جامعة نيويورك أبوظبي

**NYU | ABU DHABI**

SPECIAL EDITION

# COVID-19:
# A CALL
# TO ACTION

NOVEMBER 2020

# OFFICE OF RESEARCH
NYU ABU DHABI

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A global crisis requires a global response. Members of NYU Abu Dhabi's extensive and far-reaching community have thrown their weight behind addressing the unique challenges COVID-19 has placed on the world. In almost every field, researchers are garnering their resources to initiate unique projects specifically aimed at tackling this pandemic and better understanding the impact it has on our world.

# SPECIAL EDITION CONTENT

# INTRODUCTION

NYU Abu Dhabi is helping to scale up and speed up diagnostic tests. We are activating our state-of-the-art labs and helping create new equipment. We are working across divisions and disciplinary boundaries to better understand the impact of the necessary restrictions imposed on our lives. Here you will learn more about how we are connecting creative and scientific discovery with impact for economic and societal benefit.

# COVID-19 FACILITATOR RESEARCH FUND AWARDS

NYU Abu Dhabi (NYUAD) has awarded ten COVID-19 research grants to faculty across a range of disciplines designed to support academic research with the potential to mitigate the impact of COVID-19.

The ten selected projects focus on a wide range of disciplines from medical approaches to COVID-19 detection, to policy analysis and its impact on personal and social health.

Partnerships and coordination with local entities and institutions have been a vital component in supporting broader efforts to address the pandemic and resulting challenges.

"These research awards announced are part of a larger collaborative and coordinated national effort to find solutions to the COVID-19 challenges we face. Across the nation, NYU Abu Dhabi and other research communities in higher education institutions have mobilized to tackle the crisis. We hope that these and many other projects will help address how we can heal and be prepared for future pandemics. It is through sustainable investment in research and development and coordinated collaboration that we will, as a unified collective, defeat COVID-19."

### SEHAMUDDIN GALADARI
**Senior Vice Provost of Research, Managing Director of the Research Institute and Professor of Biology**

## MOHAMMAD QASAIMEH
**Smart Adhesive Bandage for Fingerpick-based Detection of SARS-CoV-2 Antibodies.**

Assistant Professor of Mechanical and Biomedical Engineering **Mohammad Qasaimeh** is producing a low cost, wearable smart adhesive bandage for the dual detection of the immune response to severe acute respiratory syndrome as well as the presence of the COVID-19 in the finger-prick blood drop.



## GEORGE SHUBETIA
**A Single-molecule Ultrasensitive Platform for Rapid SARS-CoV-2 Diagnostics.**

Assistant Professor of Physics **George Shubeita** is looking to develop an ultrasensitive and rapid method for the diagnostics of COVID-19 in collaboration with Professor of Biology at NYU, Director of Bioinformatics and Affiliated Faculty at NYUAD, and Co-Director of NYUAD Center for Genomics and Systems Biology **Kristin Gunsalus**. The method aims to increase detection sensitivity, allowing single viral particles in patient samples to be identified directly without the need for nucleic acid amplification and the associated enzymes which, in the current pandemic, have been limited in supply due to increased global demand.



## WAEL RABEH -
**Expression and Biochemical Characterization of COVID-19 Proteases for the Initiation of Drug Screen Efforts at GNU and in the UAE.**

Associate Professor of Chemistry **Wael Rabeh's** lab aims to express, purify, and biochemically and biophysically characterize the two proteases (enzymes important for the production of new virus particles by releasing functional proteins from the main virus polypeptides) important for the discovery and development of antiviral therapeutics against COVID-19.

The lab has successfully expressed and purified the main protease 3CLpro of COVID-19 that is responsible for the process of new virus particles. The 3CLpro protease has been biochemically characterized for optimum conditions to conduct the screening and discovery of inhibitors to be used as potential therapeutics against COVID-19.
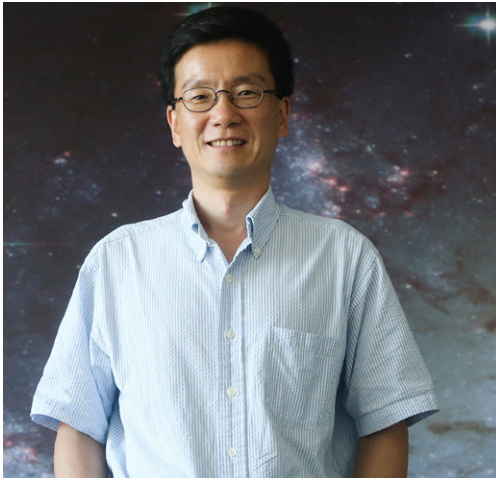
## YONG-AK (RAFAEL) SONG
### An Integrated Microfluidic Chip for Rapid Detection of SARS-CoV-2.

Associate Professor of Mechanical and Biomedical Engineering **Yong-Ak (Rafael) Song** is developing a simple and inexpensive microfluidic chip that can extract RNA's (a nucleic acid present in all living cells) from patient samples and detect the target RNA rapidly. Song fabricated an inexpensive microfluidic chip for RNA extraction and is currently testing it with synthetic samples.

## JEAN IMBS
### The Propagation of COVID-19 Via the Global Value Chain.

Global Network Professor of Economics **Jean Imbs** is developing a metric that predicts both the gravity of economic contagion from COVID-19 and the consequences of sequential reopening after a lockdown. Lockdowns caused by COVID-19 have devastated production, with ripple effects traveling through global value chains. The metric will help address two important questions - what sectors and countries are most exposed to the disruption of global value chains and what are the key bottlenecks?

## ETIENNE WASMER
### Labor Reallocation Post-COVID-19 (Acronym LRPC19): An Assessment of Alternative Labor Policies.

Professor of Economics **Etienne Wasmer** plans to investigate the post-epidemic impact of COVID-19 on the economy. Wasmer and his co-authors examine the extent of job reallocations across sectors, with some shrinking and some expanding, as well as the wage and price adjustment that will follow.

## ROBERT KUBINEC
### CoronaNet: A Dyadic Dataset of Government Responses to the COVID-19 Pandemic.

Assistant Professors of Political Science **Robert Kubinec** and **Joan Barceló** are in the process of compiling the largest and the most comprehensive hand-coded dataset (called CoronaNet) of government policy announcements made in response to the pandemic. This dataset will allow policy-makers, governments, scientists, and the broader public to examine the effectiveness of policies made at all levels of government, as well as a better understanding of the policy-making processes around the world.

## MALTE REICHELT

**A Longitudinal Examination of Changes in Norms, Social Preferences, Networks and Personal Health in Response to the COVID-19 Pandemic.**

Assistant Professors of Social Research and Public Policy **Malte Reichelt** and **Kinga Makovi** are working with a network of academics to study the immediate, short, and **long-term social impact of the COVID-19 pandemic** in the US, Germany, and Singapore. The study will address important questions such as how COVID-19 and the measures taken to prevent the spread of the virus can change our societies and the way we interact with one other. It will also monitor and track changes in social network composition, labor-market outcomes, social norms specifically related to what people believe is a socially beneficial behavior, and measures of cooperation in communities.

## AZZA ABOUZIED

**Integrating Policy Optimization in Epidemic Modeling.**

Professor of Computer Science **Azza Abouzied** is building a tool that can guide policymakers with plans that can curb and control an epidemic while taking into consideration societal and economic costs.

## PIERGIORGIO PERCIPALLE

**Structural and Functional Analysis of COVID-19 Non-structural Proteins Involved in Viral Replication.**

Associate Professor of Biology **Piergiorgio Percipalle** is investigating the mechanism of the SARS-CoV-2 replication and how certain viral proteins affect and influence host cell function after viral infection in collaboration with Visiting Professor of Chemistry, affiliated at NYUAD **Gennaro Esposito**. Percipalle's group is also developing an antibody-based tool (a 'nanobody'), that targets specific SARS-CoV-2 proteins and can be used for the screening of COVID-19 patients' samples, and potentially used as a therapeutic agent for COVID-19 treatment.

# OUR LOCAL AND GLOBAL CONTRIBUTIONS

NYUAD are contributing to the fight against COVID-19 through innovative collaborations, research, and in-field studies. Here is some of the work that our researchers, faculty and staff have conducted with their respective teams to curb the spread of the pandemic and better understand it's impact on our lives, socio-economic status, and our futures.

### 3D PRINTED REUSABLE MASKS

Ramesh Jagannathan, Michael Davis, and Oraib Al-Ketan in collaboration with Mubadala Healthcare **designed several prototypes and fabricated samples of reusable masks with replaceable filters**. For the purpose of fabrication, they used their state of the art 3D printing systems using test materials which have desirable properties (ex: flexibility, strength, rigidity). The designs have been agreed upon and now Mubadala Healthcare is producing these designs using appropriate fabrication routes that will ensure cost-effectiveness and the use of qualified and tested skin-friendly materials that will have the same properties as the 3D printed test materials.

Anthony Tzes, a Professor of Electrical and Computer Engineering, developed two different types of **3D printed sustainable and reusable masks based on N95 specifications.** Made from tough biodegradable material these locally made masks can be reused and recycled to reduce waste.

### GROCERY DELIVERY DRONE

Anthony Tzes, program head for electrical and computer engineering, has developed, has developed **a grocery delivery drone** for people who are self-isolating, capable of lifting up to 10kg. This innovation is great for a time where we want to limit human-to-human contact for deliveries. Currently, the team completed the simulations to mechanically create a couple swarm of drones to carry heavier payloads.

### LENGTHEN THE RUNWAY

StartAD in collaboration with VentureSouq and Scalable CFO launched an initiative, called **#lengthentherunway**, that supports local SMEs and startups with resources and **"Runway Grants"** totaling to over 100,000 USD for affected alumnis of the program.

### COMMUNITY COVID-19 INFORMATION HUB

Yasir Zaki, assistant professor of computer science, launched a **community COVID-19 information hub** to collect and disseminate accurate and current critical healthcare data (ex: availability of hospital beds, PPE). This was built on the "Hyperlocal Web" concept of the GAIUS Networks where users in local communities can interact via locally relevant content in local languages using ultra fast, lightweight mobile applications.

## MULTINATIONAL RESEARCH

Jocelyn Belanger, assistant professor of psychology, led an initiative which involved over 100 collaborators located in five continents to conduct **a rapid, multi-national research to identify psychological and cultural factors relevant to the spread of COVID-19 and its effect on societies.** We will be disseminating on a regular basis evidence-based reports to inform policy.


## CITIZEN JOURNALISM

Greg Chih-Hsin Sheen, a social science postdoctoral associate, conducted the **first study that confirms the positive effects of citizen journalism** (non-official sources and medical experts) on reducing the credibility deficit in a period of epidemic crisis for governance in authoritarian countries.


## CHEST X-RAY IMAGING

Farah Shamout, assistant professor emerging scholar of computer engineering, and her collaborating team at NYU Langone and Center for Data Science used chest x-ray imaging to predict deterioration of patients diagnosed with COVID-19.


## CONDUCTING LARGE-SCALE SURVEYS

Marc Witte, a social science postdoctoral associate, conducted a **large-scale survey covering 58 countries and over 113,000 respondents at the onset of the COVID-19 pandemic** to explore how beliefs about citizens' and government's response to COVID-19 pandemic affected mental wellbeing. The results of that survey were published as a **working paper.**


## POLICY BRIEF

Supporting Children's Return to School Amidst the COVID-19 Pandemic, Global TIES for Children published a **policy brief** on World Refugee Day based on pre-COVID-19 research conducted in collaboration with the International Rescue Committee and supported by Dubai Cares. The findings highlighted in this policy brief were used to understand the possible **impacts of COVID-19 on Syrian refugee children due to COVID-19 school closures** and possible learning losses resulting in children being over age for grade. See the full article **here.**

## THE AHLAN SIMSIM PROJECT

**Global TIES for Children** conducted a collaborative pilot study with the International Rescue Committee (IRC) and Sesame Workshop on the **Ahlan Simsim** project to inform their evaluation of the Ahlan Simsim Preschool Healing Classroom (PHC) program in Lebanon, this meant postponing direct child assessments and classroom observations and moving survey data collection with teachers, teacher aides, and caregivers to a phone based format. It also meant that these surveys would no longer be capturing pre-pandemic realities.

## PREVENTING PROLONGED ECONOMIC DOWNTURN

**Elena Beretta, Alberto Gandolfi, and Etienne Wasmer** formed a joint interdisciplinary team associating mathematicians and economists to examine how to balance the need to reduce the spread of COVID-19 while trying to prevent economies from experiencing a prolonged downturn. The team developed a mathematical model that offers a template for policy-makers looking for the best approach to evaluate the human and economic costs of measures to contain the pandemic.

## MIXED REALITY IMMERSIVE GAME LEARNING

Professor of Civil and Urban Engineering **Tarek Abdoun's** innovative pedagogy Mixed Reality immersive game learning "GeoExplorer" was featured in the July/August 2020 issue of American Society of Civil Engineers (ASCE) Magazine. The game was implemented last spring at five universities and we are working on implementing the game module in 12 universities in fall 2020 including both NYUAD and NYU and over 25 Universities in the USA by spring 2021. We had to allocate more resources for spring 2021.

# CURRENT COVID-19 RESEARCH STUDIES

NYU Abu Dhabi is helping to scale up and speed up diagnostic tests. We are activating our state-of-the-art labs and helping create new equipment. We are working across divisions and disciplinary boundaries to better understand the impact of the necessary restrictions imposed on our lives. Here are some of the studies underway to connect creative and scientific discovery with impact for economic and societal benefit.



## TIMOTHY M. DORE
### Associate professor of chemistry

Dore is **leveraging his expertise in medicinal chemistry, structure-based drug design, computational modeling, and virtual screening** to identify a set of drug lead candidates against COVID-19 that inhibit enzymes critical for the replication of SARS-CoV-2 and related viruses. His research team has made progress identifying inhibitors of two important targets.
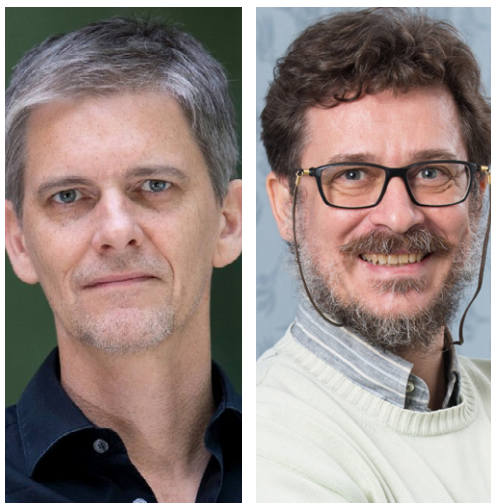


## SHAFER SMITH AND FRANCESCO PAPARELLA

Smith and **Paparella**, together with two NYUAD students, are modeling COVID-19 outbreaks within a small network of individuals, representative of an academic community. The main goal of the modeling effort is to identify actionable testing strategies allowing for a prompt detection of any COVID-19 outbreak, and to evaluate the impact of any contingency measures should an outbreak occur.



## MOHAMMAD QASAIMEH
### Assistant professor of mechanical and biomedical engineering

Qasaimeh is designing a **hands-free door opener** to manufacture. This invention will help minimize risky contact by opening doors with hands especially in hospital wards where frontline staff come in direct contact with infected patients.

## SAMREEN MALIK
**Associate professor of economics**

Malik is researching **how the usage of face masks affects the perception and behavior** related to the existing prejudice for religious face covering.

## TAREK ABDOUN
**Professor of civil and urban engineering**

Abdoun is **studying COVID-19 crises impact on students and instructors motivations and learning outcomes** with the aim to characterize student and instructor experiences during fully online learning and how game-based learning activities and virtual reality lab testing tools enhance the online learning outcome for STEM education.

## ANTJE VON SUCHODOLETZ
**Assistant professor of psychology**

## TALAL RAHWAN
**Associate professor of computer science**

Von Suchodetez and Rahwan are **analyzing the psychological impact of and strategies for coping with school closure** that have been announced by governments in an attempt to contain the global pandemic COVID-19.

## MICHAIL MANIATAKOS
**Associate professor of electrical and computer engineering**

Maniatakos is **designing a privacy-preserving contact tracing tool** for individuals who were confirmed as COVID-19 positive. It is a way to trace the individual anonymously and be notified without breaching the privacy of these individuals.

## ELENA BERETTA
### Visiting professor of mathematics

__Beretta__ is **creating mathematical models of epidemics** for studying the economic implications of COVID-19 lockdown policies.

## MOSES BOUDOURIDES
### Visiting professor of mathematics

Boudourides is assessing **to what degree the Wikipedia structural pattern and cognitive map of the COVID-19 pandemic carries over the features of the semantic classification**. Boudourides is also studying **temporal networks of sequentially co-occurring verbs in the COVID-19 positive subreddit** in order to trace the ways in which feelings, concerns, opinions and emotions are embroiled, discussed and unfold the experiential narrative of the pandemic inside social media.

## ETIENNE WASMER
### Professor of economics

__Wasmer__ is implementing a new research project on the labor reallocation consequences of COVID-19 crisis, with Jean-Benoit Eymeoud, from Banque de France, and Raul Santaeulalia-Llopis (Graduate School of Barcelona) entitled Labor Allocation and Labor Policy after COVID-19, that was accepted for the Franco-German Fiscal Policy Seminar 2020 in Berlin.

## PUBLIC HEALTH RESEARCH CENTER

Principal Investigators __Raghib Ali__ and __Youssef Idaghdour__ and their team are collaborating with Cleveland Clinic Abu Dhabi, SEHA, and G42 on research projects to better understand **genetic and lifestyle risk factors that contribute to the development and severity of COVID-19.**

## THE UAE HEALTHY FUTURE STUDY

The **UAE Healthy Future Study** is launching a COVID-19 questionnaire to study the **effects of lockdown on people's health** in relations to diet, physical activity, stress and other factors.

## DETECTION AND QUANTIFICATION OF SARS-COV-2

**Youssef Idaghdour**, Kris Gunsales, Raghib Ali, and **Fabio Piano**, are working on the **development and validation of efficient detection and quantification of SARS-CoV-2** on clinical samples in collaboration with Proficiency Healthcare Diagnostics.
This has shown high sensitivity in saliva samples and the project is now extended to environmental sampling to test samples from surfaces and waste water.
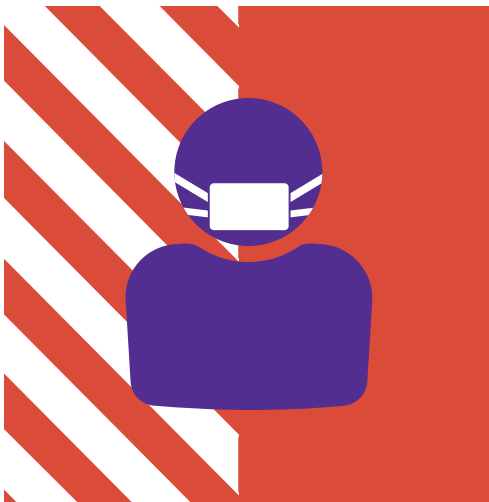
## COVID-19 NYUAD SCREENING STUDY

Youssef Idaghdour, Kris Gunsales, Raghib Ali, Fabio Piano and Dr. Ayaz Virji are currently running the **COVID-19 NYUAD Screening Study** where more than 1,000 tests were conducted. They started the saliva testing and will expand the research to start testing specific fractions of the community.
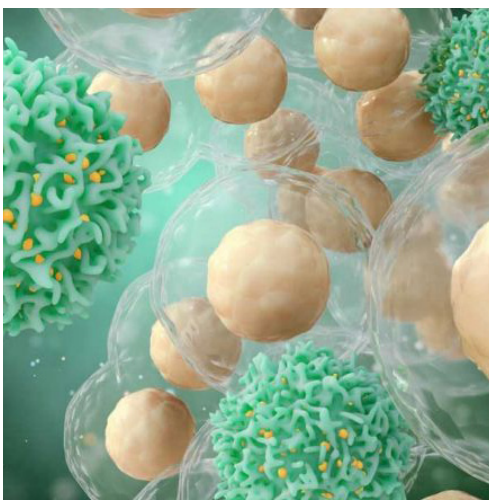
## GENETIC AND IMMUNOLOGICAL PROFILING

Raghib Ali, Kris Gonsales and Fabio Piano are working on the **genetic and immunological profiling of COVID-19 patients.** This research project is in collaboration with SEHA and G42. Over 200 patients have been sampled so far in SEHA hospitals.
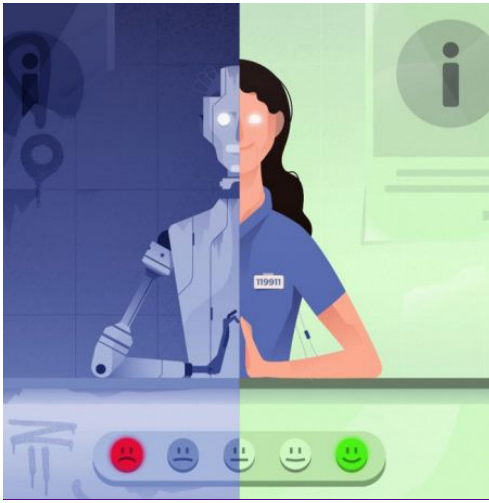
## CLINICAL AI LAB

Our team at the **Clinical AI Lab at NYUAD** is collaborating with SEHA on a research project titled **"Artificial Intelligence to support clinical management of patients testing positive for COVID-19**". This involves one undergraduate student and two recent alumna from NYUAD.

**PUBLISHED RESEARCH**

NYUAD published **more than 50** COVID-19 related publications addressing topics ranging from global behaviors and perceptions of COVID-19, to genetic and immunological studies.
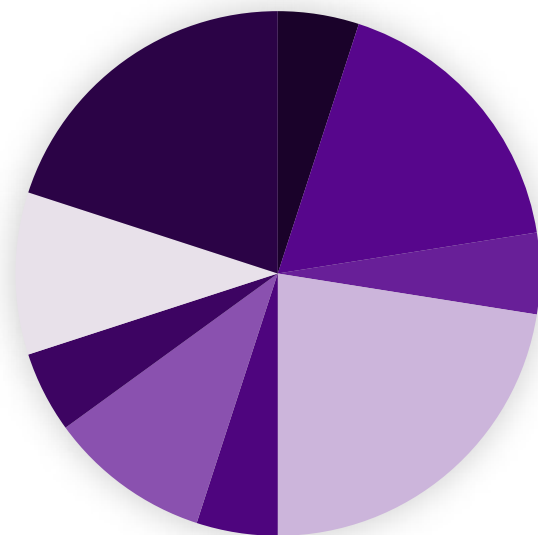


- ■ Computer Engineering
- ■ Psychology
- ■ Mathematics
- ■ Political Science
- ■ Social Science
- ■ Public Health Research Center
- ■ Chemistry
- ■ Arts and Humanities
- ■ Other

# COVID-19 RELATED COMMUNITY ENGAGEMENT

**OUR COMMUNITY ENGAGEMENT**



## THE ARTS CENTER AT NYUAD
*Reconnect*

The **Arts Center** created *Reconnect,* **a series that showcases several of the amazing performances from our first five years.** Every week we streamed a show from our archives. As of June more than 20,000 people from across the globe tuned in to watch live, and over half a million total views of the series's online content.



## SOCIAL DISTANCING MUSIC FESTIVAL
**Carlos Guedes, associate professor of music**

**Guedes** launched the NYUAD **Social Distancing Music Festival,** the online venue where the band held its debut performance, has proven a wild success with more than a thousand viewers tuning in. With members of the community and the wider general interest viewer tuning in to experience live performances at these low-latency levels, the festival is expected to grow as live performances remain on hold on campus.



## THE ART GALLERY
*TRACE:* Archives and Reunions

The **NYUAD Art Gallery** has brought tours of Project Space exhibitions online and launched *TRACE:* Archives and Reunions - **a series of ten virtual events and archive releases that will enable viewers to digitally** explore each of the Gallery's past exhibitions every two weeks over the course of the summer.

## THE NYUAD INSTITUTE
### Online talks

The **NYUAD Institute** has **broadcast a series of past online talks**, including a conversation with Nobel Prize winner, Wole Soyinka, and a talk on The Evolution of Gulf Falconry, for the public to access on the Institute YouTube channel, among others.



## CAREER DEVELOPMENT CENTER
### Virtual Internships

Our **Career Development Center** created a **Virtual Internships guide** to assist companies in securing virtual interns.



## ATHLETICS
### Virtual workouts

Athletics are **live streaming virtual weekly workout sessions to help people maintain their physical health and fitness levels** while ensuring physical distancing, accessible on their Instagram page **@nyuadathletics** and are posting weekly virtual yoga and meditation classes on their official YouTube channel to help the local and global community maintain their mental and physical health.

# STUDENTS COVID-19 RESPONSE

**OUR STUDENTS**

### VIRTUAL HACKATHON

The annual NYUAD International Hackathon was held online for the first time this year to tackle challenges created by the COVID-19 pandemic, brought together more than 170 aspiring programmers from around the world creating innovative solutions in response to the current global situation.

### HEALTH HERO MATCH (H2M)

Our students, in collaboration with other students in the region and world, designed Health Hero Match (H2M), a **two-sided marketplace website that enables medical workers to connect with hospitals with staffing shortages,** by using AI to provide resources that facilitate a seamless transition to becoming a front-line worker during the COVID-19 pandemic.

### WORLDWIDE STATISTICAL ANALYSIS

Alberto Gandolfi, professor of practice in mathematics, and a group of students are working on a **worldwide statistical analysis of COVID-19 mortality rates** to more accurately depict the amount of deaths occurring from the disease.

### COVID-19 TESTING

Ayham Adawi, Ahmed Anique, and a group of students were **recruited by Abu Dhabi's Department of Health to conduct COVID-19 tests** in the largest lab that processes COVID-19 tests, Pure Health.

### VIBROTACTILE WRISTBANDS

Mohamad Eid, assistant professor of electrical and computer engineering, students are working with a team in collaboration with CCAD that is **designing a low-cost wristband device that will be able to predict when the hand is moving towards the face** and provide vibrotactile feedback to alert the user not to touch their face.

### COMPUTATIONAL MODELLING

Panos Oikonomou is working with faculty on **developing a computational model that predicts the evolution of the disease curves over time.**

### LABORATORY RESEARCH STUDIES

We have 16 students currently involved in various laboratory research studies which include: the development and validation of efficient detection and quantification of SARS-CoV-2 on clinical samples study, the NYUAD Screening Study, and the Genetic and Immunological profiling of COVID-19 patients study.

# CURRENT GLOBAL COVID-19 RELATED RESEARCH

**GLOBAL RESEARCH HIGHLIGHTS**

### PREDICTIVE ANALYTICS

**Farah Shamout**, assistant professor emerging scholar of computer engineering, is using routinely collected physiological data to predict patients (diagnosed with COVID-19) deterioration. This is done in collaboration with the University of Oxford.

### ECONOMIC IMPACTS OF COVID-19 IN ETHIOPIA

**Morgan Hardy**, assistant professor of economics, is collecting panel survey data following women who were working in garment factories in Ethiopia's largest industrial park at the start of the COVID-19 crisis to document how their lives have changed. In a **forthcoming paper** at **World Development**, recently **highlighted by The Gates Foundation**, she documents the "Market-Spread" of the pandemic, as nearly half of these women had been put on leave by June; global retail sales collapsing in rich economies had spread through global value chains to create consequences for these low-wage workers in a city where there was yet to be lockdowns or a single confirmed case. Hardy also recently launched a baseline survey in Ghana as part of a **planned experiment** that will provide scalable policy evidence on whether (and when, and to what effect) informal firms insure their workers against shocks.

### COVID-19 MITIGATION POLICIES

**Melina Platas**, assistant professor of political science, and a team of researchers are conducting surveys in Uganda, Nigeria, and Kenya to **identify and track over time citizen's compliance with COVID-19 mitigation policies** and their access to relief services in an urban setting.

### EDUCATION ENGAGEMENT

**Samreen Malik**, associate professor of economics, is studying the effects of the COVID-19 crisis on education engagement in Pakistan.

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