COVID: Containment of Outbreaks of Virulent Infectious Diseases

COVID: CONCEPT & GOAL

COVID

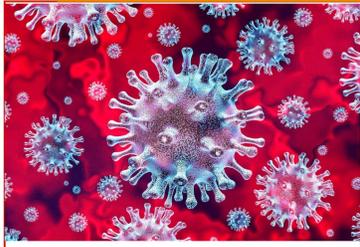**World's First GDPR Compliant, Wearable Device to Shield Humanity from Any Potential Existential Threat from Deadly Pathogens**

➢ The latest existential threat coming from Covid-19 pandemic has shaken the world.

➢ World is always at a risk of such potential apocalyptic global event that could potentially pose existential threat to the mankind.
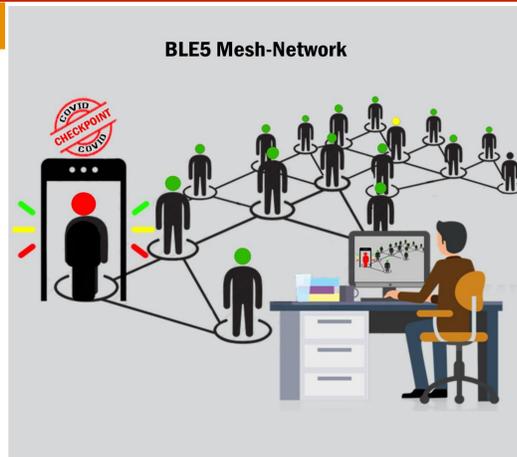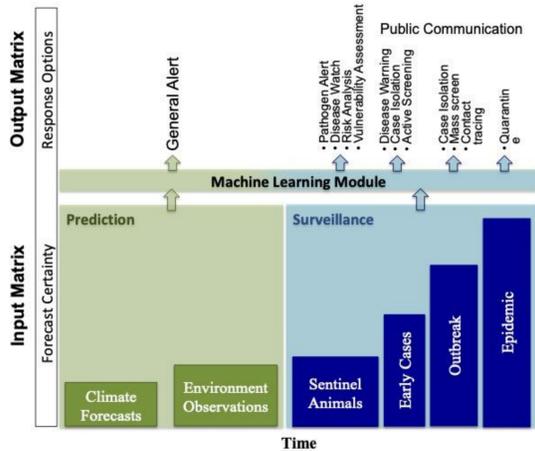
COVID: FUNCTIONS

1. AI-powered and Blockchain secured smart watch design.
2. GDPR compliant.
3. 24/7 BLE5 mesh-networking connectivity for always-on real time. anonymous surveillance of several vital health parameters.
4. Integrated with sensors to monitor Covid-19 symptoms (body temperature, blood oxygen, blood pressure, pulse, sleep pattern etc. and also with high end sensors for monitoring ECG.
5. Autonomously / anonymously monitor and detect the earliest signs of an outbreak.
6. Privacy-preserving containment measures via screening, contact tracing, quarantine, social-distancing, mobility restrictions.
7. Autonomously and seamlessly screen citizenry for any morbidity risk at the entry point to spaces housing significant human congregation.
8. Ensures easy monitoring for concerned authorities.
9. Designed to alleviate future epidemic / pandemic possibilities along with the current COVID-19 pandemic

MODULES & EXPERIMENT

COVID: MODULES

COVID AI/ML module promotes the deployment of big data analysis by AI-powered neural network that builds on a data input matrix and delivers alerts that can avert diseases before the break out.

COVID, with an always on BLE-5mesh-networking connectivity, anonymously monitors user's proximity to any potential infectivity risk to the user or to the community at large.

COVID's usability can broadly be achieved with 2 functions:

a) Early warning system to contain the disease right at the point of origin.
b) Curbing the spread of such diseases by continuously monitoring the movement of the peers, restricting the movement if found unfit to move and thus alarming the concerned authorities.

COVID achieves the first function using the AI/ML module;

While, the second function is achieved using BLE modules capable of interacting with the adjacent peers in the most secured and anonymous way without compromising the user privacy.

Bluetooth Mesh Networking is a new topology available for Bluetooth Low Energy (BLE) devices that enables many-to-many communication and is back compatible with BLE 4 versions. It's optimized for creating large-scale node networks and is ideally suited for applications where the connected nodes need to reliably and securely communicate with one another.
The primary aim of the experiment is to successfully integrate and test the Bluetooth Mesh-networking module in the current variant of COVID to enhance the robustness of the system communication

PROPOSED DEMO SETUP

The COVID project work plan primarily comprised of:

➢ Deploying and testing data connectivity / transmission in COVID devices (smart watch) in a simulated BLE-5 mesh-networking environment powered by a network of BLE-4 nodes of the City of Things testbed – CoT testbed.
➢ Select at least 1 of the CoT nodes as COVID Check Point (CCP) node simulating the real world check-in points/stations/walkthroughs to authorize passage to a high footfall surveillance areas.
➢ Simulating the CCP node to autonomously and seamlessly read the COVID device for health status (Healthy, Suspected, High Risk) and accordingly either authorize the passage or advise the user and concerned authorities regarding any infirmity detected.

The COVID-19 restrictions on Import/Export
➢ The recent restrictions imposed by COVID-19 compelled us to conduct the BLE meshnetworking experiment remotely under the supervision of the CoT testbed by simulating mobile phones to behave as a COVID smartwatch and installing our meshnetworking application over the devices to create a BLE5 mesh-network that propagates data across devices.

➢ **Accordingly,** To conduct the experiment in the simulated BLE meshnetworking environment we developed;

1. an algorithm that calculates users health status based on his/her vitals such as temperature, heart rate, blood oxygen and blood pressure.
2. an android mobile application with BLE meshnetworking protocol that enables sending and retrieving user health information in a private and secure manner when users come in Bluetooth vicinity of one another.
3. a mechanism that alerts the user as per the health status of the close contacts in the Bluetooth vicinity.

COVID BLE-MESH ENABLED MOBILE APP

As it can be seen in the following diagram, to test our developments, we simulated a scenario with 3 COVID device users coming in close vicinity of one another.

The smart watch measures the vital health parameters of the user and accordingly assigns the health status as healthy, suspected or infected.
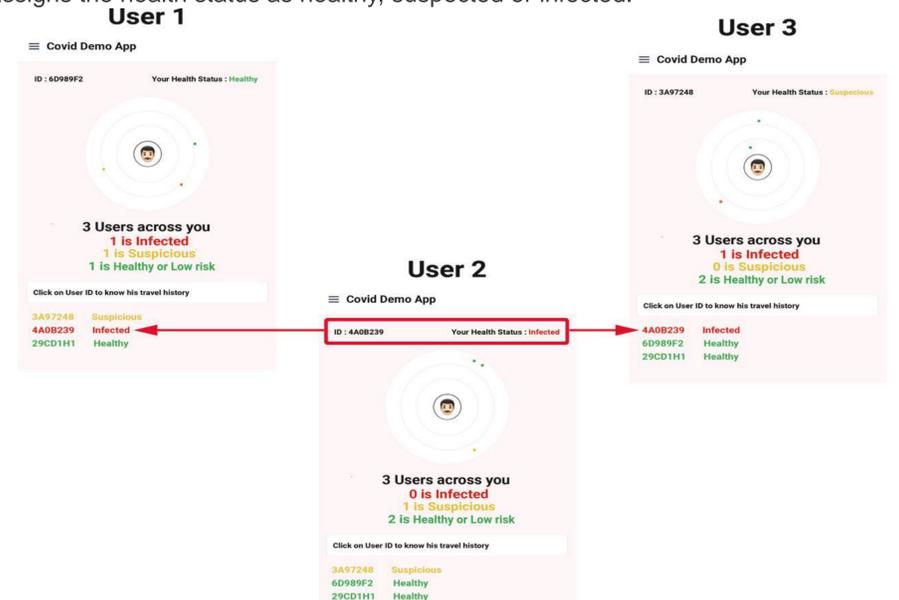
When 3 mobile phones with pre-installed COVID applications and integrated with 3 COVID smart watch were brought in the Bluetooth vicinity of one another, the users were able to see the other BLE devices using the BLE meshnetworking protocol installed within the application.

Users could also see the anonymous user ID of the peers in their Bluetooth vicinity along with their health status. This is because, the BLE meshnetworking protocol is always set on the search and broadcast mode to ensure the continuous updation of the list of the similar devices that comes in close contact with it.

RESULT & CONCLUSIONS

➢The protocol ensures the continuous data sharing between the peers using BLE meshnetworking as and when the devices come in close vicinity of one another.

➢The BLE meshnetworking enabled mobile application also provided users with the information on his/her contact with the other peers which justifies and ensures the contact tracing of the person, if found to be in close vicinity with the person with suspected or infected health status.

➢The experiment thus justifies the simulated case of BLE meshnetworking for data transmission in a secured manner without the use of any other means of communication in the controlled atmosphere using the BLE meshnetworking script installed over the mobile phone.

POST MORTEM

➢ Company has successfully validated the BLE mehnetworking capabilities of the device with the current experiment & plans to test the AI/ML module in the next phase by conducting a small scale feasibility study with the City lab testbed and thus train the ML module depending on the outcomes of the study.

➢Company plans to quickly launch a pre-sale crowdfunding campaign before starting a large-scale production.

➢Once the significant numbers of pre orders are generated, company plans to launch the first iteration of the device on crowdfunding platforms like Kickstarter or Indiegogo.