FY2022 MERIT Course Corporate Internship report

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Outline of Internship program

Host: Automotive Device Development Department, Kyocera Corporation

Workplace: Shiga Yasu Plant

Period: One month from August 22, 2022 to September 22, 2022

Theme: Study on realization of an aerial display

Background

Kyocera Corporation's Automotive Device Development Department is currently developing an aerial display. An aerial display is a display that floats in the air, as light emitted from a light source display is imaged in the air. It was originally installed in the "Moeye" concept car unveiled in 2020[1] and is now attracting significant attention as a non-contact display due to the recent situation of infectious diseases. Unlike conventional displays, it is hygienic because it does not have an entity. Kyocera Corporation is particularly focusing on the development of high-resolution aerial displays, and is aiming to develop the market for aerial displays in a wider range of applications. However, because the field of aerial displays is too new, there is a problem that the correct performance evaluation method has not been established. Since the aerial displays are difficult to measure the imaging position and their image surfaces are curved unlike conventional ones, evaluation methods for conventional displays cannot be applied without modification. In order to lead the aerial display market, it is necessary to solve this problem, reflect customer requirements in specifications, and compare them with other companies' products.

Contents of the internship

During my research internship, I mainly worked on the following tasks. Details are omitted from this report because they include confidential information.

- Optical simulation and analysis using "Code V" optical design software
- Performance measurement of our and other companies' aerial displays through experiments
- Consideration of the merchantability of the aerial displays

We also discussed the previous research such as Masaoka (2020) [2] and built "Code V" macros and python programs to support the above contents. Through this research internship, we obtained results that will be useful in establishing a method for evaluating the performance of aerial displays.

Impressions about the internship

As a graduate student studying in the field of condensed matter theory, it was a refreshing and stimulating experience for me to be able to do research in the field of optics, which is very different from my own field. At the same time, I was able to learn about the challenges unique to the latest theme of aerial displays and the a trial-and-error development process. I was also able to work freely thanks to the warm and friendly guidance of the people in the Automotive Device Development Department of Kyocera Corporation, who accepted me. It was very motivating to take a break from my normal research life and actually visit the Shiga Yasu Plant to see actual products while conducting research, and it reminded me of the longing I once had for manufacturing and research and development. This internship gave me a valuable opportunity to learn about the atmosphere of corporate R&D work and the actual needs of the field, and I believe it was a valuable experience that will help me in choosing a career path after graduation.

Acknowledgements

[1] `https://www.kyocera.co.jp/news/2020/0905_llps.html`

[2] K. Masaoka, "Line-based modulation transfer function measurement of pixelated displays," IEEE Access **8**, 196351–196362 (2020).