5 Solutions To Covid-19 Provided By Biomedical Enginners

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1 INTRODUCTION

As the coronavirus (Covid-19) pandemic spreads, technological applications and initiatives are multiplying in an attempt to control the situation, treat patients in an effective way and facilitate the efforts of overworked healthcare workers, by BIOMEDICAL ENGINEERS. Also while developing new vaccines.

Here are the 5 solutions given below by the BIOMEDICAL ENGINEERS in the technological domains that are helping the fight against this pandemic disease by means of innovative applications. It also sheds light on the main legal and regulatory challenges, but also on the key socio-ethical dilemmas that the various uses of these technologies pose when applied in a public-health emergency context such as the current one.

2 ARTIFICIAL INTELLIGENCE

In the case of Covid-19, AI has been used mainly to help detect whether people have novel coronavirus through the detection of visual signs of Covid-19 on images from computerised tomography (CT) lung scans; to monitor, in real time, changes in body temperature through the use of wearable sensors; and to provide an open-source data platform to track the spread of the disease. AI can process vast amounts of unstructure d text data to predict the number of potential new cases by area and which types of populations will be most at risk, as well as to evaluate and optimise strategies for controlling the spread of the epidemic. Certain AI applications can also detect fake news about the disease by applying machine-learning techniques for mining social media information, tracking down words that are sensational or alarming, and identifying which online sources are deemed authoritative for fighting what has been called an infodemic. Facebook, Google, Twitter and TikTok have partnered with the WHO to review and expose false information about Covid-19.

3 BLOCKCHAIN

Using encrypted data and records to track transactions, several blockchain technologies have been launched to solve the challenges posed by the Covid-19 crisis and bring innovative solutions to the problems associated with this major disruption. First, in the area of donation tracking, blockchain allows donors to oversee where their funds are needed, receive notifications when the donations have been received and then track donations made for the treatment of people infected with the coronavirus in the Wuhan region.

Figure 1: Artificial Intelligence

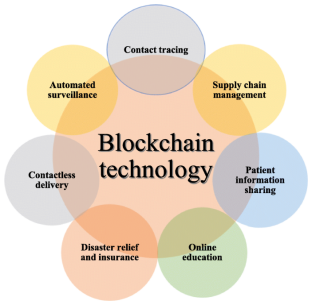

Figure 2: Blockchain

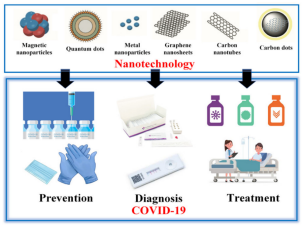

Figure 3: Nanotechnology

The borderless nature of Covid-19 and the global mask shortage require more thoughtful and planne d collaboration to deal with supply chain vulnerability. Blockchain seems to offer a variety of solutions in this regard. A blockchain-based platform has been launched to enable users to trace demand and supply chains of medical supplies, given the shortage of facial masks, and to rise to the challenges associated with the management, allocation and donation of relief supplies. It reviews, records and tracks demand, supplies and logistics with regard to epidemic prevention materials.

4 NANOTECHNOLOGY

Nanomedicine has already been used in drug delivery. In the case of an RNA-based vaccine, which consists of messenger RNA (ribonucleic acid) strands, lipid nanoparticles have been used to pack the RNA molecule and deliver it within the body. While no RNA vaccine has ever been licensed, a US-based biotechnology company specialising in messenger RNA therapeutics recently announced that its mRNA-based vaccine candidate (mRNA-1273) for the novel coronavirus disease (Covid-19) had just entered Phase 1 study. Novavax, meanwhile, also recently initiated the development of a vaccine candidate for Covid-19, using its proprietary recombinant nanoparticle vaccine technology. A group of scientists from the University of Washington's Institute for Protein Design have been manufacturing nanoparticles to create a more efficient vaccine against Covid-19 via computational models to predict and design self-assembling proteins. Furthermore, a group of researchers from the University of Lille and Ruhr-University Bochum have recently demonstrated that the addition of gold nanoparticles and carbon quantum dots (CQDs) to the cell culture medium before and during infection with coronaviruse s considerably reduced the infection rate of the cells.

5 SYNTHETIC BIOLOGY

In the case of Covid-19, the Bill and Melinda Bill and Melinda Gates Foundation and the National Institutes of Health have invested in the emerging field of synthetic biology, aiming to engineer vaccines. A vaccine, developed through synthetic biology would not just be 'scalable to a level of billions' but would also work even without needing to be refrigerated. The synthetic biology powerhouse Ginkgo Bioworks is giving 25 million dollars worth of resources to public and private teams working to cure, prevent and treat the novel coronavirus. A number of companies in the field of synthetic biology have been developing experimental vaccines containing synthetic strands of RNA or DNA that code for

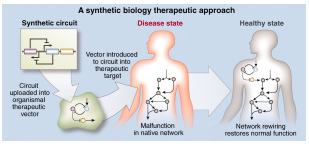

Figure 4: Synthetic Biology

Figure 5: Robots

protein molecules on the surface of the virus.

A Cambridge laboratory has used synthetic biology to locate a critical area of the virus's genetic code that may help them develop a vaccine ready for testing within a very short time frame, while Twist Bioscience has announced the availability of synthetic SARS-CoV-2 RNA controls to provide quality control for the development, verification, and ongoing validation for diagnostic tests. Their synthetic virus could help more labs to develop drugs, vaccines, and diagnostic tests for Covid-19.

6 ROBOTS AND DRONES

Robots are being deployed across the globe in the fight against the coronavirus pandemic. From robots that disinfect whole hospitals, decontaminate public and private sites, handle biohazardous waste or deliver food and medication, to robots that take patients' temperatures and act as medical assistants, robotics technology is being used to reduce the risk of person to person transmission especially in pandemic hotspots as an intelligent solution to combat the coronavirus.

In the context of the Covid-19 pandemic, drones are being used to monitor quarantine measures, to facilitate aerial broadcasting, to spray disinfectant, conduct aerial thermal sensing, monitor traffic and deliver medical supplies in infected areas. As the situation is becoming more serious, drone software is being rewritten to acquire a multitude of functions, with drones being used to replace helicopter patrols and traditional regular disinfection, for law enforcement purposes and for transportation to shore up epidemic prevention and control in several countries. The use of drones and other aerial surveillance technologies in the Covid-19 pandemic can facilitate the tasks of enforcing containment and social distancing measures, helping reduce the number of face-to-face contacts but also freeingup crucial human resources and minimising their exposure to the virus, thereby reducing the chances of contamination.

7 CONCLUSION

A scan of the technological horizon in the context of Covid-19 indicates that technology in itself cannot replace or make up for other public policy measures but that it does have an increasingly critical role to play in emergency responses.