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Research Project: "A sustainable approach to upgrading slums in Morocco"

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Research Contents: The research aims at analyzing the housing typologies and construction methods of the urban slums in Rabat city in Morocco, which are known to be mostly self-built structures. As such, our research focus is to first identify the different spatial usages related to inhabiting the slums and better understanding the logic and motives that encourage the dwellers to expand their house. Then we continue further our research to establish potential digital construction support methods for these kind of settlements and assist the inhabitants when they decide to upgrade or expand their house.

Due to time and budgetary constraints, our we had to modify our original plan to accommodate according to the new circumstances.

The first part of our research focused on understanding different building typologies from the slums and squatter housings existing in Morocco in general and Rabat in particular. This has aspect of the research has been conducted in order to understand how the inhabitants interact with their living environment and how social and economic factors directly affect how they

build their houses. Our research found correlations between socioeconomic backgrounds and housing upgrade, namely related to an improvement in the economic situation or a change in the family structure. As such, housing typologies are differentiated by the building materials that are used, the spacial (vertical and horizontal) layout, and land ownership.

Conducting this inquiry has allowed us to establish a strong background for the second part of our research. In this part of our research, we inquired and tested different architecture survey methods in order to gather data from the slums. As such, we inquired about digital architecture survey methods by using IoT devices and computer software such as Rhinoceros. Methods that were used include photogrammetry scanning by digital camera and compiling software, iSense scanner attached to and iPad in order to scan interior spaces in 3D and export them to CAD or BIM software, and finally a laser rangefinder that can measure different spatial distances and curvatures in a set environment and then instantly export to a nearby computer in XLS format. All of the scanning methods that have been tested so far have shown certain limitations in regard to how intuitive they can be, which is an important parameter to take into account when tackling the issue of participatory design.

The next step for our research will be to look for intuitive ways to integrate scanned data with CAD/BIM software in order to establish an algorithmic solution that assists the inhabitants during their self built housing endeavors.

Activities conducted:

- April 5-8 CAADRIA 2017 conference in China

By going to Suzhou i had the chance to attend CAADRIA 2017 conference. During this conference i attended lectures and paper presentations about the use of digital assistance tools in architecture and urban design. I had the opportunity to collect information on the use of algorithmic and digital design methods in architecture. I attended conference presentations and lectures focused on the use of computational design and digital technologies to solve design related issues in architecture. Attending this conference has allowed me to consider using such advanced digital design tools in my research about slums upgrade in Morocco as part of an integrated sustainable solution.

- August 9-14 fieldwork in Kuchino erabu island, Japan

During this study trip to Kagoshima prefecture, we first visited kagoshima city to observe a major example of modern architecture built by Japanese architect Fumihiko Maki 25 years ago. There we could appreciate the particularities of modern japanese architecture of the late 90's. Then, we went to kuchino erabu island to work on a workshop about self built bamboo shell shelter using local materials, which relates to my research about self built architecture in Morocco since it treats with similar themes of participatory design with the use of digital technologies to assist the locals.