Scalable Track, Trace, and Isolate Solution for Pandemic Contagion and Risk Management

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The COVID-19 Pandemic emphasizes the need for a Track, Trace, and Isolate approach (TTI) in society. Solutions (like mobile apps and Bluetooth devices/sensors) proposed for COVID-19 risk management at schools, care homes, and workplaces face resistance in user adoption. Why does this resistance occur, and is it possible to build a multiscale TTI solution? The project used the Six Sigma design approach to identify vital requirements for a plausible solution. The data collected showed that the global adoption rate is low (<5%) for current technology solutions as they are primarily based on mobile hardware and apps. These market solutions raise concerns of user privacy/security and inconsistencies in the mobile ecosystem. By evaluating the available technology landscape, the Internet of Things (IoT) was the most optimal method to address key concerns as it can work independently. The device's software/service architecture will be cloud-based to allow for flexible deployment at lower costs than competitors. This research has also brought forth a specially designed wearable device to deploy the IoT software, usable by all ages. I used Raspberry Pi as a proxy for IoT electronics, C++ as the root processor, and Python for data analysis. In conclusion, my proposed IoT-based TTI solution provides an effective pandemic response at a very low per-user cost at scale ($1 -$2 per wearable). I also have proposed additional sensors (like blood oxygenation), despite the additional costs from the extra hardware, so non-symptomatic cases are identifiable by the device; this approach takes a long-term strategic view to supplement public health management.