

Chapter 6 Conclusion

The system proposed in this research shows an example of combining various design media. By sharing the visual feedbacks of each media, the system provides some features that don't exist in original design process. The basic functionalities of the system could be summarized as follows:

- Enhances digital model into digital environment with more visible information
- Integrates physical models and tools into digital environment
- Integrates physical 2D sketches into digital environment
- Combines digital and physical 2D sketches
- Combines digital 2D sketches and physical tools

These basic functionalities allow designers to get visual feedbacks from all the media while using each of the medium. Moreover, with the combination of these basic functionalities, more possibilities of using media could be developed. The followings are new ways to use original media while using this system:

- 2D digital sketching with the assistance of 2D physical sketches
- 2D digital sketching with the assistance of 3D physical tools
- 3D digital model measuring using physical tools
- 3D physical model constructing with the assistance of 2D digital sketches
- 3D physical models transformed into 2D digital sketches and modifies it quickly with sketching
- Different parts of 3D physical models combined using 2D digital sketches

Significance

With this system, designers can continue to use design media that they are familiar with, and the uses of the original media are enhanced by sharing visual feedbacks with other media. Therefore, designers are able to bring their concepts into full play without additional limitations. The more important thing is, some functionalities of each design medium can be applied to other media. This makes each medium

become more useful.

Since visual feedbacks from various media are combined together, ideas that designers generated while using each medium also become more useful. These ideas last throughout the design process by keeping providing visual feedbacks to instinct designers.

Moreover, the system provides some new ways to manipulate the design media, which makes some differences in the design process. And the system provides more visual feedbacks for designers during the design process, which makes a difference to the results. For conclusion, this system not only makes design process more efficiency but also may improve the result of the design. It also shows a way to use AR in CAAD by integrating different media and enhances them by sharing each other visually.

Limitation and future works

One limitation of this research, in its currently proposed form, is that the captured data of physical models and objects are only 2D images. Moreover, the precision of the system is limited by the resolution of the web camera. A future version of the research could hypothetically extend this aspect of the system to allow a fully 3D rendering of the physical models to be automatically reconstructed from captured data. If the 3D data of physical objects (models and tools) can be captured in real-time mode, the integration of physical and digital objects would be more complete.

Another limitation of this research is that the form of the output display is only 2D image, which is compatible to sketches. The result of the system shows that the integration of the sketches is better than other media. A future version of the system could be using the output compatible to another medium.

Also, the proposed system provides only the combination of one basic digital medium and two traditional physical media. Since one of the principal aims of this research is to provide a generic platform that seamlessly integrates information from qualitatively different media sources, the proposed system is, by nature, maximally forward-compatible with additional forms of media. In summary, providing further digital information from physical media and the integration of new digital media such as those mentioned in the references are promising avenues for further research.