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## ●研究テーマ (Research theme)

### ①高速/高信頼水中光無線通信システムの研究

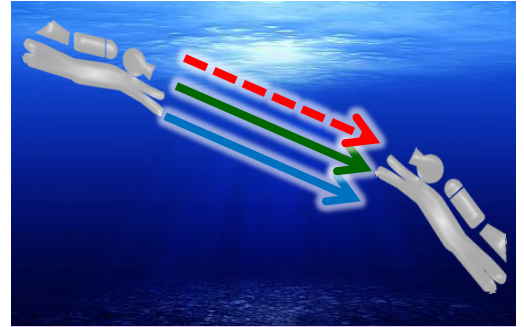
(High-speed / Highly Reliable Underwater Optical Wireless Communication Systems)

### ②室内照明光無線通信/測位システムの研究

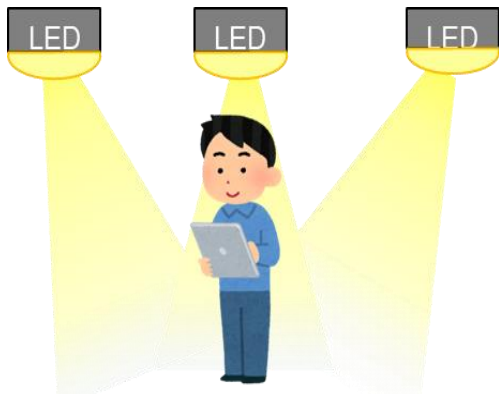
(Indoor Illumination Light Communication / Positioning Systems)

①海洋開発などの発展により、電波が通りにくい水中環境でのリアルタイムな高速無線通信が求められています。本研究室では良好な水中透過率を持つ“光”を着目し、高速/高信頼水中光無線通信システムの研究を行っています。特に、光無線通信路での背景光雑音干渉問題、エネルギー減衰問題を解決するため、誤り訂正符号を用いる光無線通信の高信頼化技術の研究を行っています。

With the development of the ocean, the high-speed underwater wireless communications in real-time used between unmanned underwater vehicles (UUV) or divers are required. Different from the radio wave, the optical light has a good propagation characteristic in the water. However, the reliability of the underwater optical wireless system is easy to be influenced by external factors, such as background noise, attenuation. Thus, how to enhance reliability is an important issue. In our laboratory, we are working the high-speed / highly reliable underwater optical wireless communications. Particularly, we focus on the error-correcting code techniques for enhancing optical wireless communications.



RGB-LEDを用いる水中光無線通信



室内光無線通信 (Li-Fi)

②LEDの普及とともに、可視光通信の室内への利用、Li-Fiシステムの構築が検討されています。可視光通信は照明機器用のLEDデバイスをもそのまま送信機として使用できるため、導入コストが低いですが、同時に照明機能と通信機能の実現が課題となります。本研究室では測位機能を加え、照明、通信、測位3つの機能を同時実現できる可視光通信システムの研究を行っています。

With the growth of light-emitting diode (LED), indoor visible light communications (VLC), Li-Fi systems are investigated. For the low introduction cost, the LED illumination devices are investigated as a VLC transceiver. In our laboratory, we are now working on the VLC system which can realize universal illumination, data transmission, and positioning, simultaneously. In particular, the realization of dimming control, safety for

human eyes, flicker mitigation, positioning schemes regardless of dimming control, elimination of interference from neighboring lightings, dimming-level-independent constant data transmission schemes, and suppression schemes for co-channel interference between neighboring illumination systems are investigated.

キーワード (Keyword)

光無線通信(Optical Wireless Communication)、可視光通信 (Visible Light Communication)、誤り訂正符号(Error-correcting Code)、室内測位(Indoor Positioning)

専門分野 (Specialized Field)

光無線通信(Optical Wireless Communication)

共同研究可能技術 (Possible Technology of Cooperative research)

無線通信(Wireless Communication)

関連論文・特許情報 website

<https://info.ibaraki.ac.jp/Profiles/112/0011142/profile.html>

(Related articles・patent information)

研究設備 (Research Facility)

可視光通信実験設備

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