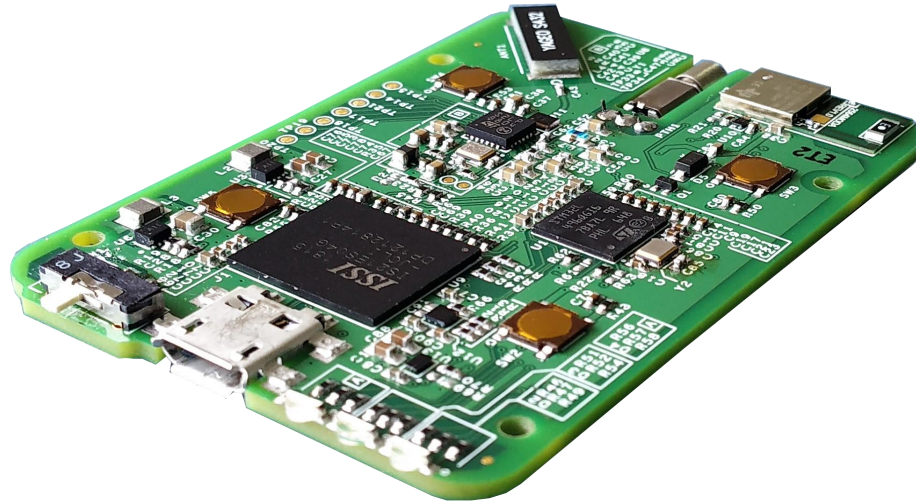




# Unifi Thumper Pro



A leading Magic products company, dedicated to the innovation of world class magic illusions for the discerning performer wanted to develop a wearable electronic device and iOS App which assists the world's leading magicians with breath defying feats of magic and mentalism

**Project Size:** 11 members

**Project Duration:** 4 months

**Technology Used:** BLE/BT 4.1, 433.92MHz Sub GHz RF, eMMC 5.1, Li-po battery, iOS.

**Interfaces available:** Micro USB, BLE/BT, Four User configurable buttons, Power slide switch, 3 RGB status LEDs, Low power battery indication

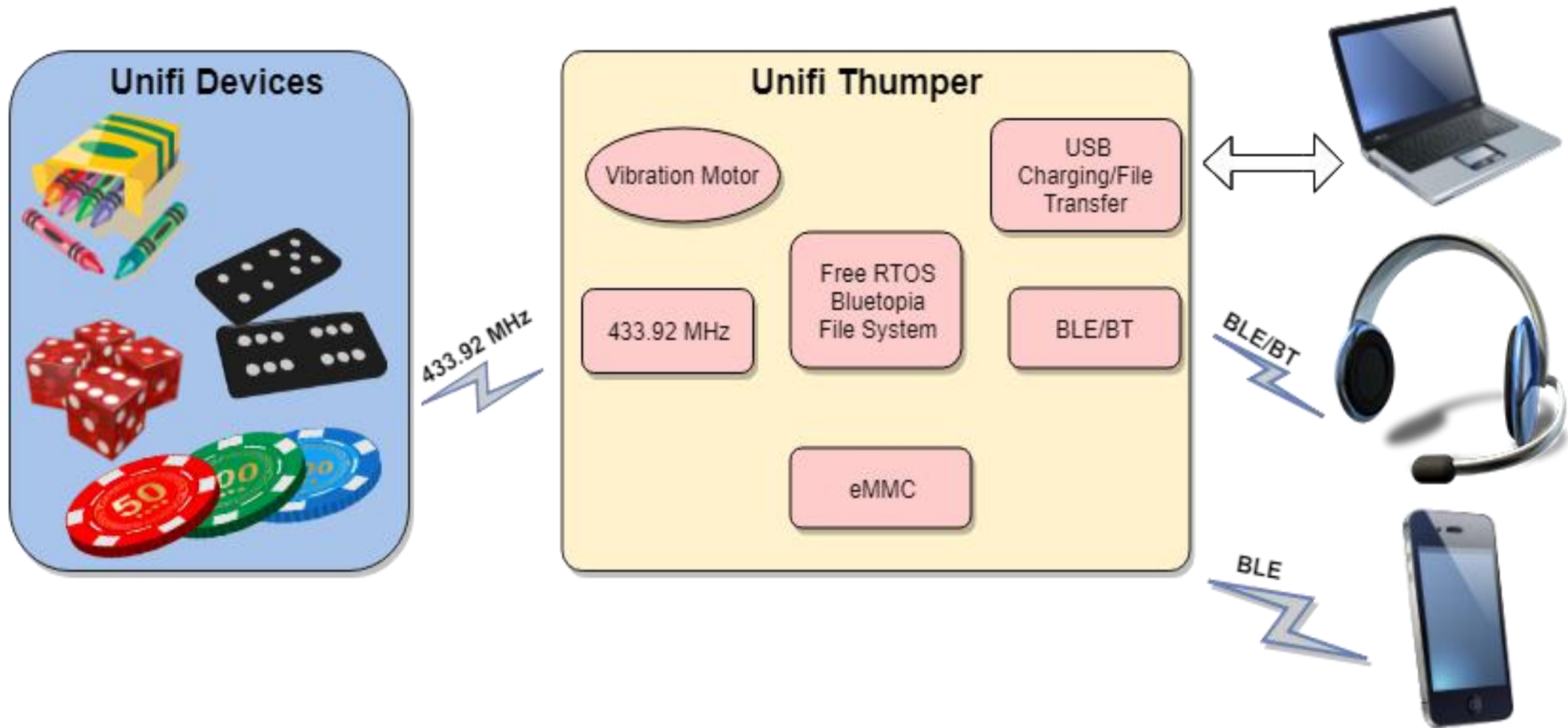
## Challenges

- Form factor constraints – 42x60x8mm
- Having two radio interfaces (433MHz and BLE/BT) with on-board PCB antenna in this form-factor

## Outcome

- Rechargeable & replaceable Li-po powered vibrating miniature central hub for multiple Unifi Tx devices
- Easy Configuration of Thumper device & event detection using iOS Mobile & Watch App
- USB Mass-storage device & firmware upgrade via Bluetooth

# Thumper Pro - System Architecture



# Thumper Pro - Use case



WHAT DID GADGEON DO?	PLATFORMS/ TECHNOLOGIES USED
1) Feasibility study and Documentation	<ul style="list-style-type: none"> <li>▪ Requirements Gathering &amp; Analysis, competitive product study,</li> <li>▪ H/W Architecture development and finalization</li> <li>▪ Component selection for all components &amp; BoM Management</li> </ul>
2) Hardware design(Schematics)	<ul style="list-style-type: none"> <li>▪ Part selection to minimal footprint as possible to accumulate all interfaces in required PCB dimensions.</li> <li>▪ Design done in view of passing radio certifications with proper EMC guidelines.</li> <li>▪ Tool: Cadence OrCAD Capture CIS</li> </ul>
3) PCB design(Layout)	<ul style="list-style-type: none"> <li>▪ Complex PCB design of very small form-factor of 42X60mm.</li> <li>▪ Intra and Inter Length matching and spacing for all critical high speed interfaces.</li> <li>▪ Critical placement &amp; routing of radio signals (433.92MHz, BT) to ensure optimum performance.</li> <li>▪ 6L 1.6mm PCB with BGA fanout micro Via Structure</li> <li>▪ Tool: Cadence Allegro PCB Designer</li> </ul>
4) Fab and Assembly House co-ordination	<ul style="list-style-type: none"> <li>▪ DFM and DFA</li> <li>▪ Preparing low cost CBoM's with low cost alternatives identified for high cost parts.</li> <li>▪ Life time check for components in BoM.</li> </ul>
5) Bring-up and Testing	<ul style="list-style-type: none"> <li>▪ Initial bring-up of the board followed by detailed Electrical interface verification.</li> <li>▪ Testing on iOS platform.</li> </ul>
6) Firmware Application development	<ul style="list-style-type: none"> <li>▪ Integration of Bluetopia stack for BLE/BT Dual module</li> <li>▪ 433 MHZ RF integration in GPIO mode in custom protocol format</li> <li>▪ STBCFG01JR Fuel Gauge driver development and integration</li> <li>▪ eMMC 5.1 driver development and integration</li> <li>▪ Sophisticated state machine development for multiple event handling and status updation</li> <li>▪ Remote firmware upgrade support</li> <li>▪ FreeRTOS integration</li> <li>▪ Pairing and audio playback to a BT Classic ear piece.</li> </ul>





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