

## Singapore unveils automated blood oxygen monitoring system to beat COVID-19

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**A team of researchers has developed an open-sourced system that wirelessly collects measurements of oxygen levels taken from Bluetooth-enabled pulse oximeters, and presents the data on a color-coded dashboard**



Automating the collection and presentation of healthcare data is crucial in the fight against COVID-19 – it adds capacity to screening efforts by automating routine tasks.

Singapore's Temasek Foundation brought together NUS, National University Hospital (NUH) and Singapore General Hospital (SGH) to develop an open-sourced system that wirelessly collects measurements of oxygen levels taken from Bluetooth-enabled pulse oximeters, and presents the data neatly on a dashboard. This compilation is quicker and more efficient compared to the current method of manually writing down the readings, which then requires additional manpower to consolidate the data electronically.

### Using pulse oximeters for COVID-19 monitoring

Pulse oximeters measure the level of oxygen saturation in the blood. Collecting data on oxygen levels is crucial because people with COVID-19 may suffer from “silent hypoxia”, a dangerous condition in which they do not outwardly appear to be short of breath, but are confirmed to be so through a pulse oximeter test. With the NUS system, the time-consuming task of manually collecting and sending pulse oximeter measurements from thousands of individuals could be automated.

The NUS system consists of several components: wireless nodes to be installed to capture data from Bluetooth-enabled pulse oximeters, individual Bluetooth-enabled pulse oximeters, WiFi stations, and a dashboard that presents the data to the end-user.

To start the monitoring process, the user must first be within six metres of a wireless node located within the room. The user then clips the Bluetooth-enabled pulse oximeter onto their index finger and leaves it there for 30 seconds for the device to complete the measurement.

Once the measurement is taken, the wireless nodes then send the information collected to the cloud via WiFi stations. The data is then displayed on a single integrated dashboard which will show the users' names and their pulse oximeter readings.

The data can be conveniently accessed via a computer, tablet or a smartphone.

The user will also be informed about the readings taken via text messages. If the readings are normal, the message will indicate so. If any reading is abnormal, a text message will be sent to the users in their preferred language – such as English, Chinese, Tamil, Bengali and Hindi – advising them to retake the measurement after 30 minutes.

If an abnormal reading is returned the second time, or if the user does not retake the measurement within the hour, the user will receive another alert requesting that the user contact healthcare workers for further examination.

The team is continually updating the system to address evolving healthcare needs surrounding care for COVID-19, might be with additional sensors. The team also aims to use the system to automate the monitoring of asymptomatic COVID-19 patients in large settings such as community isolation facilities.