

Laboratory Profile

Introducing two labs directed by Professor Shinichiro Haruyama

Professor Shinichiro Haruyama

Total design of information and communication systems for ubiquitous society and entrepreneurship



Visible Light Communication Laboratory

Representative: Professor Shinichiro Haruyama

1 High precision navigation system using LED lighting



We have the technology to develop indoor 3-D positioning to centimeter precision by adding information on visible LED lighting. This technology enables a robot in an indoor setting to be guided via overhead LED lighting placed two meters overhead. We can guide a wheelchair equipped with this system through a hospital as shown in the photo.

Wheel chair guides itself through positioning information contained in the LED lighting.

2 Integral system design of visible light communication and augmented reality (AR) technologies



AR system to show advertisement information dispatched from lighting sources and similar objects overlaid on the physical surroundings.

Augmented reality combines and adds virtual objects as electronic information on top of image information of real environments such as the physical surroundings. Our research resulted in a friendly user interface, which overlays helpful information in floating graphics or objects. Future research will apply this technology to intelligent transportation systems.

3 System design of visible light communication survey

We have developed a "visible light communication 3-D position measurement system" together with Sumitomo Mitsui Construction Co., Ltd. This system applies visible light communication and a photo survey in a construction site. Thanks to this system, night-time surveying and unattended surveying, which were difficult with conventional technologies, are now available at a low cost. This system can measure with millimeter precision in a 40m x 40m area and maintain a survey of movement for a 24-hour period. In 2009, the Japan Society of Civil Engineers named this system as one of ten innovations in civil engineering.

Visible light communication survey system awarded as one of ten innovations in civil engineering by Japan Society of Civil Engineers



Train Services Laboratory

Representative: Professor Shinichiro Haruyama



Experiment of high-speed communication of about one gigabit per second for a bullet train moving at 270 km per hour.

We are proposing various ideas for future train transportation and related services from the users' perspective based on technological, social, and psychological considerations. We have been conducting joint research on high-speed communication technology for

a high-speed train with the JR Railway Technical Research Institute since 2007. In 2010, we achieved high-speed communication of about one gigabit per second between the moving Shinkansen bullet trains, local trains, and fixed sites. Currently we are working to improve the performance.



Image of potential on-board high-speed communication services

In the Train Services Laboratory, we are researching the viability of on-board services using high-speed communication technology and other information technologies. If adopted commercially, individual passengers will be able to enjoy on-demand video and sound as well as use cloud computing services, as shown in the photo image.



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