Reflection Report

A.H.E.A.D - Affordable Housing Enabled by Automation-oriented Design

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The AHEAD project can be seen from two angles. From the problem and objectives angle, the project trying to deal with the problems in two different layers: for a larger background that is the shortage of affordable housing in developing countries, such as Indonesia; and for the smaller scale that is the lack of proper housing for the migrant workers in Cigondewah in Bandung. From the design solution angle, the project has 3 different aspects: the first is the ACS (Automated Construction System), the core of the project; the second is building system which is optimized for the ACS as a subsidiary component of the project; and the third is the housing prototype in Cigondewah which works as a demonstration of the actual application of the above mentioned systems in a specific context. The first two aspects are in fact intended for more generic layer. The last aspect is about how it can be anchored in the specific layer. Thus the research is somehow a mirrored support for the project. The research can also be divided into 3 aspects respectively for the design. The knowledge of robotics and of its composition, combination, configuration and case studies supports the design of the ACS; the principles for product design – including product structure, component, and joint- in automation environment, supports the design of the building system; the study of the existing housing typologies and context of Cigondewah supports the design of the prototype. There were some major drawbacks. Some other researches, such as the affordability condition of current market in Indonesia, and modularity strategies used in manufacturing and housing, were done but was in the end less relevant to the design. Some aspects planned originally were not really full filled, which is mainly the estimation of end cost. However, this aspect is beyond my knowledge and capability, since the cost of building contains very many aspects and is influenced by conditions such as state of the market, time and industrialization level of the context. In the end only the construction cost, and mainly the cost of the ACS would be compared with corresponding labor in conventional construction of a residential tower of comparable quality.
2. THE RELATIONSHIP BETWEEN THE THEME OF THE GRADUATION LAB AND THE SUBJECT/CASE STUDY CHOSEN BY THE STUDENT WITHIN THIS FRAMEWORK

The architectural engineering studio has different locations and 3 themes for design, make, stock and flow. The student has to apply a chosen theme for design in a chosen location. The location I have chosen is Bandung, which is in fact focusing the urban kampung of Cigondewah in southwest of Bandung where the expansion of textile production and correlated aggregation of population have led to series of environmental and social problems. The Bandung location group is correlated with the tutor’s design proposal for a fashion village, which is trying to use a combination of make and flow strategies to improve the quality of the kampung and the circulations of material and funds to create a more sustainable future for the workers, villagers and also the factory.

The theme of my project is “make”. My project is trying to use “new” – not really but in many cases in current building practice it is quite so- technology of onsite automation to create new buildings to solve the problem of housing shortage and densification. The project is to stand within the currently undeveloped open fields owned by the factory, which can be used for expansion for production or dormitory for its workers. There are already provided accommodation in the southwest of the location. However, these accommodations are of minimal quality and since they are mostly one floor on ground, they take up much land space and offer limited amount of usable building space. The project proposes a better solution by stacking the space vertically – with a smarter way of construction- and leaving the rest for sustainable production of raw material, which is in fact production gardens for plants such as bamboo, banana, mango etc.

Building tower in the relatively low rise context might seem radical. However, considering the current autonomously uncontrolled densification process happening in the kampung, which is often dangerous in terms of both construction and structure reliability, and is harming the spatial quality, choosing a controlled way of centralized densification might not be a bad choice. Also, although the villagers could lose the possible income from rental rooms, the project creates opportunities for jobs of managing the production garden.
In the architectural engineering studio students start with a technical fascination and spend first half year researching on the chosen technology and integration of such technology in a chosen context. The end result of the research can often be a toolkit with guidelines for design. In the second half the students start to design the with these findings. Technological innovation is important indeed and is often useful in solving actual problem, however, the studio does not neglect the integration of technology in the context of design, which is a social and cultural aspect. The idea seems to be that a good combination of considerations on both sides should be achieved.

In my research I was in the beginning more focused on the technology. I researched on the technology of automation and design method of automation-oriented product and in the end I have a sufficient- of course the extent if for an architectural practice- background of knowledge in this field and it can well guide my design of corresponding aspects in the second phase. However, partly because of the fact that I didn’t go to Bandung myself before P2 but only just before P4, my research had been more intended for generic purpose and with insufficient consideration of its integration in specific context, especially socially. I was reminded about this at P2. Also after the trip to Bandung I started to gain better understanding of the context, and really start to find a strategy to position the design in between the factory, the workers and the villagers.

The integration of technology and design is the core of the methodology of the AE studio, as far as what I have understood. I had been somehow neglecting the non-technological aspects but I have been corrected. I think it is a good lesson for me not just for this project but also for future design.
As is mentioned, the project is intended for not only the case in Cigondewah, but is in fact also for the larger background of shortage of affordable housing in developing countries. Or it might even be better to put it this way, that the case in Cigondewah is a demonstration of how such systems can be applied.

We all know that the population growth and urbanization process with its migration waves greatly increase the need of housing and density especially in the cities. What’s happening in Cigondewah is actually a typical miniature of society. The aggregation of population in uncontrolled manner and with insufficient interference of government and organizations often lead to serious problems in terms of environment and living quality etc. To build a better future, of course many improvements should be achieved, such as new policies, new investment, better propaganda of new way of doing, better management and better intelligence. The innovation of construction is merely a small part of it, but not a trivial one.

The construction concerns investment, efficiency, payback period and very importantly the safety of both workers and structure – currently in Indonesia lots of construction are done with insufficient structural design, management and safety protection. Traditionally people have to first earn more money and then to consider these qualities, since it would take tremendous time and resource for the whole building industry to improve and upgrade. Choosing an innovative way of construction is, in my own view, like taking a short cut, and might even be more applicable than upgrading the current condition.