Research Objective

- Fundamental study of ultraviolet (UV) and visible light communications (VLC) channel modeling and system design with experimental validation
- Modeling and analysis of hybrid networking
- Prototype development for experimentation and demonstration to promote transition

Challenges

- High link loss inherent in long-range UV channel
- Complex atmospheric channel in NLOS UV links
- Unconventional design constraints (e.g., UV safety and perceived visible-light emission)
- Limited experimental data for modeling & design
- Lack of commercial off-the-shelf components for UV system development

ARL Facilities and Capabilities Available to Support Collaborative Research

- NLOS UV channel modeling framework
- UV communication system analysis
  • End-to-end link modeling
  • System design tradeoffs (e.g., rate/range/pointing)
- Patent-pending RGB visible light communication modulation design approach
- UV channel-sounding measurement systems developed with academic collaborators
  • Short-distance systems employing LED transmitters
  • Long-distance system employing pulsed UV laser
- ARL hybrid UV/RF Common Sensor Radio (CSR)
  • Leverages mature CSR RF radio system with efficient power management & networking protocols
  • UV MODEM enhancement provides UV communication capabilities
  • Experimental platform for UV/RF hybrid networking
  • Demonstrated three-hop RF/UV/RF link

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Device development: UV LEDs, APDs, & solar-blind filters
- Measurement and communication system development for expanded experimentation
- Rigorous experimental design, execution, and analysis
- Atmospheric modeling