

## COVID – 19 with IoT

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**Abstract:** Nowadays the new 2019 corona-virus, which is known as “covid-2019”, was discovered in cases of viral pneumonia in Wuhan and was named by the World Health Organization on January 12, 2020. The corona-virus is a large family of viruses known to cause influenza as well as other serious diseases such as Middle East Respiratory Syndrome and Severe Acute Respiratory Syndrome. The virus is a new strain of corona-virus that has not been found previously in humans. The common respiratory symptoms of this infection are fever, cough, and breathing difficulties. In more severe cases, pneumonia, kidney failure, and even death can occur. Currently, there is no specific treatment against the new corona-virus. Internet of Things (IoT) has the ability to stop the proliferation of Corona-virus like outbreaks, and can be implemented in future to avoid such health emergencies, a network of interconnected systems and advances in data analytics, artificial intelligence (AI) and ubiquitous connectivity can help by providing an early warning system to curb the spread of infectious diseases

**Key Words:** corona- virus, covid-2019, Middle East Respiratory Syndrome , Internet of Things (IoT), Network, data analytics, artificial intelligence (AI),

### 1. INTRODUCTION:

Corona viruses are a family of viruses that can cause illnesses such as the common cold, severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS). In 2019, a new corona virus was identified as the cause of a disease outbreak that originated in China.[1] The virus is now known as the severe acute respiratory syndrome corona-virus 2 (SARS-CoV-2). The disease it causes is called corona virus disease 2019 (COVID-19). In March 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a pandemic.[2]

Public health groups, including the U.S. Centers for Disease Control and Prevention (CDC) and WHO, are monitoring the pandemic and posting updates on their websites. These groups have also issued recommendations for preventing and treating the illness.[3. Fig 1 and 2 corona-virus structure]

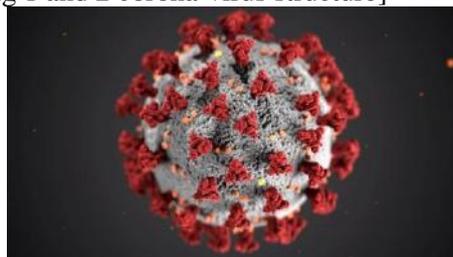


Figure 1 Corona-virus structure

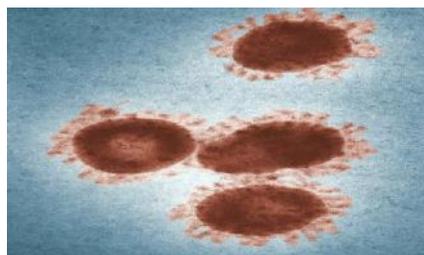


Figure 2. Corona-virus structure

2. **SYMPTOMS:** Signs and symptoms of COVID-19 may appear two to 14 days after exposure and can include:

- Fever
- Cough

- Shortness of breath or difficulty breathing

The severity of COVID-19 symptoms can range from very mild to severe. Some people may have no symptoms at all. People who are older or who have existing chronic medical conditions, such as heart disease, lung disease or diabetes, or who have compromised immune systems may be at higher risk of serious illness, such as influenza.[4].

### **3. Risk factors for COVID-19 appear to include:**

- Recent travel from or residence in an area with ongoing community spread of COVID-19 as determined by CDC or WHO
- Close contact with someone who has COVID-19 — such as when a family member or health care worker takes care of an infected person

### **4. Complications:**

Although most people with COVID-19 have mild to moderate symptoms, the disease can cause severe medical complications and lead to death in some people. Older adults or people with existing chronic medical conditions are at greater risk of becoming seriously ill with COVID-19.

Complications can include:

- Pneumonia in both lungs
- Organ failure in several organs

### **5. Prevention**

Although there is no vaccine available to prevent infection with the new corona virus, you can take steps to reduce your risk of infection. WHO and CDC recommend following these precautions for avoiding COVID-19:

- Avoid large events and mass gatherings.
- Avoid close contact (within about 6 feet, or 2 meters) with anyone who is sick or has symptoms.
- Keep distance between yourself and others if COVID-19 is spreading in your community, especially if you have a higher risk of serious illness.
- Wash your hands often with soap and water for at least 20 seconds, or use an alcohol-based hand sanitizer that contains at least 60% alcohol.
- Cover your mouth and nose with your elbow or a tissue when you cough or sneeze. Throw away the used tissue.
- Avoid touching your eyes, nose and mouth.
- Avoid sharing dishes, glasses, bedding and other household items if you're sick.
- Clean and disinfect high-touch surfaces daily.
- Stay home from work, school and public areas if you're sick, unless you're going to get medical care. Avoid taking public transportation if you're sick.

### **6. Internet of Things:**

The Internet of Things, or IoT, is a scalable and automated solution that has seen explosive growth in other industries such as automated manufacturing, wearable consumer electronics, and asset management. IoT consists of several functional components: data collection, transfer, analytics, and storage. Data is collected by sensors installed on mobile, end-user hardware like phones, robots, or health monitors[5]. Then, the mobile data is sent to the central cloud server for analytics and decision-making, such as if a machine requires proactive maintenance to prevent unexpected breakdown or if a patient needs to come in for a check-up.

### **7. Internet of Things (IoT) technology can be employed to achieve the following goals:**

- Efficiently learning the updated interim guideline, suggest rapid learning interim and revised management guideline
- Better managing suspected cases
- Performing a consultation on difficult diagnose patients to improve the success rate of supportive treatment. And
- Directing and ensuring quality control for clinical practice.

As the number of people getting infected with corona-virus is on the rise, the World Health Organization (WHO) has declared a global health emergency.[6] corona-virus like outbreaks can be prevented in the future The first step in infectious disease control detection. While a global network of sensors is unlikely to happen in the foreseeable future. Couple that with facial recognition and location, existing surveillance cameras to identify, trace, and monitor people that may have contracted the corona-virus An added layer would be able to also track every individual that an infected patient contracted .IoT and AI may be the most logical way to prevent highly infectious diseases from spreading rapidly in a world that is getting smaller every day.

AI sensors to help with targeted quarantines and quick treatment to mitigate the spread the corona-virus . AI has also been used to predict future outbreak areas

**Using IoT to dissect an outbreak:** With the numerous and diverse datasets collected by mobile devices, IoT can have many more applications during an epidemic. IoT can be used to trace the origin of an outbreak. A researchers at MIT used aggregated mobile phone data to trace, in granular details of short distances and periods, the spread of virus. Therefore, overlaying geographic information system (GIS) on IoT mobile data from infected patients can do two things. Upstream, it can assist epidemiologists in their search for patient zero; downstream, it can help identify all the persons who have come into contact with the infected patients and may, therefore, also be infected.

**Using IoT to ensure compliance to quarantine:** IoT can also be used to ensure patient compliance once the potentially infected persons enter into quarantine. Public health personnel can monitor which patients remain quarantined, and which patients have breached the quarantine. The IoT data will also help them track down who else may be exposed due to the breach.

**Using IoT to manage patient care:** The scalability of IoT also comes in handy for monitoring all the patients who are high-risk enough to warrant quarantine but not serious enough to warrant in-hospital care. Right now, the daily check-up of the patients is done manually by healthcare workers who go door-to-door. In one reported instance, a healthcare worker had patients standing in their apartment balconies, so that he could fly a drone up to take their temperatures with an infrared thermometer. With IoT, the patients can have their temperatures taken and upload the data with their mobile devices to the cloud for analysis. This way, healthcare workers can not only collect more data using less time but also reduce the chance for cross-infection with the patients.

## 8. Data Analytics Powers the Fight against Corona-virus:

Data analytics is helping analyze volumes of data selected from multiple sources, which includes the data collected for various phases of the corona-virus, the disease and its spread Big data analytics is facilitating the detection of the virus through computerized scans and contact tracing. This is providing to be helpful in containing the transmission of the virus. Techniques such as structural, mathematical and statistical techniques as well as path and graph analysis are helping identify super spreaders. Further analysis of data from personal electronic devices (PEDs) such as smart-phones, smart-watches and so forth, helps identify a person's location, browsing patterns, social media interactions, and sentiments. All of this data can provide insights for an accurate prediction of people who are more prone to exposure. Based on their location history and their close circle of acquaintance, they can be monitored more effectively. Big data analytics can facilitate informed, faster and accurate decisions, which can help contain and eventually end this global crisis and national governments to collectively create a massive global network of sensors to detect viruses. However, this would require planning and implementation on a global scale that would tax the very foundations of democracy and obligate governments to place the needs of the planet ahead of the needs of their citizens. The most logical solution is often the most difficult to implement. The amount of planning required to make this solution a reality would, A global network of sensors is unlikely to happen in the foreseeable future, wide-area IoT solutions on a scale that has never been seen before. Couple that with facial recognition and location, existing surveillance cameras to identify, trace, and monitor people that may have contracted the corona-virus. An added layer would be to also track every individual that an infected patient contacted. IoT and AI may be the most logical way to prevent highly infectious diseases from spreading rapidly in a world that is getting smaller every day with air travel. In monitoring every 'compromised' individual as they go through customs at airports and/or border crossings and leveraging AI-sensors to help with targeted quarantines and quick treatment to mitigate the spread the corona-virus.

## 9. Satellite Monitoring:

As countries have shut down to slow the spread of the corona-virus pandemic, satellites in orbit around Earth are noticing changes to our home world. Specifically, orbiting instruments are observing reductions in emissions and in night lighting as people follow orders to stay home and reduce contact with others. Such approaches are vital in slowing the jump from person to person of the new corona-virus that causes the COVID-19 disease. However, these measures are also reducing the visibility of humanity on Earth, Because the new corona-virus has spread so rapidly, satellites are watching its impacts affect multiple continents at once.

## 10. Robotics Monitoring:

"robots are no stranger in the healthcare system," now being used in surgical procedures, dispensing medication, and transporting items within hospitals. While no one robot can do it all, there are robots that can help with informing and entertaining people, moving patients, and cleaning and disinfecting areas. Some of the challenges facing robotics startups that want to serve the healthcare market include central management of growing robotic fleets, providing the right levels of support, and improving collaboration among robots and with human staffers and patients, Health sensors and apps monitoring system corona-viruses, Monitoring corona-virus patients remotely with clinical-grade sensors and

collecting data on numerous physiological signals could improve clinical decision-making for providers. Digital tools such as telehealth, remote patient monitoring, data analytics and even consumer-facing AI-based chat bots could play a key role in containing the outbreak of COVID-19 and help people who think they've been exposed to the novel coronavirus. It assigns three colors to people — green, yellow and red — on the basis of their travel and medical histories. Whether a person should be quarantined or allowed in public spaces was decided based on the color code. Citizens had to log into the app using pay wallet services Only those people who were assigned a green color code could be allowed in public spheres after using the designated QR code at metro stations, offices and other public places. There were checkpoints at most public places where the code and a person's body temperature was checked.

**Big Data and facial recognition:** Access to public information has led to the creation of dashboards that are continuously monitoring the virus. Several organizations are developing dashboards using Big Data. Face recognition and infrared temperature detection techniques have been installed in all leading cities. Smartphone apps are also being used to keep a tab on people's movements and ascertain whether or not they have been in contact with an infected person.

**Artificial Intelligence:** AI-powered infrared system that can detect change in a person's body temperature. The system can examine up to 200 people in one minute without disrupting passenger flow.

### 11. Mobile tracking/mass surveillance:

Thousands of facial recognition-powered CCTV cameras have also been installed at almost every quarantine center and only those who have been assigned the green color code are allowed to drive on the roads. We Chat, the popular instant messaging app that also has a digital wallet, is being used to collect data. Using this data, the government can find out the number of people with whom an infected person was in close contact and order them to self-isolate themselves. Facial recognition powered CCTV cameras in all major cities to fight the Corona-virus.

### 12. CONCLUSION:

The underlying technology and the IoT components that can be leveraged to enable a healthcare system to deal with disease outbreaks already exist; however, they are fragmented and not yet connected. Therefore, the system needs to be able to build up its infrastructure quickly to connect the components of data collection, processing, and storage, so that the system can scale and expand for disease tracking, preventive quarantine, and the in-patient care of the infected.

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