# Optical Signaling

Optical Signaling refers to Line of Sight (LOS) information transfer using visual means. Each of these techniques has the potential to significantly reduce vulnerability to detection of electromagnetic (EM) radio emissions.

## Quick Reaction (QR) Code Streaming

Quick Reaction (QR) Codes can be used for single messages of various sizes or to create a streaming data channel.

### Thesis work

- Sokol, Christopher R., "A Study on Using Quick Reference Codes in Airport Surface Operations to Reduce Accidents and Incidents While Taxiing," capstone project, Embry-Riddle University, 18 June 2013.

### QR Code on King Hall

NPS thesis work in 2013 investigated the possibility of viewing QR codes as a data-signaling mechanism to aircraft. Here are pictures of the completed QR Code on King Hall.

### QR Chat

As part of our building an open-source application, here is a video demonstration of our open-source QR Visual Chat application that works without a network. Working nickname: "Digital Semaphore" for use in Network Optional Warfare (NOW).

Interested in learning more, or telling us if you have seen the rooftop QR code? Your feedback is welcome at qr@nps.edu, thanks!

### Additional references

- Digital Flashing Light (DFL). New project referring to automation of classic Flashing Light signaling through use of QR Code (Digital Semaphore) streaming techniques.
  - TODO: we are interested in obtaining a pair of Navy signal lamps for use in ongoing experimentation.
- Flag Semaphore display and recognition also appears to automatable using digital image analysis techniques.
- Laser and Free-space optical communication

Stay tuned, lots more to follow!

- Examining correspondences and corollaries between radio and optical domains
- Radar-absorbing, carbon-fiber clouds, aka "electronic smoke" ([7th Fleet Tests Innovative Missile Defense System](http://qr.nps.edu))
- Ongoing work comparing Network Centric Warfare (NCW) and Network Optional Warfare (NOW) approaches

## Contact

All questions and comments are welcome, please let us know what you think.