

**CONCOURS EXTERNE ET INTERNE  
ORGANISES AU TITRE DE L'ANNÉE 2021  
POUR LE RECRUTEMENT D'INSPECTEURS DES DOUANES ET DROITS INDIRECTS  
DANS LA SPÉCIALITÉ « TRAITEMENT AUTOMATISÉ DE L'INFORMATION –  
PROGRAMMEUR DE SYSTÈME D'EXPLOITATION »**

**ÉPREUVE ÉCRITE D'ADMISSION N° 3 (OBLIGATOIRE)**

(DURÉE : 2 HEURES - COEFFICIENT 1)

**N.B. : Seules les copies des candidats admissibles seront corrigées**

**TRADUCTION SANS DICTIONNAIRE ET RÉPONSE À DES  
QUESTIONS PORTANT SUR UN TEXTE EN ANGLAIS ISSUE  
D'UNE REVUE OU D'UNE DOCUMENTATION INFORMATIQUE**

**AVERTISSEMENTS IMPORTANTS**

L'usage de tout matériel autre que le matériel usuel d'écriture et de tout document autre que le support fourni est **interdit**.

**Toute fraude ou tentative de fraude** constatée par la commission de surveillance entraînera l'**exclusion du concours**.

Il vous est interdit de quitter définitivement la salle d'examen **avant le terme de la première heure**.

Le présent document comporte **3 pages** numérotées.

APRÈS AVOIR PROCÉDÉ À LA TRADUCTION DES DEUX EXTRAITS SURLIGNÉS DU TEXTE CI-DESSOUS :

1<sup>ER</sup> PASSAGE : DE « ONE OF THE UNITED NATION'S » À « ...POWERFULL SOLUTIONS »

2<sup>ÈME</sup> PASSAGE : DE "IoT PRIVACY.." À "...EACH WIRELESS CHIP" ;



VOUS RÉPONDREZ ENSUITE EN ANGLAIS AUX DEUX QUESTIONS SUIVANTES (IL EST DEMANDÉ DE RÉDIGER AU MOINS QUINZE LIGNES POUR CHAQUE RÉPONSE) :

QUESTION 1 : Describe how IoT could provide means to combat the spread of pandemics

QUESTION 2 : Why does IoT raise ethical and security issues ?

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## How IoT Can Help Control Pandemic

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One of the United Nations' sustainable development goals is preparedness to combat the spread of infectious diseases. This goal has never been as relevant as it is now during the Covid-19 pandemic. Technology plays a major role in beating infectious diseases, and the IoT is an important part of our technology arsenal. Cost reduction, autonomous and remote caregiving and diagnosis, as well as newly available patient data are just a few of the ways that the IoT is transforming healthcare. And when it comes to disease control, wireless and IoT technologies offer powerful solutions.

We often think of IoT as a network of sensors and wireless micro-controllers, yet this is only the physical layer of IoT. Holistically, the IoT is distributed computing on a massive scale. The estimated 24 billion smart connected devices of the IoT can collect and perform computations on unprecedented amounts of data. In a pandemic response, more data simply means better decision making and better response plans. Both are vital in preventing and controlling the spread of a disease.

### Contact tracing

At the rise of a pandemic, the most urgent task is to trace and isolate those who possibly made contacts with the infected. This is one way of putting the disease under control. The traditional contact tracing techniques rely on interviewing subjects and asking them questions. This method is costly and time consuming and prone to human error. Traveling populations between densely populated cities exacerbate the problem and emphasize the weaknesses of the traditional method.

Alternatives to the traditional contract tracing rely on wireless technology (RFID, Bluetooth Low Energy, GPS, Wi-Fi and magnetic field signature) for detailed location tracking. Unlike the traditional method, wireless technology offers information on duration and proximity of the interaction with confirmed cases. Bluetooth Low Energy (LE), one of the most highly adopted IoT standards, can provide location tracking to a relatively high degree of precision. Compared to Wi-Fi and cellular location, Bluetooth LE can provide an order of magnitude greater precision than proximity detection. This improved accuracy is paramount in classifying the traced contacts and prioritizing the response to the closer contact cases. Bluetooth LE offers a multitude of location tracking schemes, such as RSSI and angle of arrival (AoA). The Bluetooth LE standard is also widely available on our smartphones and most connected wearables.

During the rise of a pandemic, deploying Bluetooth tags is yet another solution to improve the response plan. To put things into perspective, this means deploying hundreds or even thousands of Bluetooth tags and smart devices communicating in densely populated urban areas. Systemwide optimization of this mesh of Bluetooth devices is needed to overcome message collisions, which

could potentially mean missing a highly susceptible contact because their device did not register the interaction they had with a confirmed subject.

### **Biosensors and point-of-care Testing**

Another critical task in pandemic response is point-of-care testing. The lack of widely available test kits for Covid-19 has put us under the tip-of-the-iceberg impression whenever we examine Covid-19 data. The unconstrained spread of the Covid-19 virus in New York City could have been minimized if test kits were more widely available. Cost effective and quickly deployable diagnostic devices are also a fundamental need in remote and developing parts of the world, where lack of trained personnel and equipped healthcare centers can result in uncontrollable spread.

Besides being cost effective, diagnostic devices must be reliable, sensitive, portable, and user-friendly. Additionally, it is preferable if they can be fully or partially disposable, easily reproducible and have a small form factor. Cloud-connected biosensors fit this bill perfectly. Imperial College London researchers have demonstrated a lab-on-chip capable of early detection of diseases. The patient experience is fairly simple. A sample is extracted from the patient into a disposable cartridge. Within 30 minutes, the testing is complete.

[...]

IoT privacy and security vulnerabilities must be addressed before the technology reaches the hands of healthcare consumers. Addressing such concerns begs for the collective work of legislative, economical, medical, and technical players in the field. From a technical standpoint, a tremendous amount of innovations already exist to protect hardware and software devices against hacks. For example, Silicon Labs' Secure Vault technology generates a unique signature, like a birth certificate, for each wireless chip. This means the computations performed on the chip become only available to IoT service providers of the IoT service and not to nearby hackers. However, establishing consumer trust in how their personal data is handled by the providers remains an open issue.

IoT technology can lead the way in helping to prevent and manage current and future pandemics. The IoT, deployed at mass scale, offers humanity an unprecedented body of data and analytics in the face of pandemics. Controlling the spread of a disease becomes more efficient and can help us can track, test, and treat entire populations with IoT technology.

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