



Summer 2018

<http://networkscience.igert.ucsb.edu>

Farewell, Dr. Newman



This summer we say goodbye to Alyssa Newman, who has worked as our IGERT's Diversity Coordinator for the past few years. Alyssa received her PhD in Sociology in June and will be leaving Santa Barbara for a postdoctoral appointment at Harvey Mudd College. While not a network scientist, Alyssa's experiences as a PhD student at UCSB were invaluable to our program, and she has been responsible for our IGERT's self-assessment. Congratulations, Dr.

Newman. We wish you all the best in your future endeavors.

INVITED TALK - AUGUST 13TH

INFORMATION SLOWS DOWN HIERARCHY GROWTH

Professor Janusz Holyst

Physics in Economy and Social
Sciences Lab

Warsaw University of Technology

3 pm, 1132 Harold Frank Hall

At the 2018 Undergraduate Research Symposium

Once again, we brought a group of undergraduate interns into the Network Science Lab for a Research Experience for Undergraduates (REU) lasting from June until August. In addition to hands-on research in a lab-setting, interns attended weekly group meetings as well as seminars about topics relevant to graduate school and professional skills development. Students then presented their work at the 2018 UCSB Undergraduate Research Symposium. Here, we present the titles and authors of the outstanding projects. Full abstracts are available on our website.



Four NS Undergraduates. Four Network Science Posters



The Moral Framing of Human Rights Reports: An Exploratory Data Analysis of the Human Rights Global Knowledge Graph

Aaron Barel, Statistics,
UC Santa Barbara
Mentor: Frederic Hopp



Molecular Fingerprinting on Small Datasets

Lucas Tong, Computer Science,
UC Santa Barbara
Mentor: Sourav Medya



Deep Probabilistic Forecasting and Data Mining Granger Causality Networks in Time Series

Andy Jin, Computer Science,
Stanford
Mentor: Xiaoyong Jin

Database Query Prediction using Arrival Rate History

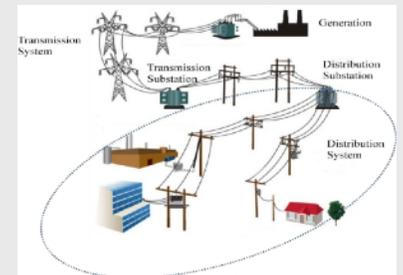
Lawrence Lim,
Computer Science,
UC Santa Barbara
Mentor: Vivek Kulkarni





Theoretical Conditions for the Regions of Attraction in Kuramoto Systems

Power grid simulations take a long time to run and are prone to numerical error. Furthermore, they are difficult to use for planning future control systems to bring in renewables or other smart grid tech. ECE trainee **Kevin Smith** and Professor Francesco Bullo are working on “direct methods” for transient stability analysis, which provide theoretical conditions for stability (as opposed to the current numerical approaches). Specifically, they are studying the regions of attraction of equilibrium points in first-order and second-order Kuramoto systems: networks of coupled oscillators, which provide a simplified model for power system dynamics. By developing theoretical conditions for the regions of attraction in Kuramoto systems, we can estimate how “bad” of a disturbance a (simplified) power system can handle and still return to its 60 Hz equilibrium... without running any costly simulations. (Image credit: ResearchGate)



Mapping techniques of slums using machine learning, remote sensing, and volunteered geographic information

Health provision to slum communities are limited by the informal planning of slum communities and the lack of navigational and cartographic information about these informal settlements. In this review, Geography trainee **Vania Wang** will describe the current techniques used to map informal settlements, specifically focusing on methodologies that utilize Big Data techniques to predict the underlying pathways of a slum area. Furthermore, it will justify how the MoveMap project can fill gaps in our understanding of slums and their

internal network structure, where nodes are representations of locations of interest (latrines, health clinics, homes, etc.) and edges are the pathways that connect them. Using either GPS-enabled mobile phones or personal GPS trackers, the daily movement patterns of a subset of residents in a given slum will be recorded and saved. These movement patterns will be merged and overlaid to create an overall map of the slum area. The eventual aim of MoveMap is to utilize a continuous stream of GPS-tracked movement pathways to create dynamic maps of areas undergoing continuous change. (Image credit: Slum Rehabilitation Authority)