"Networked Complexity: The Case of COVID-19"

AMERICAN UNIVERSITY OF BEIRUT
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Titles and Abstracts

Hassan Zaraket

Title: COVID-19 Pandemic: An Overview

Abstract: SARS-CoV-2, the causative agent of coronavirus infectious disease (COVID-19), emerged in China during late 2019. It quickly spread to other countries becoming pandemic around mid-March. The virus shares high homology with SARS-like viruses of bat origin; however, the intermediate host preceding its spillover into humans remains elusive. The virus has caused several million cases and several hundred thousand deaths worldwide. The pandemic has posed an unprecedented challenge to healthcare systems and threatened the world's economy. COVID-19 incubation period ranges from 2-14 days, with symptoms ranging from mild to severe. Research is ongoing to develop antiviral drugs and vaccines for COVID-19. This seminar will provide an overview of COVID-19 from emergence to the current situation.

Bio: Dr. Hassan Zaraket is an Assistant Professor of Virology and Assistant Director of the Center for Infectious Disease Research (CIDR) at the Faculty of Medicine, the American University of Beirut. Dr. Zaraket received his Ph.D. from Niigata University in Japan. He did his postdoctoral training at the World Health Organization (WHO) Collaborating Center and Center of Excellence for Influenza Research and Surveillance at St Jude Children's Research Hospital, USA. His postdoctoral training focused on investigating influenza viruses of pandemic potential. Dr. Zaraket joined AUB in 2014, where he established a virology research group. His research interests include genetics and evolution of RNA viruses, antiviral drug discovery, vaccine efficacy, diagnostics, and virus-host interactions. Dr. Zaraket is an associate editor for BMC Infectious Diseases Journal and a council member of the International Society for Influenza and Other Respiratory Viruses (isirv). He is a member of the WHO Working Group on Pandemic Influenza Special Studies (PSS). He has over 75 peer-reviewed publications.

Hiba Sheheitli

Title: On the Nonlinear Dynamics of Compartmental Epidemic Models

Abstract: On April 16th, 2020, German Chancellor Angela Merkel stated: "We looked at the models. We are now roughly at a reproduction factor of 1. So 1 person is infecting 1 other... I can always only say this for a chain of infections, if 1 person is infecting 1 other and then it's an average value. But it's roughly 1 infecting 1 other. Already, if we get to the point where each person is infecting 1.1 other person, then in October we are back at the capacity of our health system with the assumed number of intensive-care beds. If we get to 1.2, so if each person infects 20% more people. So of 5 people, 1 infects 2 other people and 4 infect 1, then in July we are already back at the maximum load for our health system. And at 1.3, that doesn't sound like much: we started out at 4, 5 infections or 3 to 5 infections at 1.3, then in June we are already at the maximum load for the health system. So here you can see what a small amount of wiggle room we're working with. And the entire progression is based on the assumption that we are able to keep an overview of the number of infections we have, that we're able to track that we have more plans for protection and are able to ease restrictions based on these plans. But this is thin ice, as Mr. Tschentscher already said, or a fragile situation or really a situation in which caution is the order of the day and not foolhardiness". I believe Merkel did a great job in 1) relaying to the public the highly nonlinear nature of the dynamics of the epidemic infection, 2) highlighting the existence of a of bifurcation in the dynamics, i.e. a sudden qualitative change in the observed behavior due to a crossing of a specific threshold value of the reproduction factor and 3) acknowledging the role of mathematical models in allowing us to understand and manage the situation at hand. During this brief webinar, I will attempt to elaborate on some of the simplest but fundamental models (SIS, SIR, SEIR models) used to obtain such insight as that explained by Merkel, to discuss the assumptions and physical parameters involved and to unfold how the, or a, reproduction factor consistently emerges in such models as a decisive parameter that delineates the "thin ice" boundary between safety and catastrophe."

Bio: Dr. Hiba Sheheitli is a nonlinear dynamicist with an undergraduate degree in Mechanical Engineering (with a minor degree in Biology) from the American University of Beirut and a PhD in Theoretical & Applied Mechanics from Cornell University. Her doctoral work focused on perturbation methods for the study of nonlinear systems with slow-fast oscillatory interactions. She spent some time after that at SISSA (Trieste, Italy) investigating the cellular mechanics and dynamics of developing neurons, before moving back to Lebanon for an assistant professor position at the Lebanese American University - Mechanical Engineering department, where her research focused on the non-trivial dynamics of the classical spinning top under the influence of rotation and high frequency excitation. She then took a detour back to the world of neuroscience and joined the Theoretical Neuroscience Group at Aix-Marseille University (France) where

in collaboration with Viktor Jirsa she developed a novel mathematical model for ephaptic interactions among brain white matter fibers. She then went on to explore the world of industry and data science through a quantitative researcher position at Algotraders, an algorithmic trading start-up based in Beirut, where she worked on developing systematic financial trading strategies based on the analysis and mathematical modeling of nonlinear time series data. With the current global turnaround of events, she has left the industry to focus again on more fundamental scientific questions pertaining to nonlinear dynamics in the physical and biological world, through an affiliation with the CNRS-National Center for Remote Sensing and as a visiting researcher at the Center for Advanced Mathematical Studies at the American University of Beirut.

Carlos Gershenson

Title: Networks as Models of Complex Systems

Abstract: Complex systems are characterized by relevant interactions among its components. Networks have established themselves in the last two decades as the most popular model of complex systems as they can represent components as nodes and interactions as links between them. Having such a convenient mathematical tool has enabled the exploration and understanding of complex systems to a degree that was previously not possible. In this introductory talk, I will briefly review the history of graph theory and network science, discuss its relevance and implications, mention some examples and variations, and sketch future research avenues.

Bio: Carlos Gershenson is a tenured, full time research professor at the computer science department of the Instituto de Investigaciones en Matemáticas Aplicadas y en Sistemas at the Universidad Nacional Autónoma de México (UNAM), where he leads the Self-organizing Systems Lab. He is also an affiliated researcher at the Center for Complexity Sciences at UNAM and a visiting professor at ITMO University (2015-). He was a Visiting Professor at MIT and at Northeastern University (2015-2016). He was a postdoctoral fellow at the New England Complex Systems Institute (2007-2008). He holds a PhD summa cum laude from the Vrije Universiteit Brussel, Belgium (2002-2007). His thesis was on "Design and Control of Self-organizing Systems". He holds an MSc degree in Evolutionary and Adaptive Systems, from the University of Sussex (2001-2002), and a BEng degree in Computer Engineering from the Fundación Arturo Rosenblueth, México. (1996-2001). He studied five semesters of Philosophy at UNAM (1998-2001).

He has more than 150 scientific publications in books, journals, and conference proceedings, which have been cited more than 4500 times. He has given more than 250 presentations at conferences and research group seminars. He has a wide variety of

academic interests, including complex systems, self-organization, urbanism, artificial life, evolution, cognition, artificial societies, and philosophy.
He is Editor-in-Chief of Complexity Digest, Associate Editor for the journals Complexity and Frontiers in Robotics and AI, and member of the Board of Advisors for Scientific American. He has worked in consulting, software and web development, teaching at undergraduate and graduate levels, and scientific divulgation and journalism.

Sarah Wise

Title: Simulating for Intervention – An Agent-based Approach

Abstract: World events have highlighted an uncomfortable truth: adopting a static approach to a dynamic system management is ineffective, and often dangerous. Effective interventions require that researchers and practitioners understand not only the situation on the ground, but how it might respond to different stimuli. Researchers need to employ complex system thinking to explore counterfactuals, exploring not only the processes that give rise to the dynamics they are studying but how those dynamics might change with their component parts. This is especially challenging in situations where the collection of data is challenging or inherently ex post facto. How, then, can we address these problems? This talk will present a case for utilising agent-based modelling (ABM) to help practitioners structure their thinking about the systems they manage. It will review a series of application of ABM to systems which feature humans making decisions, with or without oversight from external actors, and with or without explicit collaboration between individuals. Taking as examples problems of distribution and emergency evacuation, the talk will explore how we can use open data sources to better understand these challenges.

Bio: Dr Sarah Wise is a lecturer in agent-based modelling at the Centre for Advanced Spatial Analysis, University College London. Her work deals with exploring and forecasting the development of systems involving people, infrastructure, and information, in particular by using agent based modelling. In particular, she is interested in simulating crisis and disaster situations. Sarah is also an active member of the Missing Maps Project and its parent organisation, the Humanitarian OpenStreetMap Team. She completed a PhD in the Computational Social Science department of George Mason University in 2014. Her most interesting social media presence is her GitHub, at https://github.com/swise5; she also maintains a blog at https://computationalsocialscience.blogspot.com/.

Ana Basiri

Title: Crowdsourced Data Paradox: Large but Biased or Small but Randomised Sample?

Abstract: This talk will look at the challenges of crowdsourced/self-reporting data, such as missingness and biases in 'new forms of data' and consider them as a useful source of data itself. A few applications and examples of these will be discussed, including extracting the 3D map of cities using the patterns of blockage, reflection, and attenuation of the GPS signals (or other similar signals), that are contributed by the volunteers/crowd. In the era of big data, open data, social media and crowdsourced data when "we are drowning in data", gaps and unavailability, representativeness and bias issues associated with them may indicate some hidden problems or reasons allowing us to understand the data, society and cities better.

Bio: Professor Ana Basiri is a Chair of Geospatial Data Science at the University of Glasgow, and UK Research and Innovation Future Leaders Fellow. Ana works on developing (theoretical and applied) solutions that consider gaps, unavailability, and biases in data as a useful source of data to make inference about the underlying reasons that caused missingness or biases. For this, she leads a team of an interdisciplinary team and collaborates with world-leading academic and industrial partners, including Ordnance Survey GB, Uber, Alan Turing Institute, and engage with the public, policymakers and government. Ana is the Editor in Chief of Journal of Navigation and Associate/Guest Editor of several high impact journals including IET Smart city and International Journal Geographical Information Science. She has published more than 40 peer-reviewed journal papers and book chapters, chaired several conferences. Ana has secured over £1.5M in research funding and received several awards and prizes, including Women Roe Model in Science by Alexander Humboldt and European Commission Marie Curie Alumni.

Monika Halkort

Title: Producing the COVID Body. The Intersectionality of Data Modelling with a View from the Global Souths

Abstract: Among the many disturbing effects of the CORONA virus is that the pandemic is more likely to intensify already existing inequalities than to alleviate them. What's more, studies about the likelihood of dying from COVID indicate, that long standing intersections of gender, class, race and ethnicity are key factors in determining who will survive the pandemic and who will not. As the rapid spread of infections in migrant worker homes and informal refugee camps has shown, poor housing conditions and lack of proper sanitation disproportionally expose the weakest segments of society to infections, while leaving them without access to proper health care. Similar situations can be witnessed in Arab countries locked into enduring conditions of war

and conflict (Syria, Yemen, Libya). Against this backdrop this presentation asks: What kind of social body is produced in CORONA data models and what are the ethical implications for simulating a pandemic that is increasingly acting as a social and political force in its own right?

Bio: Monika Halkort's research explores the intersectional dynamics of racialization, dispossession, and enclosure inhered in digital infrastructures focusing in particular on contexts of political struggle, activism and humanitarian governance. Key themes include the coloniality and biopolitics of data power and how they affect claims for political autonomy and self-determination of stateless populations and refugees. The main geographic focus of her work is the Arab world.

Hassan Zaraket

Title: COVID-19 Early Investigation Studies: UNITY

Abstract: Pandemics constitute an imminent threat to health and the global economy. Our success in controlling or mitigating the burden of pandemics relies on the availability of high-quality epidemiologic, virologic, and clinical data. Studies aimed at collecting this data are needed at each stage of the pandemic and should be initiated as early as possible. Recognizing the importance of these studies in pandemic response, the World Health Organization has developed Early Investigation Protocols for COVID-19 called the "Unity Studies." These protocols are designed to rapidly and systematically conduct studies aimed at predicting the course of the pandemic, refining case definitions, and understanding transmission patterns, severity, clinical features, and risk factors for infection. These studies aim to provide timely information on the pandemic and to guide countermeasures needed for mitigating the outbreak. The protocols provide harmonized tools that can be deployed in geographically and epidemiologically diverse locations with a streamlined data-sharing platform. The Unity Studies currently include the First Few X cases (FFX) and contacts and the household transmission protocols in addition to healthcare workers COVID-19 exposure risk factors and population-based age-stratified seroepidemiological investigation protocols. The talk will provide an overview of these protocols and their objectives.

Heinrich Dohna

Title: Estimating Parameters of the COVID-19 Pandemic from Contact Tracing Data?

Abstract: Tracing contacts of identified cases is a key component of combatting the current COVID-19 pandemic. The effectiveness of contact tracing depends on

parameters that are intrinsic to the COVID-19 biology, such as R0, and the time course of infectivity within an infected individual, and extrinsic parameters, such as the rate at which new infected cases are detected and traced, as well as the effects of quarantining, social distancing, and hospitalization on the transmission rate. The talk will present a framework for estimating these parameters from contact tracing data and discuss applications for exploring COVID-19 control options.

Bio: Heinrich Dohna is an assistant professor in Computational Biology in the Biology Department at the American University of Beirut. He holds a Diploma in Environmental Natural Sciences from the Swiss Polytechnic Institute in Zurich and a Master's and PhD in Ecology from Yale University. He is interested in biological invasion processes, including disease dynamics, and applies in his research different methods from population genetics, phylogenetics, bioinformatics, and ecological modeling.

Ghina Mumtaz

Title: Covid-19 in Lebanon: Epidemic Status and Challenges of Modelling Predictions

Abstract: Very shortly after the first covid-19 case was confirmed on February 21, 2020, Lebanon has imposed rigid restrictions and a near-complete lockdown of the population for over two months. While the early implementation of social distancing measures have led to a flattening of the curve, the extent of community transmission remains uncertain as testing capacity continues to be relatively limited. As the country has started easing restrictions, many questions arise on the immediate and near future of the epidemic in Lebanon. While mathematical modeling simulations may address several of these questions, many challenges, pertaining mainly to the availability of and accessibility to local data, preclude the implementation of a model which would be able to give reliable guidance for policy. This presentation will tackle what we know about the current status of the covid-19 in Lebanon and what is predicted as we exit lockdown based on principles of transmission dynamics and the current evidence on the infection globally. Preliminary applications of a deterministic compartmental mechanistic model to the local epidemic will be presented and challenges and limitations of this modeling exercise in Lebanon will be discussed.

Bio: Ghina Mumtaz PhD MSc is an Assistant Research Professor at the Department of Epidemiology and Population Health at the American University of Beirut (AUB). She earned her PhD in Infectious Disease Epidemiology from the London School of Hygiene and Tropical Medicine (LSHTM) in 2017, and her Master of Science in Epidemiology and Population Health from AUB in 2003. The primary focus of Ghina's research is on characterizing the epidemiology of HIV, other sexually transmitted infections, and

hepatitis C virus in the Middle East and North Africa, with a special focus on most-at-risk populations and, more recently, refugees and internally displaced populations. Ghina's expertise lies in various quantitative methods including systematic reviews and meta-analyses, and statistical and mathematical modelling analyses. She has led several studies that were published in influential journals such as PLOS Medicine, AIDS, the Journal of the International AIDS Society, and Sexually Transmitted Infections. Her research work has informed policy and programming decisions at key international organizations such as the World Health Organization, UNAIDS, and the World Bank.

B. Shayak

Title: Paths to the End of COVID19 - a Mathematical Modeling Study

Abstract: In this work we use mathematical modeling to describe a possible route to the end of COVID-19, which does not feature either vaccination or herd immunity. We call this route self-burnout. We consider a region with (a) no influx of corona cases from the outside, (b) extensive social distancing, though not necessarily a full lockdown, and (c) high testing capacity relative to the actual number of new cases per day. These conditions can make it possible for the region to initiate the endgame phase of epidemic management, wherein the disease is slowly made to burn itself out through a combination of social distancing, sanitization, contact tracing and preventive testing. The dynamics of the case trajectories in this regime are governed by a single-variable first order linear delay differential equation, whose stability criterion can be obtained analytically. Basis this criterion, we conclude that the social mobility restrictions should be such as to ensure that on the average, one person interacts closely (from the transmission viewpoint) with at most one other person over a 4-5 day period. If the endgame can be played out for a long enough time, we claim that the Coronavirus can eventually get completely contained without affecting a significant fraction of the region's population. We present estimates of the duration for which the epidemic is expected to last, finding an interval of approximately 5-15 weeks after the self-burnout phase is initiated. South Korea, Austria, Australia, New Zealand and the states of Goa, Kerala and Odisha in India appear to be well on the way towards containing COVID by this method. More recent research indicates that the fraction of asymptomatic carriers may be higher than previously thought, in which case more severely hit areas may proceed to herd immunity despite adopting all possible precautions. We believe that this has been the case in New York City, parts of Italy, Mumbai, Moscow and several other regions."

Bio: B Shayak is a fifth year doctoral student in Prof. Richard Rand's group at Cornell University, Ithaca, USA. He was born in Kolkata, India and did his undergraduate studies at IIT Kanpur, India. His interests are in various aspects of nonlinear dynamics. Hitherto, his research was focused on theoretical delay equations, magnetic levitation

devices and MEMS devices, but after the Coronavirus broke out, he has shifted temporarily to epidemiology. He looks forward to the day he can go back to his other research topics.

Fakhteh Ghanbarnejad

Title: Epidemic Dynamics on Networks

Abstract: Spreading of infectious diseases, as examples of epidemic dynamics are among the most serious threats against human kind. Here, firstly and briefly we review the basic models for modelling such phenomena. Then we address how the underlying topology of social contacts can affect the dynamics. Finally we discuss if, how and when intervening the contact network may impact an outbreak.

Bio: Fakhteh Ghanbarnejad is a Research Staff Associate at the Quantitative Life Sciences at The Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy. Prior to that, she was Postdoctoral Researcher at Robert Koch-Institute &, Institute for Theoretical Physics, TU Berlin, Germany, and the Max-Planck-Institut fu̇r Physik komplexer Systeme, Dresden, Germany. She is the recipient of the Eigene Stelle grant (Principal Investigator) by DFG (German Research Foundation) entitled "Interacting Dynamics on Networks, Applications to Epidemiology". She received her PhD in Informatics, Bioinformatics Group, & IZBI, Leipzig University, and her B.Sc and M.Sc in Physics at Sharif University of Technology, Iran.

Elsa Arcaute

Title: Mobility and Inequality under the Pandemic in Spain

Abstract: This talk looks at the effects of the implementation of mobility restrictions in Spain during the pandemic. In particular, we look into discrepancies between expected and observed commuting flows. These can bring insights into the impact of releasing the lockdown, and how to optimise testing following the re-emergence of hotspots, to avoid a second wave. In addition, we look at commuting flows given by occupational sectors, and investigate whether the pandemic is contributing to increasing the inequality gap.

Bio: Dr. Elsa Arcaute is an Associate Professor in Spatial Modelling and Complexity at the Centre for Advanced Spatial Analysis (CASA) at University College London. She is a physicist with a masters and a PhD in Theoretical Physics from the University of Cambridge. Her area of research is Complexity Science applied to urban systems, in particular towards understanding the hierarchical organisation of processes related to

the morphology of cities, human behaviour and the distribution and relationship of economic activities. These relate to studying the emergence and non-universality of scaling laws; the problem of defining city boundaries; the quantification of resilience in urban systems, and the emergence of inequality and of innovation. At present she is co-investigator of an EPSRC grant intended to look at rebalancing the economy in the UK, and she is a member of the Advisory Board for the PEAK Urban GCRF programme, UKRI, aiming at building skilled capacity for decision making on urban futures.

Tapio Ala-Nissila

Title: Using and Constructing Mobility Data for Modeling Epidemic Spreading

Abstract: We have recently established a national FINCovid consortium to focus on developing spatially resolved mathematical models for the COVID-19 pandemic spreading in Finland. Human mobility between different cities and across regions is an integral part of spatially resolved modeling. I will discuss various ways to build up reliable models for human mobility from different sources of data.

Bio: T.A-N. is a Professor of Physics at Aalto University, Finland, and Professor of Theoretical Physics and Applied Mathematics at Loughborough University, UK. He is the head of the Interdisciplinary Centre for Mathematical Modelling ICMM at Loughborough. His fields of expertise include Statistical Physics and Nonlinear Dynamics.

Sara Najem

Title: Log Gaussian Processes over Networks

Abstract: We introduce Gaussian Processes and their use in the modeling of spatiotemporally varying risk and exposure. We show how they have been used in the study of infectious diseases and how the complexity of their dynamics over networks can be accounted for in this formalism.

Bio: Dr. Sara Najem is as an assistant professor at the Physics Department. Sara graduated with a B.Sc and M.Sc in physics from the American University of Beirut with focus on network complexity and dynamics. She then earned her Ph.D in Physics from McGill University studying out-of-equilibrium systems with focus on living cells morphologies. She was a Postdoctoral Fellow at the Couzin Lab at Princeton University studying collective behavior, and the Gordon & Betty Moore Postdoctoral Fellow at GALCIT at California Institute of Technology focusing on cell mobility. Prior to joining AUB, she was a Researcher at the National Center for Remote Sensing of the Lebanese

CNRS studying city-scale out-of-equilibrium processes like forced refugees' migration and investigating the relationship between urban morphology and energy. Her research focuses on statistical physics and complexity science applied to living systems and urban environments.

Chadi Abdallah

Title: Data Collection in Lebanon

Abstract: In to order to strengthen the capacities to monitor and forecast hazards for Disaster Risk Reduction (DRR), and to properly assist both emergency operations and to implement proper prevention and preparedness actions, the CNRS operates the "SuNaR" platform which is a government priority within the National DRR strategy. The SuNaR forecast hydro-meteorological hazard and release a daily report with the Civil defense on the potentiality of forest fires for the coming 72 hours. It also records on a daily basis data on natural hazards and fatalities. Moreover, it gathers essential data to provide rapid and effective response during disasters to aid early actions and relief populations devastated by the effects of hazardous challenging events. These challenges include response to environmental hazards, security of personnel and resources, political and economic issues, cultural barriers, and difficulties in communication. Accordingly, this talk will generally discuss the role and function of the SuNar platform in terms of COVID-19 pandemic, highlighting the data gathering methods and means, quality control, Dashboards, Maps, enabling tracking actions. The talk will also identify gaps, suggest optimal solutions and shed light on early lessons learned.

Bio: Research Director and Geologist holding a PhD in GIS and RS of natural resources (Paris VI University-France), a Post-doc in Radar Interferometry (University of Missouri-USA), Researcher at the Lebanese National Council for Scientific Research (CNRS-L), Remote Sensing Center (1998-Present). Principle Investigator on several projects related to natural disasters, water information management, modeling and decision-making; assessment, monitoring and management of natural resources and sustainable development. Deputy Director and responsible of the Early Warning System platform, CNRS-L. Member of Disaster Risk Management Unit, Presidency of Councils. Has sixteen years of teaching experience in Hydrology, geology GIS and Remote Sensing. Chair of the Arab Science and Technology Advisory Group for disaster risk reduction, Editorial Manager of the Lebanese Science Journal and Adjunct Researcher at University of Missouri Columbia-USA. Authored and co-authored over 80 scientific papers in peer-reviewed international journals, and conference proceedings.

Wafa Al Ghatham

Title: How We Understand the City from a Space Syntax Approach?

Abstract: Space syntax is a science-based, human-focused approach that investigates relationships between spatial layout and a range of social, economic and environmental phenomena. These phenomena include patterns of movement, awareness and interaction; density, land use and land value; urban growth and societal differentiation; healthiness; safety and crime distribution. It is a set of techniques for analysing spatial layouts and human activity patterns in buildings and urban areas. It is also a set of theories linking space and society. Space syntax acts as a frame for all kinds of urban data by simply adding data to the model segment by segment: movement flows, land uses, densities, demographic information, property and rental values and so on. It is a tool for asking spatial questions of the city, of the form: is there a spatial dimension to this or that urban problem – to social malaise, to migration patterns, crime distributions, to the emergence of centres, the success or failure of areas – all these are areas have been investigated using space syntax. The talk presents the theoretical and methodological framework related to space syntax. It begins by introducing space syntax; the first idea, as determined in analytic space syntax theory between society and space, describes the generic mechanism through which foreground and background networks puts its imprint on the configuration of urban space; the second describes the natural patterns of different people in co-presence/encounter within the space and microeconomic distribution patterns. Then the talk moves on to the applied part of the discussion and introduces the program of empirical investigation in relation to covid-19.

Bio: Wafa AL-Ghatam studies the principles and constraints that govern the generation of the built form and its social, cultural and economic functions. Her work includes the development methods and measures for the analysis of built space at the scale of buildings and urban areas. Wafa research explores the socio-economic implications of the urban fabric of the villages absorbed by cities in Bahrain; Manama and Muharraq; using Space Syntax methodology. She is an expert in space syntax analysis and method. She worked for Space Syntax Limited in London and as a representative in Bahrain, on a range of projects within the UK and abroad including strategic planning of Jeddah city in Saudi Arabia, Doha urban Knowledge Economic planning. She worked as a research associate for a project on architecture and urbanism at the Technical University of Munich, Germany (TUM). Her experience spans from East to the West, from architectural to urban projects. She has taught at Wentworth Institute of Technology (WIT), Boston USA, Boston University (BU), Boston USA, the Architectural Association School of Architecture (AA), London UK, and the Bartlett School of Graduate Studies, UCL, London UK. She is currently the director for Urban and Housing lab [https://uhl.center] at the University of Bahrain at the Department of Architecture and Interior Design.

Polly Hudson

Title: Microspatiotemporal Data Generation and Collection - Lessons Learned from the Colouring London Initiative

Abstract: We highlight the relevance of information about buildings stock to the public health sector, which can help in the assessment of exposure and vulnerability. Cardiovascular and respiratory diseases are linked to indoor pollution, temperature extremes and inadequate energy access together with non-optimal lightning conditions and exposure to irritating noise levels are shown to be linked to anxiety and depression and numerous illnesses. Colouring London open data platform was originally set up to address the problem of access to data on the composition, energy performance, and dynamic behavior of the UK building stock, faced by those researching into energy and material waste reduction. Over the past five years the relevance, and urgent need, for open spatial data on stocks, at building level, and for longitudinal data spanning many decades, has been highlighted by many sectors- required for analysis of the existing stock and to improve accuracy in long-term forecasting models. The importance of the crowd in adding data, and in verifying data generated using automated methods, has also been observed, as has the role of building age and construction history data, and the knowledge of those working in historical research relating to persistent patterns of vulnerability and risk in cities, as well as to building lifespans and survival rates. Recently, lessons learned from Colouring London have been applied to the design of a simple calendar add-on for pandemic symptom apps which allows symptom/non-symptom data spanning many months to be collected in a single go.

Bio: Polly designed the Building of Bath Museum in 1992 (shortlisted for the European Museum of the Year 1992) and founded The Building Exploratory charitable trust in 1996. She has worked in both the construction industry and the conservation sector, and over the past 18 years has designed many GIS related projects and exhibitions, most recently 'Almost Lost' for English heritage at Wellington Arch 2013. Since 2004 her work has focused on 4D GIS animation and energy/urban resource conservation. She was awarded a visiting fellowship at The Centre for the Historic Environment, Kellogg College, University of Oxford in 2010 and was an Honorary Research Associate at CASA from (2014-16). Public appointments include boards/committees for English Heritage, the Department of Culture, Media and Sport, The National Lottery and the Royal Institute of British Architects (current).

Melda Salhab

Title: Using Satellite Data to Fill in Critical Information Gaps in Data-scarce Countries

Abstract: In an era where machine learning and big data reign supreme, the gap between data-rich and data-scarce countries is ever growing. Many countries lack timely, high quality data forcing researchers and policy makers to rely on estimates or outdated information. A potential solution to this critical data gap is satellite data. Petabytes of data are being collected each year from the several hundred currently operational earth observation satellites orbiting the earth. Much of that data is publicly available and can be used for a wide range of applications, including natural resource management, greenhouse gas detection, and urban growth measurement.
To illustrate the breadth of this data source, a single earth observation program, NASA's Landsat mission, has captured approximately 2,000 images of Lebanon over the past three decades. In recent years, additional satellites by other spaces agencies and private companies now produce daily imagery of the entire terrestrial earth, reaching sub-meter resolutions. This enables unprecedented near real-time monitoring of both natural systems and anthropogenic activities. This talk will focus upon applications of satellite data that are particularly relevant to the Lebanese context, such as forest fire detection and management, drought mitigation, crop yield prediction, and refugee camp monitoring. It will discuss the use of earth observation for socio-economic development, with a particular consideration to the COVID-19 context. For example, satellite imagery have been used to estimate impacts on global trade flows through port monitoring, and recent studies have found a relationship between Nitrogen Dioxide levels (produced from burning fossil fuels) and severity of COVID cases.

Bio: Melda Salhab is a doctoral researcher at the Centre for Advanced Spatial Analysis (CASA) at University College London. Prior to commencing her PhD, she worked for several years as a management consultant at Monitor Deloitte in Dubai, UAE, where her projects spanned a range of industries, including telecom, financial services, and public policy for clients across the Middle East. Her academic research focuses on automated landcover classification, change detection, and the spatialization of economic indicators. She is interested in exploring how best to use remote sensing datasets and machine learning to fill in critical data gaps in developing countries. Melda has a BA in Economics from Wellesley College, Boston, USA. She also has an MSc in Urban Economic Development and an MRes in Spatial Data Science & Visualization, both from University College London, UK.