1. Motivation:
Communicating toys offer new play experiences at home and in controlled environments, for example in entertainment theme parks like the Walt Disney World™ in Orlando, Florida. The high technical complexity is limiting the widespread use of communicating toys. For this reason, low-cost toy-to-toy communication can use Visible Light Communications (VLC), where Light Emitting Diodes (LEDs) are used as transmitter and receiver. The demo shows use cases and a VLC platform using LEDs and microcontrollers.

2. Toy Scenario:
- Complex devices: radios, sensors, actuators
- Rich interactions: toy-to-toy, toy-to-computer, toy-to-environment

3. Approach: Visible Light Communication:
- Toys communicate using visible-light LEDs
- LEDs are used as transmitters and receivers
  - transmitting: fast LED on/off switching
  - receiving: read capacitance discharge time
  - half-duplex operation

Visible Light Communications (VLC) in a smart toy network. VLC enables low-power cost-effective toy-to-toy wireless interactions with visual effects.

Demo: Bi-Directional Transmission:
- Text messages are sent and received via VLC and displayed on a screen
  - two VLC boards connected to USB ports of a laptop
  - two modes of operation: short text and continuous text

Demo: Message Passing and Flickering Avoidance:
- Messages are passed from one node to another in a multi-hop way
  - four VLC boards: one source, two relays, and one sink
  - each board runs customized firmware
  - flickering effects are avoided with a novel encoding scheme

Learning and Future Work:
Low cost communication is essential for consumer electronics. This motivates the use of VLC for toy-to-toy communication. Other applications may involve mobile devices, displays, cameras, vehicles. Future work will focus on improving the reliability of communication and the achievable throughput and range, without adding complexity.