NIST COVID-19 RELATED RESEARCH

NIST is pleased to share details of several efforts that NIST has underway to help address the COVID-19 pandemic, and greatly appreciate the opportunity to share them with you. We are rapidly getting these projects in place and will be adding more details on the NIST website https://www.nist.gov/coronavirus about these efforts, and others as they come to fruition.

Biological Measurements

NIST developed a new way to increase the sensitivity and accuracy of the common swab test for COVID-19, critical for understanding and controlling the outbreak. The math-based approach could reduce measurement errors in the test, potentially detecting more asymptomatic carriers of the virus. Read the e-print.

One approach to diagnostic testing for COVID-19 involves detecting the RNA (genetic material) of the SARS-CoV-2 virus in a nasal swab. Manufacturers of test kits need a way to measure how effective their tests are at detecting this RNA. To help with this, NIST will produce synthetic fragments of SARS-CoV-2 RNA that manufacturers can use to calibrate their instruments and develop quality controls. This research grade test material will be safe to handle, as it is composed of RNA fragments, rather than the virus's full RNA genome.

NIST will research how the diagnostic assay for COVID-19 deployed by the CDC will be affected by mutations in the coronavirus that causes the disease, and potentially identify issues in the test before the virus mutates enough to escape detection.

NIST is co-organizing a pilot study with three other National Metrology Institutes through the International Bureau of Weights and Measures (BIPM) CCQM Nucleic Acid Working Group. The study will expand measurement capabilities and help standardize the performance of analytical methods used by diagnostic test manufacturers, clinical laboratory-developed tests and international test standardization efforts.

Machine Learning/Artificial Intelligence, Data and Analytics

A multidisciplinary team of NIST experts in natural language processing and data curation and discovery have created tools that allow researchers to get the most from the COVID-19 Open Research Dataset (CORD-19), a collection of tens of thousands of scholarly research articles about coronaviruses, SARS-CoV-2 and COVID-19. Read the NIST news article.

NIST researchers are leveraging TREC, a long-running program that evaluates and advances search engine technologies, to spur improvements in searches of the CORD-19 dataset, in partnership with the White House Office of Science and Technology Policy. Read the NIST news article.

A cross-laboratory group is working on ways to apply NIST expertise in privacy, cybersecurity, sensors and other measurement-science fields to meet community challenges in the development and application of encounter notification through apps and other hardware.

NIST researchers are exploring the feasibility of using AI to predict key COVID-19 trends.

Personal Protective Equipment

A team of NIST researchers plans to design a system to test the release of gases from masks after they have been decontaminated, in coordination with the CDC's National Institute for Occupational Safety and Health National Personal Protective Technology Laboratory.

NIST scientists are applying their expertise and using existing equipment to create an apparatus that measures how well different fabrics capture aerosol particles to help inform understanding of mask effectiveness.

A team of NIST researchers is designing a research plan to verify the integrity of N95 masks following decontamination with ultraviolet irradiation, using techniques including high-resolution scanning-electron microscopy (SEM). This research builds needs identified in a NIST workshop on ultraviolet disinfection technologies and healthcare associated infections, held in January 2020.

A NIST engineer developed a spreadsheet tool to estimate the amount of vaporized hydrogen peroxide (VHP), N95 masks would receive during disinfection, to help hospitals determine the best rooms to use for the process. Read the NIST news article.

The NIST campus in Boulder loaned an environmental chamber to Colorado State University for use in testing N95 masks.

Our standards experts are helping manufacturers meet relevant standards for production of personal protective equipment.

Manufacturing and Industry

The NIST Manufacturing Extension Partnership has worked with its clients across the country to identify and support manufacturers who can help with supplies required to respond to COVID-19 needs.

The NIST Manufacturing Extension Partnership is awarding CARES Act funding to its national network of centers to help manufacturers respond to the COVID-19 pandemic. Read the news release.

The Manufacturing USA network is awarding funds to existing institutes to support rapid, high-impact projects that help with the nation's response to the pandemic. Read the news release.

NIST research chemists are working to make widely available reliable test materials and methods to verify the ethanol content in hand sanitizer.

NIST economists will survey small and medium-sized enterprises to document their experiences planning for natural disasters during the COVID-19 pandemic, and share lessons learned with

federal partners (e.g., Federal Emergency Management Agency, Economic Development Administration, NOAA, Small Business Administration) and other key stakeholders.

Ventilators

NIST engineers are coordinating with other government agencies to identify opportunities to address reported ventilator shortages through new technologies, rapid assessment, and other options.

Wireless Innovations

NIST researchers are beginning a project to capture data on wireless spectrum occupancy, traffic load, and the number of devices/networks operating during the current period of heavy remote working and operations. The project is designed to develop appropriate scenarios for future testing to enable device developers, manufacturers, and regulators to stress-test systems prior to deployment and to support communication networking that is more resilient to pandemics and other disasters.

NIST researchers are exploring the feasibility of implementing a simple software update to wireless routers or base stations to enable them to function as non-contact respiratory monitors in home and medical environments.

Energy and Environment

NIST engineers are retooling an existing web-based indoor particle exposure modeling tool to address virus outflow, transport, and occupant exposure within buildings.