01 Library For All

SLQ Wiki Fabrication Lab 2026/05/31 23:16

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Library For All is an Australian non-profit organisation with a mission to make books and educational resources accessible to all. [1)]

Library For All LFA has built an innovative digital library to deliver quality educational materials in communities where history, poverty or remoteness limits access to books. State Library of Queensland (State Library) has partnered with LFA and building upon previous work with remote and regional delivery of workshops and prototypes, the Applied Creativity team used the fabrication lab at The Edge to develop, prototype and deliver the hardware solution for their digital library.

If you are interested in the development and prototyping of the LFA project - read below, or jump to instructions on how to build your own case, or case server.

The Brief

LFA hardware brief is based around forty (40) low cost android tablets, packaged in a robust case, with a built in charging and sync solution. Wherever possible custom hardware/software design has been avoided, with the aim of producing a solution that can be adapted re-used and modified to suite future needs and with low initial investment.

The key LFA software requirement is the LFA app installed on each device. The devices ideally would run in kiosk mode (or a functional equivalent), restricting use to the LFA app, with a few chosen alternatives. Later in the project mobile device management system was scoped to provide device management.

The LFA hardware needs to be field upgradeable, with low-cost Consumer Off the Shelf (COTS) hardware wherever possible. The charging solution is separate from the sync solution to lower complexity of the build.

The Case

The volume of a 40 android tablets is the key constraint, and dictated the minimum dimensions. An industry standard Pelican case was specified, to be used without external modification (no cutting/penetration of the box). The case foam is the most customised part of the build, relying on specialist manufacturing and assembly to cut and build the foam.

Tablets

The manufacturer and model of tablet will shift the course of the project, requiring the case foam insert be modifiable. Custom silicon tablet cases were specced by LFA, which adds to the external dimensions.

Charging

5 port USB chargers were specced early in the project, requiring eight chargers per box.

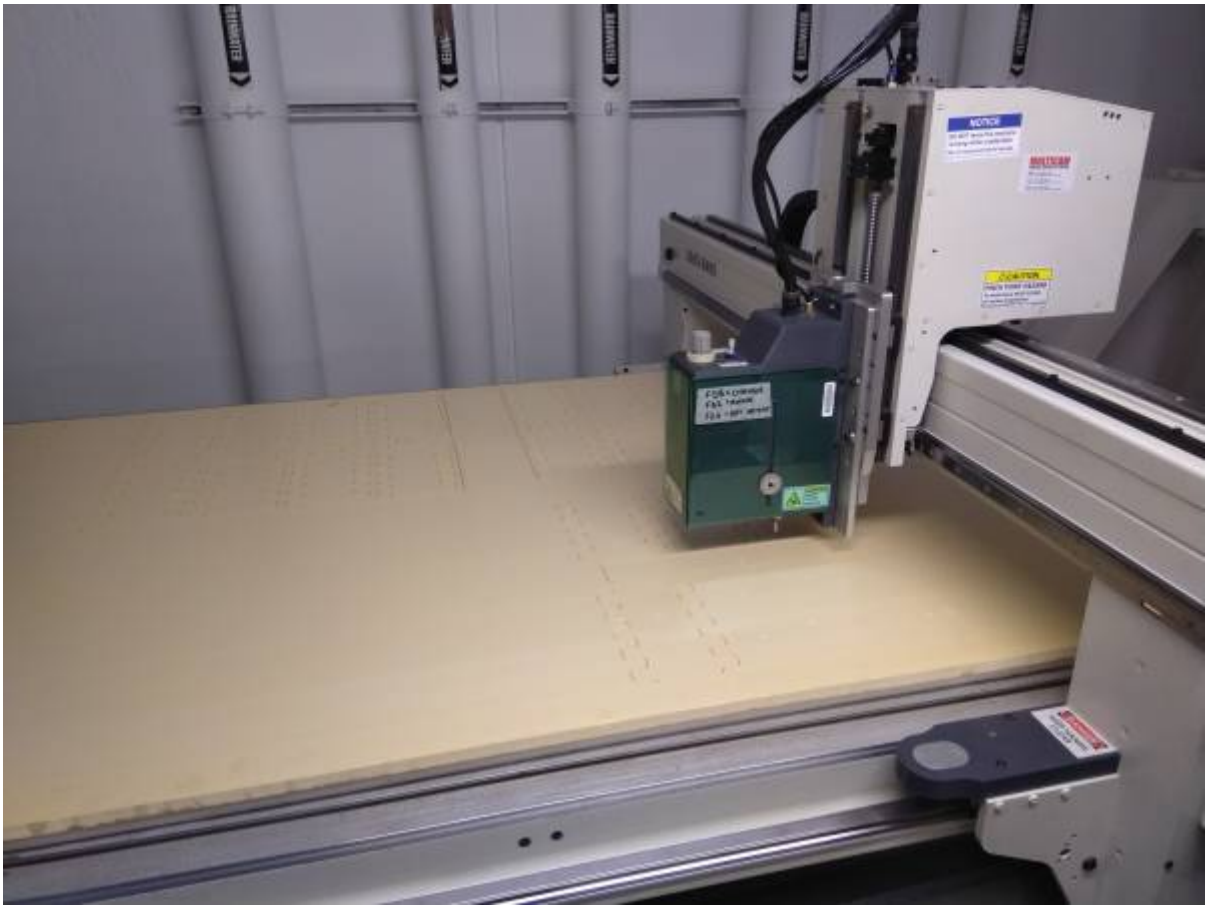
Syncing

Initial discussion revolved around creating a local (in the box) server for deployment. This server would cache the app, providing a local hosted version to minimise bandwidth requirements.

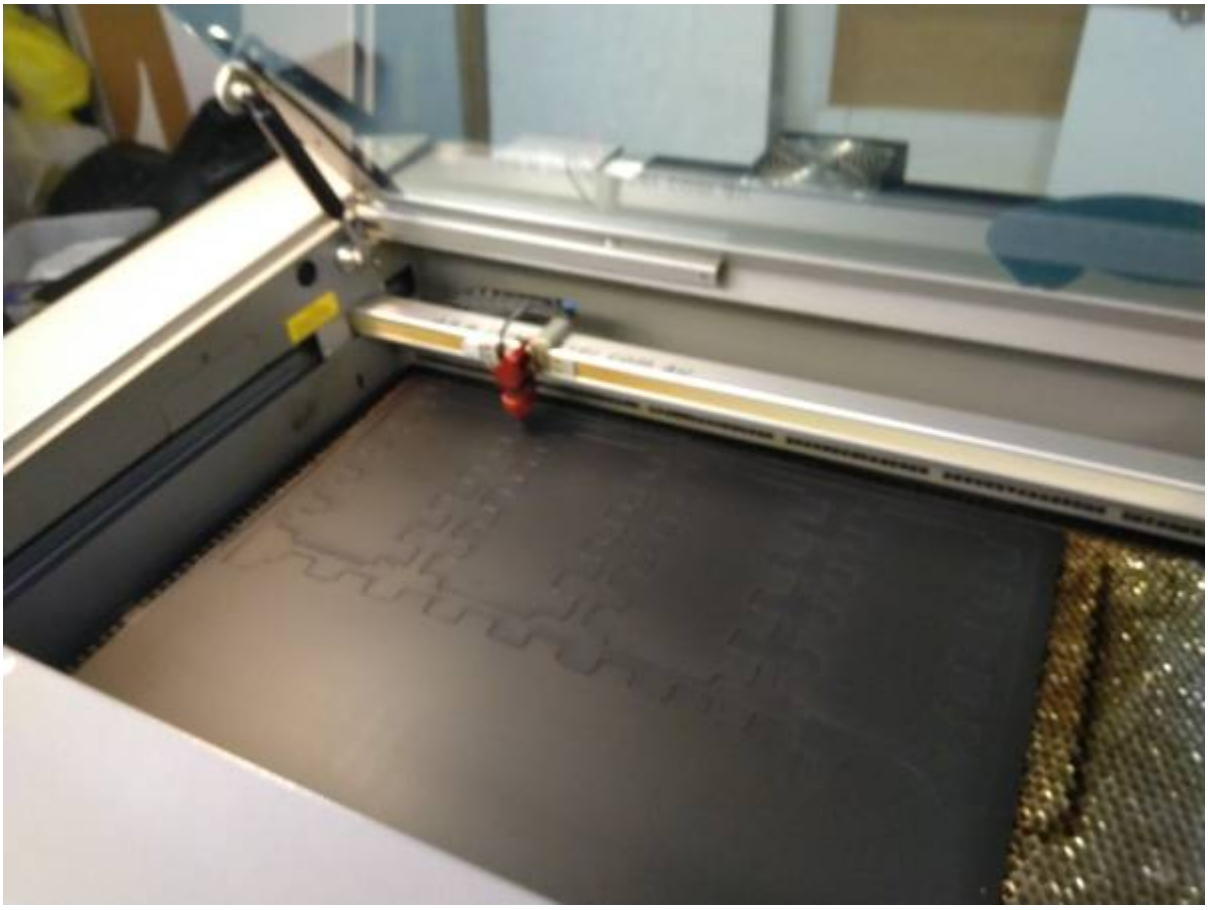
Case Prototype

The first prototype consisted of just the case foam and charging solution, cut out of expanded PVC foam.

Cut on the Fabrication Lab CNC router - using an oscillating knife.



With a polypropylene protective insert cut on the Fabrication Lab Laser Cutter



Web Server

Several consumer wifi routers were evaluated to scope suitability to act as local webservers (hotspot) with the following requirements identified.

- Custom firmware option for extending functionality (access to opkg repository)
- Robust/reliable, with sufficient CPU (dual core) and RAM (256 miB - min) and Flash RAM (128 MiB).
- 4g/3g modem support (either built-in or USB)
- USB flash drive support (2 ports)
- Price (less than $180 AUD)

To complicate matters, each device would be required to be adaptable in the field to suit the available 3G/4G mobile networks for PNG. The two [2)] major networks sell their own re-branded devices, with varying coverage so all devices would have to work with all networks. This pointed towards a wifi-router with the capability to host a USB 3G/4G modem.

Firmware

OpenWRT supported hardware were researched, as the longest running open source router firmware, this is the ideal option, - but finding a stable, fully supported device at a suitable price point proved

difficult.

Other custom firmwares investigated include DD-WRT, Tomato and Asus-Merlin and a short list of devices was compiled, along with the PNG network requirements, coverage and supported hardware.

AsusWRT-Merlin with ASUS RT_AC68U

Asusmerlin firmware, paired with Asus hardware seems most suitable, with regular updates supporting multiple consumer grade (cheap) devices, and an active community.

The Asus RT-AC68U.

For detailed build instructions.

PNG Network Settings

Telikom PNG

APN Settings:

- name - Telikom Mobile Internet
- APN name - internet
- MCC - 537
- MNC - 02

Digicel

APN: internet.digicelpng.com

Files

- http://www.giuseppeparrello.it/en/net_router_install_full_webserver.php
- https://www.dokuwiki.org/install:lighttpd
- face_plate_blank.dxf
- face_plate_blank_v2.dxf
- lfa png
- lfa-logo-1-e1548132716478.png

1)
https://libraryforall.org.au/
2)
Digicel and Telikom PNG