced in an exceedingly thanks to certify the virus won't unfold once more.

A. Gadgets That Can Be Worn

As the companies who have employees are being called upon to work again, students have been called to schools and colleges again, and the economy is going back to normal, we cannot be lose on the situation and therefore must adopt some protective techniques in order to fight against the virus. Tracking and maintaining safe distancing are very much to be thought-about. Wearables, can be those devices which will be used to track the user contacts with people and further notify them if the corona guidelines are not followed.

B. EasyBand

EasyBand works very effectively in order to ensure, notify and alert the public to channel themselves to follow the covid guidelines of maintaining a safe distance. This IoT device, that is added with (IoMT), triggers and snaps knowledge from alternative devices. EasyBand can work among a particular radius and shows suspected risk by emitting lights to notify the person. For instance, if somebody sporting AN Easyband gets near four mts of any other person, the band gives a beeping sound to alert the person wearing and inform them to maintain a safe distance from one another. This system device has displayed great results compared to the other mobile apps.



C. Drones

The return to normal is slowly and gradually taking shape but still the virus hasn't disappeared. Many drones are employed to ensure corona guidelines after reopening, and are helping businesses to continue operating.

D. Surveillance Drone

The police investigation drone was made & updated as an efficient thanks to check the public, so even if people cannot maintain social distancing due to any reason, this drone can help regulate affairs.



E. Robots

As the companies who have employees are being called upon to work again, students have been called to schools and colleges again, and the economy is going back to normal, we cannot be lose on the situation and therefore must adopt some protective techniques in order to fight against the virus. during this section, everyone must understand the importance of maintaining safe distance everyplace to control the spread of the virus. autonomous robots can be used in the management maintaining safe distance. This IoT robots can be controlled remotely, it's additionally usable for transferring of information to an internet interface for additional observance.



F. Mobile App

Usage of IoT in these corona virus times is suddenly increasing and also massive issues which often include cost-friendly, economical observation, applicable treatment, less mistakes, and diagnoses. Some mobile app are developed particularly related to reopening of businesses, schools, companies etc.

G. Aarogya Setu

Aarogya Setu app is a contact tracking app for the people so that they can use it and notify themselves and isolate if they are notified that they have come in contact with the infected personnel. It is meant for good communication between the health-care authority and the public. In the app, the users are requested to answer whether he or she has any symptoms of corona or has recently traveled out of country. It then notifies you by sending a message whether you have come in contact with the infected person or not.

VI. FUTURE WORKS

This corona virus has been impacting the world economy, psychology and lives. The lockdown that was imposed has had serious impact on lifestyles all over the globe and we still are fighting against it. We have started reopening businesses all over the world but still the corona virus is not all gone, and we still require to fight against it by making use of Iot devices and making sure to follow the guidelines of corona virus. We still are far behind and are improving in terms of awareness thanks to the usage of IoT devices and softwares. (IoT) technology has displayed positive results in recognising detecting, making sure that guidelines are being followed, but, as we tend to understand a lot of concerning the about corona and its substantial behavior, the people (we) always have to regulate the approaches in several parts. as an instance, it might be attention-grabbing to add and compute AI and IoT technology to use AI to raise interactions between care employees and persons altogether parts. Other instance is, making use of smart and no contact devices with the help and assist of different input, that might expeditiously lessen the spread of the corona virus and control the peak of the virus. more analysis must be done on suspected & confirmed corona virus cases to stay in isolation to stabilize the spread of the virus.

Adding to this, will IoT softwares will help entertain isolated patients expeditiously by providing useful info in their day to day lives. once internment, and as world economy is back to open up and livelihood is getting back to normal, IoT systems that have been deployed serve great amount of feedback and response so that the business and economy of world is **not** affected by the virus . The concerning factor also is that the patients and public are scared to share their information on these systems due to certain issues in the society or other reasons. The companies developing these devices must come up with some secure databases so that the information shared does not become a problem in day to day lives of a person.

By making use of Iot devices, big cities have been able to successfully contract the curve of the corona virus at the moment and will also help in combating future pandemics if necessary. Also, these technologies have found a way to enter small rural areas where people can make use of the apps for a very less amount and spread awareness. In the near future, it will also help to maintain a safe distance between two individuals, regulate traffic, help in transportation, and also as always it has been a good servant to any military power across the world. As a neighborhood of good living within the good town, good home IoT-based tech can even cut back the infection % of corona virus. For instance, good doorbell & security system is installed so that there is minimum contact between the people.

VII. CONCLUSIONS

The planet is scuffling with corona virus, variety of techniques have been implemented to fight against this epidemic. Amongst this, the Internet Of Things has come up with something new and helpful. Throughout this epidemic, it has been a high success and will continue to help people and health care workers to fight against this virus.

In this research, we have touched upon the topics of significance of the Iot devices during the epidemic and various systems that have been employed such as mobile apps, robots, drones, etc. IoT technology is very economical for this pandemic, however it's conjointly crucial to every person regarding their privacy of their body metabolism. Making use of these devices will have a strong impact on businesses worldwide, but also help psychologically to the people scared of this virus and serve as a great weapon against this virus. As a result, the medical staff, and frontline workers will have some time for themselves to research about the virus. Apparently, the death%, number of cases will be reduced and in near future we will be able to control and get rid of this virus.

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