Clinical Care/Therapeutics

A multicampus infrastructure to advance telehealth implementation for low-income Californians in response to COVID-19
Researcher/s: Hector Rodriguez, Denise Payan, Lorena Garcia | UC Berkeley, UC Merced, UC Davis
Examining the transition towards telehealth COVID-19 treatment for low-income Californians with pre-existing chronic conditions.

Augmented Reality video-assisted clinical care for remote management of COVID-19
Researcher/s: Narges Norouzi, Ian Julie | UC Santa Cruz, UC Davis
Demonstrating real-time analysis of video telehealth treatment intended to assist a clinical practitioner in the management of COVID-19 patients.

Contact Tracing

Discovery of symptom phenotypes and trajectories for COVID-19 adaptive interventions
Researcher/s: Katherine Kim, Xin Liu, Jill Joseph, Joanne Natale | UC Davis Health
Using an innovative platform to collect longitudinal data and testing results and applying cutting-edge machine-learning methods to predict COVID-19 infection.

A data scientific approach to coronavirus surveillance: Application to re-opening UC campuses
Researcher/s: Scott Moura, Raja Sengupta | UC Berkeley
Leveraging data science methods to model, survey, and potentially mitigate outbreaks within large institutions, such as university campuses, developing a toolkit for societal leaders and organizations to re-open operations.

Data Analytics/Modeling

Estimating the local spread of COVID-19 around long-term care facilities in California using social interaction networks with spatial information
Researcher/s: Martin Cadeiras, Miriam Nuño, Diego Pinheiro | UC Davis Health
Using novel epidemiological modeling of COVID-19 to generate accurate predictive analytics on the local spread of COVID-19 at long-term care facilities (such as nursing homes) in California.

Social distancing and sheltering in place: Using a nationwide smartphone panel with location data to understand population heterogeneity and inform intervention methods
Researcher/s: Daniel Chatman, Joan Walker, Daniel Rodriguez | UC Berkeley
Taking pre- and post-COVID movement data to measure household activity changes to correlate with baseline demographics - including household income, household size, and race/ethnicity.
Identifying and quantifying COVID-19 misinformation
Researcher/s: Hany Farid, Alexa Koenig | UC Berkeley
Using machine learning to collect data on COVID-19 misinformation on social media sites in order to mitigate harm caused by deception and conspiracy theories.

Privacy guarantees for the use of personal location data in COVID models
Researcher/s: Joshua Blumenstock | UC Berkeley
Developing privacy-preserving techniques for the use of personal location data in epidemiological methods without compromising individual privacy.

Strain-level surveillance of SARS-CoV-2 and RNA viromes in municipal wastewater
Researcher/s: Kara Nelson, Jillian Banfield | UC Berkeley
Wastewater-based epidemiology to track the spread of COVID-19 via sewage surveillance, monitoring community infection levels as shelter-in-place orders are lifted and detecting future reintroductions of the virus.

Improving COVID-19 severity forecasting and uncertainty quantification
Researcher/s: Bin Yu | UC Berkeley
Using novel interpretable models to forecast COVID-19 cases, hospitalizations, and deaths for each county - accurate up to a month ahead.

Open-source 3D browser with and without Virtual Reality for gamified crowdsourcing of COVID-19 data analysis
Researcher/s: Mircea Teodorescu, Sri Kurniawan | UC Santa Cruz
Web-based platform that enables crowdsourced analysis of COVID-19 data through browser-based 3D rendering with and without virtual reality.

PPE/Equipment

AmbuBox: Fast-deployable low-cost ventilator for COVID-19 emergent care
Researcher/s: Tingrui Pan, Andrew Li | UC Davis
Designing a low-cost, clinically viable ventilator - “AmbuBox” will be able to be rapidly deployed for pandemics inflicting respiratory distress.

At-home COVID-19 detection on face mask
Researcher/s: Liwei Lin, Shuvo Roy | UC Berkeley, UCSF
Analyzing exhaled breath condensate on face masks to detect COVID-19 infection without the use of conventional throat swabs.

Developing a 3D-printed protective cage for decontamination of N95 masks
Researcher/s: Phillip Messersmith | UC Berkeley
To address the PPE shortage, researchers will study the eco-friendly use of liquid CO2 to clean and sterilize clinical masks without diminishing mask performance.

Developing a mobile, low-cost, scalable, variable output ozone generator for different sanitization applications
Researcher/s: Reza Ehsani | UC Merced
Designing a new, low-cost, portable ozone production system to efficiently sanitize medical equipment and spaces to mitigate spread of COVID-19.

**RespiraWorks open-source ventilator**  
*Researcher/s: Julia Schaletzky | UC Berkeley*

Creating an open-source ventilator design to address market shortfalls while providing the features of ventilators capable of monitored care for up to two weeks.

**Low-cost, flexible oxygen saturation and temperature sensors for COVID-19 patient home monitoring**  
*Researcher/s: Rikky Muller, Ana Arias | UC Berkeley*

Developing disposable body-worn patches to measure blood oxygen and heart rate to address hypoxia concerns.

**Vine robot for automated nasopharyngeal swabbing**  
*Researcher/s: Gabriel Elkaim, Lin Zhang | UC Santa Cruz, UC Davis Health*

“Vine” robot that extends a soft, vine-like swab tip to test patients with more comfort for patients and less risk for clinicians.

**Testing**

**The UCSC SARS-CoV-2 genome browser**  
*Researcher/s: Maximilian Haeussler, Jim Kent | UC Santa Cruz*

Accelerating Covid-19 research by integrating all genetic information from existing resources into the UCSC Genome Browser.

**Applying transformative technology to create a diagnostic testing facility from a research lab**  
*Researcher/s: David Haussler, Olena Vaske | UC Santa Cruz*

Transformative technology to open a Clinical Laboratory Improvement Amendments (CLIA) diagnostic testing facility to benefit symptomatic community members and essential workers.

**COVID-19 detection using nanotechnology-based devices**  
*Researcher/s: Waqas Khalid | UC Berkeley*

Designing a portable, point-of-care rapid testing device the size of a credit card to aid in continuous testing.

**Delivering safer air in healthcare facilities treating COVID-19 patients**  
*Researcher/s: Hayden Taylor | UC Berkeley*

Rapidly manufacturable, easily deployable, and affordable air treatment system to reduce the volume of virus particles inhaled by healthcare personnel.

**Ionizing air to trap COVID-19 virus to prevent airborne transmission**  
*Researcher/s: Saif Islam | UC Davis*

One-dimensional semiconductor nanostructures to address the biggest challenge of ionizing devices – dangerously high voltage of operation that emits harmful ozone gas as a byproduct.

**At home personalized monitoring of exhaled breath inflammatory biomarkers for known or suspected COVID-19 patients**  
*Researcher/s: Cristina Davis, Nicholas Kenyon, Michael Schivo | UC Davis*
Self-administered tests so that subjects who are sent home from hospitals to self-quarantine can collect their exhaled breath samples.

**Development of sensor platforms for rapid COVID-19 antibody detection**  
*Researcher/s:* Wei-Chun Chin, Changqing Li, Jennifer Lu | UC Merced

Building low-cost COVID-19 antibody sensor platforms based on graphene and carbon nanotubes with very fast response time (within seconds).

**Droplet transport controlling airborne disease transmission**  
*Researcher/s:* Simo Makiharju | UC Berkeley

To understand and control the transmission within and between rooms, including the effects of building ventilation in distributing aerosols throughout buildings.

**Online visualization and annotation of SARS-CoV-2 protein domains**  
*Researcher/s:* Ian Holmes | UC Berkeley

Developing a web application prototype to integrate protein phylogenies, alignments, and structures in an interactive browsing experience that allows scientific literature to be annotated, bookmarked, and shared.

**Integrated quantitative microbial risk assessment and geospatial analysis of SARS-CoV-2 in wastewater for vulnerable populations**  
*Researcher/s:* Colleen Naughton, Maureen Kinyua | UC Merced, UC Davis

Information technology to quantify the associated risk of SARS-CoV-2 infection for wastewater treatment operators and neighboring communities.

**Detection of active SARS-CoV-2 infections in crude biofluids**  
*Researcher/s:* Markita Landry | UC Berkeley

Rapid, reversible, and portable device to detect active CoV-2 infected individuals, with a supply chain orthogonal to qPCR-detection of infected individuals.

**An ultra-sensitive method to determine viral load of COVID-19 patients for patient stratification and care**  
*Researcher/s:* Lydia Lee Sohn | UC Berkeley

Quantifying SARS-CoV-2 viral load in COVID-19 patient saliva, tagging viral particles with DNA oligonucleotides — tDEV preliminary data shows unprecedented sensitivity for SARS-CoV-2 quantitation.

**Validating the use of Propidium Monoazide (PMA) qRT-PCR to detect viability of SARS-CoV-2 without the need for BSL3 tissue culture**  
*Researcher/s:* Jonathan Eisen | UC Davis

Propidium Monoazide-based assay to detect viable SARS-CoV-2 virus in environmental samples, testing how long the SARS-CoV-2 virus is viable in the environment.