ASEC 2021
The 2nd International Electronic Conference on Applied Sciences
15–31 OCTOBER 2021 | ONLINE

A wearable temperature sensor network to address the COVID-19 pandemic emergency

Nunzio Cennamo

Department of Engineering
University of Campania L. Vanvitelli
Aversa, Italy

Università degli Studi della Campania *Luigi Vanvitelli*

Antonietta Fiore

FLOS srl,

Afragola (Naples), Italy

Salvador Tufano, Giovanni De Rosa, Carmela Maria Napolitano, Carla D'Antò

Ministero dell'Istruzione,

Rome, Italy

A wearable temperature sensor network to address the COVID-19 pandemic emergency

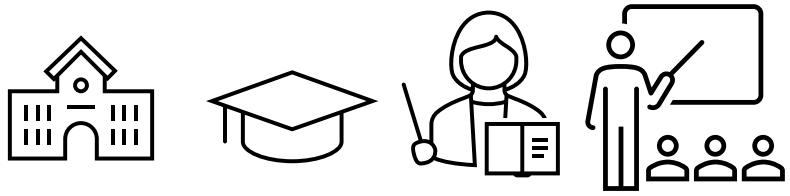
Outline

- Introduction
- A sensor network for body temperature detection
- Conclusions

Introduction

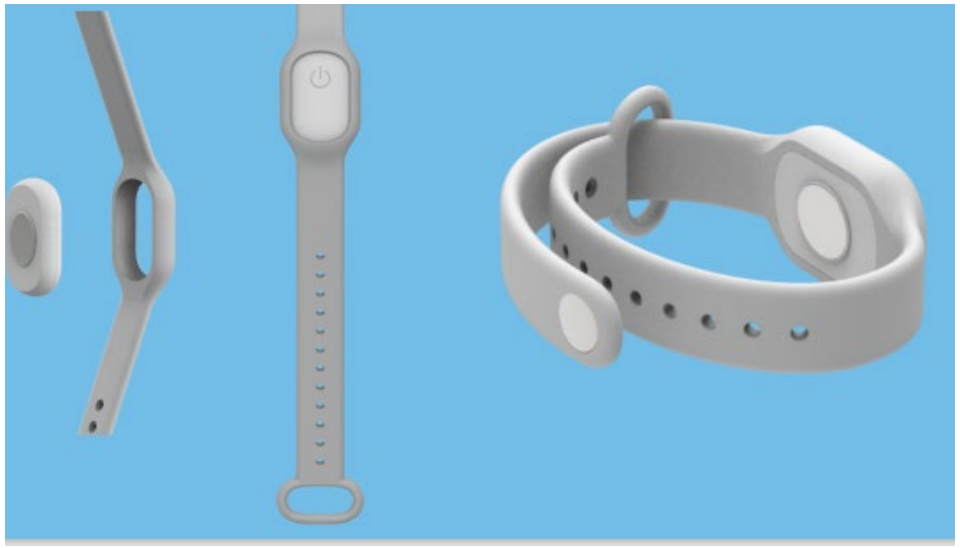
In this COVID-19 emergency, to reduce the infection risk, several types of body temperature sensors have been used to monitor people access to public enclosed spaces, e.g. thermal imaging cameras and infrared thermometers. In some buildings, the people are located for several hours, so a continuous monitoring could be useful.

For this reason, in three schools, we have proposed and tested a body temperature sensor network based on wearable temperature sensors monitored via Bluetooth 5.0 by smartphones and/or custom gateways. The data are collected on a server via the Internet, and a custom software is used to control the measured temperature and to produce warnings automatically.

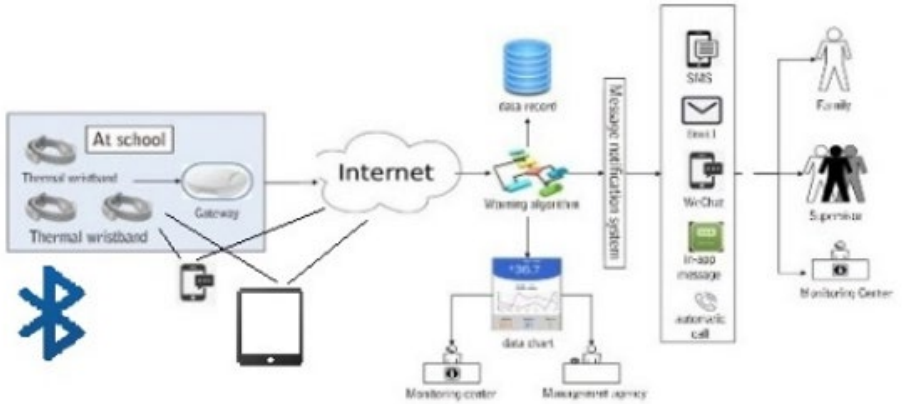


A sensor network for body temperature detection

All students and staff members were assigned bracelets. Each wearer is a monitored object and, exploiting the smartphone app, can monitor other people connected in a range of 100 m.



The wearable sensor system is a small-size chip with an accuracy of +/- 0.1° C that can be inset into a specific rubber bracelet for continuous and real-time temperature monitoring and for data transmission

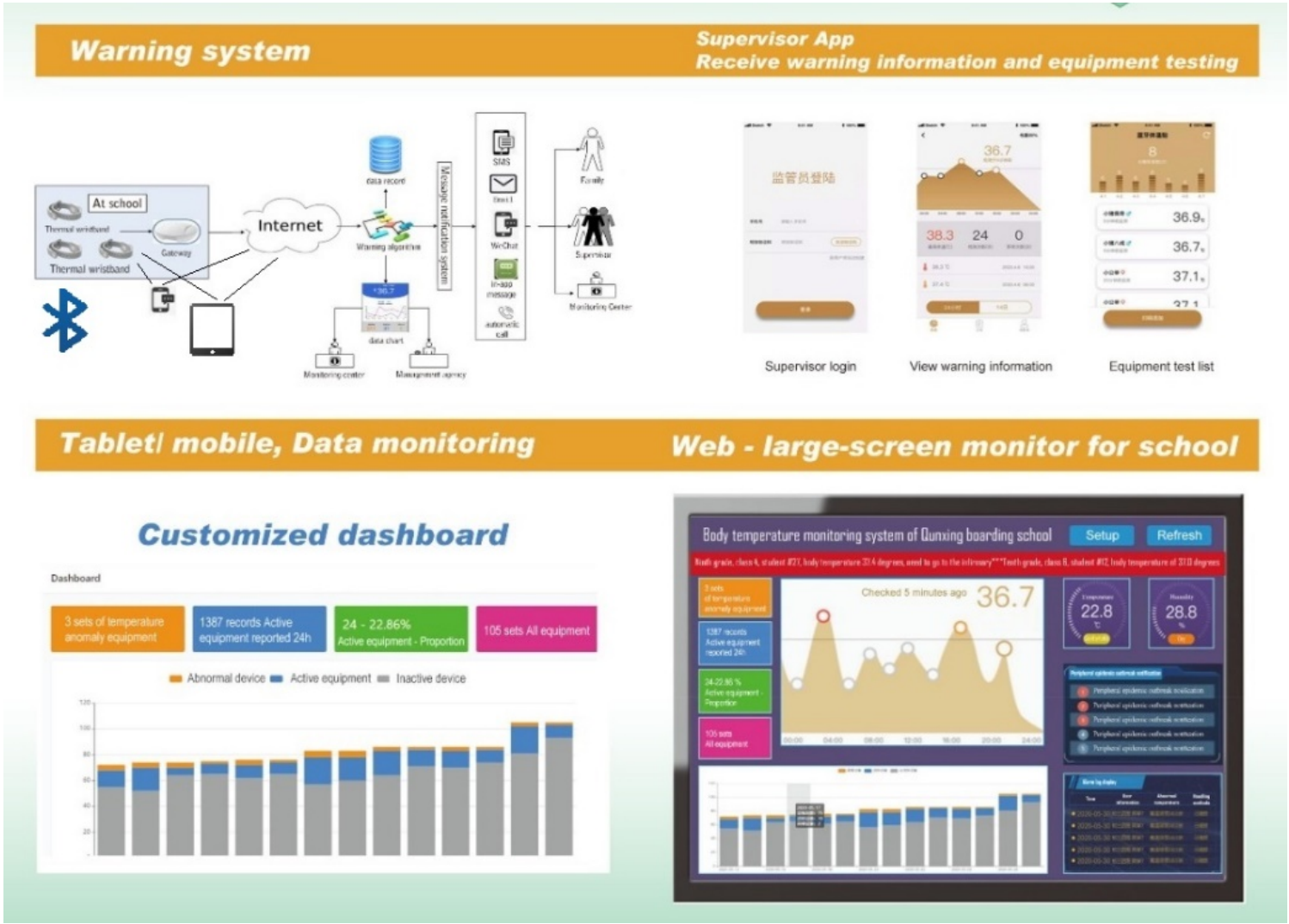


The used temperature sensors measure the parameter of interest and transmit it via Blue-tooth 5.0 to smartphones and/or custom gateways (with a maximum of about one hundred and fifty per gateway and about fifty per smartphone).

A sensor network for body temperature detection

To obtain a body temperature sensor network, that is able to constant and safe monitoring, the developed software is used to analyse the database present on the Server, to control the measured temperature, and to produce warnings automatically.

The sensor network is provided with a web interface to view the data stored on the Server. In particular, each School can see only the data relative to its students and staff, even if the database is the same for all to allow statistic analysis, etc.



Conclusions

- We have presented an innovative strategy for continuous and real-time body temperature monitoring by a sensor network based on simple wearable sensors inserted into bracelets. It exploits the real-time notification of the monitoring system and allows immediate isolation of the person with abnormal temperature after alert notification.

- We are testing this sensor network in three schools: IPSEOA “C. Russo” di Cicciano (NA), IPSSAR “Di Gennaro” di Vico Equense (Na), and IS “A. Torrente” di Casoria (NA).

- In each School, in addition to the installation of the App on Smartphones and Tablets, we installed a monitoring gateway covering the entire School. Moreover, we set up a background service system running in the cloud.

- It could be a first paradigm for monitoring body parameters in a community exploiting a sensor network; in fact, the same sensor network system can be used to measure different parameters of interest for diagnostics and health protection.