

Project L

Looma Wand Redesign Project

Sponsor: VillageTech Solutions

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Looma is an interactive whiteboard system for use in village schools. It has been tested during two school years in Nepal and has great response. VillageTech is undertaking a redesign of all Looma components for [low-volume] mass production in 2014. Teams are working on Looma internal electronics, Looma packaging and mechanical design, Looma software, and Looma educational content.

The Looma wand is a simple hand-held device the size of a marker pen. Currently, it has an on/off switch, an IR LED that is detected by an IR camera on the Looma box, 2xAAA batteries, and a mouse-click button. The wand is used from the front of the classroom. The IR camera on the Looma tracks the wand position and system software moves the cursor on the projected screen. The mouse-click button modulates the IR LED (with a simple 555 timer circuit) and the modulation is detected by system software as a mouse-click.

We want to re-design the wand for mass production.

Project elements:

- Wand electronics
- Wand IR functionality
- Wand packaging



Details on each element:

- **Wand electronics**

The current design is rudimentary, but a good proof of concept. We need to analyze and improve the circuit, change to re-chargeable batteries, re-layout the PCB, replace the switch and button with more robust buttons, and create professional documentation.

Goals for redesign:

- re-chargeable battery through USB connector
- investigate battery-life enhancement, including duty-cycle LED "on" state, reduced current to LED, etc
- characterize all circuit devices to ensure we are operating them with-in spec

- consider adding a on/off indicator LED (pulsed during mouse-clicks)
- consider adding micro-controller to regulate all functionality and timing for programmable flexibility
- investigate some form of auto-sleep/auto-shutoff functionality (perhaps with accelerometer) to save battery life
- **Wand IR functionality**

The current wand uses an IR LED that has not been characterized for optimal performance with respect to the IR camera or for battery-life. The diffuser is ad-hoc and has not been evaluated.

Goals for redesign:

- characterize IR camera to determine LED selection criteria
- literature search for best LED
- characterize selected LED
- laboratory measurements of selected IR LED
- laboratory measurement of wand's IR diffuser - determine performance, usefulness and optimal design (shape, material, etc)
- select diffuser material
- create production molds for diffuser manufacture
- **Wand packaging**

The wand body has been extensively user tested for comfort and operation. The current case design will have to be changed to accommodate the new PCB, switches, charge port, etc.

Goals for redesign:

- re-design wand body for high-volume manufacturing, and serviceability

For more information, please contact Skip Stritter: skip@stritter.com.