Intelligent Dynamic Light-field Illumination for Real-Face “Light-Morphing”

Principal Investigator：Yoshihiro Watanabe（Associate Professor, School of Engineering, Institute of Science Tokyo）
Co-PI：Sato Imari（National Institute of Informatics）・Shin’ya Nishida（Kyoto University）・Yoko Mizokami（Chiba University）

Grand Challenge and Goal：

We will realize an intelligent illumination that actively controls the light field by understanding the optical properties of dynamic objects and their interactions with light, and demonstrate its application as the novel concept of real-face “Light-Morphing”—flexibly transforming physical appearance through light projection, thereby creating a reality for adaptive appearance across contexts

Summary：

- Challenge 1: Illumination is the foundation of real-world understanding through vision, but can we unlock its higher potential?
- Challenge 2: By expanding the options of facial appearance, can we further broaden human possibilities?
- Strategy: Development of illumination technology capable of intelligently controlling appearance, and realization of a new reality technology that flexibly transforms facial appearance solely through light projection
- Research objectives: (1) fundamental system for dynamic light-field illumination, (2) high-speed vision for measuring and controlling complex reflections, (3) evaluation/modeling of Light-Morphing perception, and (4) optimization of illumination for reproducing target facial impressions

Social Impact：

- Evolving into a new social infrastructure that replaces conventional indoor lighting and enhances human potential
- Unlocking the value of the face—its skin, attributes, and emotions—and reshaping a wide range of applications and social practices, including beauty, cosmetics, entertainment, healthcare, caregiving, and communication