

Title: Dashboard/Visualization: RobSim – Robustness Simulator for FIFA2022

Project Description: Multilayer networks have been the subject of intense research in the recent years in different applications. However, in urban mobility, the multi-layer nature of transportation systems has been generally ignored, even though most large cities are spanned by more than one transportation system. These different modes of transport have usually been studied separately. It is however important to understand the interplay between different transport modes. In this project, we consider the multimodal transportation system, represented as a multiplex network, and we address the problem of urban mobility in the transportation system, in addition to its robustness and resilience under random and targeted failures. Multiplex networks are formed by a set of nodes connected by links having different relationships forming the different layers of the multiplex. We study, in particular, how random and targeted failures to the transportation multiplex network affect the way people travel in the city. More specifically, we are interested in assessing the portion of the city covered by a random walker under various scenarios. The overall project is to develop a computational framework to better understand and predict mobility patterns in the city of Doha once its ambitious metro system is deployed in 2019. The computational framework will help the city to efficiently manage the flow of people and intelligently handle capacity through different transportation modes, in particular during mega events such as Soccer World cup FIFA 2022.

To better understand and predict mobility patterns in the city, we are working on a scalable computational framework that will help the city to efficiently manage the flow of people and intelligently handle capacity through different transportation modes. The proposed model will be validated and used to understand the underlying structure of urban mobility infrastructure of any city, using public data. This computational tool will help Doha to identify early problems, predict failures (random and targeted) and design better transportation infrastructure.

In this summer project, we propose to build a data visualization tool on top of this framework, to create visual narratives around topics like safety, robustness and resilience.

The intern will acquire a deep knowledge on using GIS technologies, and will work closely with the team to design, and develop the tool.

Duties/Activities: participate in the design of the dashboard and program it

Required Skills: Python, HTML, Javascript (D3)

Learning Opportunities: Being part of this project will give you the opportunity to develop a dashboard which may be used for FIFA2022.

Expected Team Size: 2 or 3

Mentors Dr. Abdelkader Baggag (abaggag@hbku.edu.qa); Dr. Sofiane Abbar (sabbar@hbku.edu.qa); Dr. Michael Aupetit (maupetit@hbku.edu.qa) ; and Tahar Zanouda (tzanouda@hbku.edu.qa)