

HARDWARE ROADMAP

From Idea to Manufacturing

MODULE 4

PROTOTYPING STAGE

Step 12

Prototype the Printed Circuit Board (PCB)

- Empty PCB
- Board assembly
- Outsource PCB production
 - Domestic vs. Asia
 - Seeed, PCBWay, Bittelite, Sunstone
- Start with 3-5 units, ramp up with each iteration

Step 13

Prototype the Enclosure/Case

- 3D printing
- CNC machining
- Urethane casting
- Professional prototype shops
 - Seeed, ProtoLabs, ICOMold
- Personal 3D printer

Step 14

**Evaluate the PCB Prototypes,
Revise As Needed**

- No design is perfect the first time
- Revisions and tweaks always necessary so plan for it
- Develop upfront an evaluation and testing plan
- Difficult to forecast because of unknowns
- Complex circuits (wireless, etc.) take multiple iterations
- Do not rush through evaluation!

Step 15

**Evaluate the Enclosure/Case Prototypes,
Revise As Needed**

Step 15

Evaluate Enclosure/Case Prototypes, Revise As Needed

- Get to finally feel your product in your hand
- If appearance critical = more prototype iterations
- Once finalized migrate up technologies
 - Start with 3D printing
 - If specific plastic critical -> CNC machining
 - Move to urethane castings
 - Finally, transition to injection molding
 - Start with 1-cavity aluminum then steel