



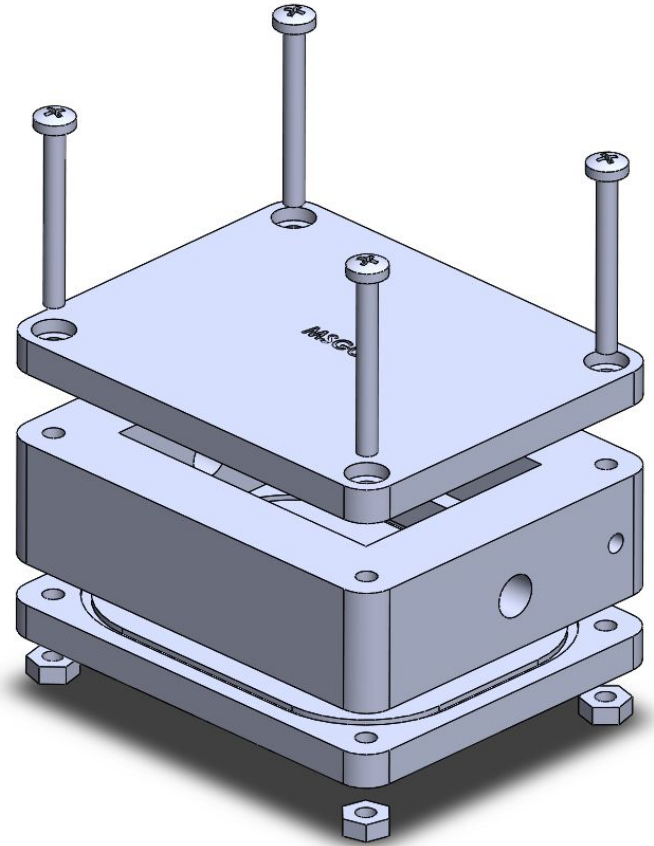
The Waterproof Cutdown, V3

Tim Uhlenbruck, Isaac Schmidt, and Lance Nichols



Development of the Box

- Challenges
- Design choices
- Materials



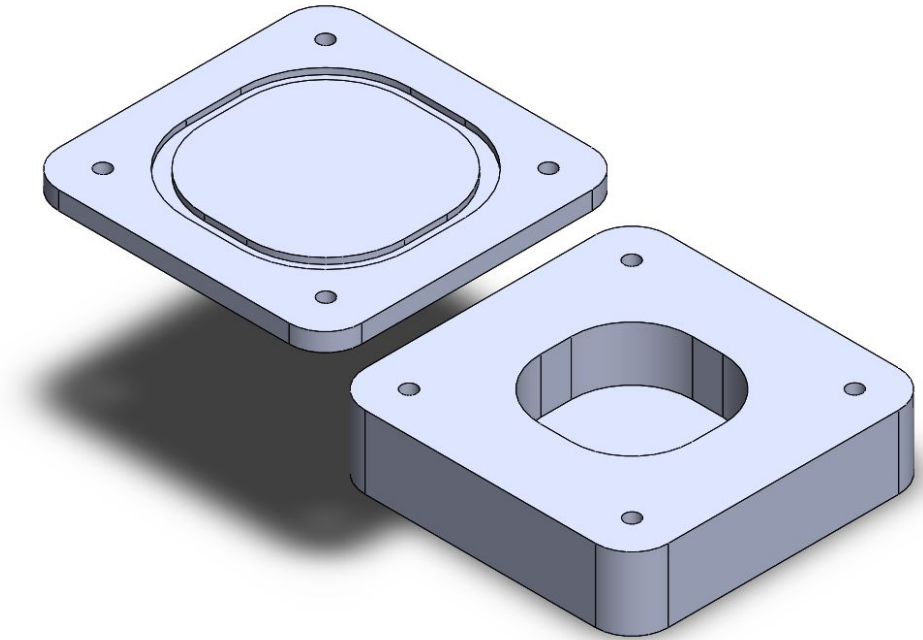
The String

- How?
- Compression fittings
- Silicone Seal
- BIG Needle



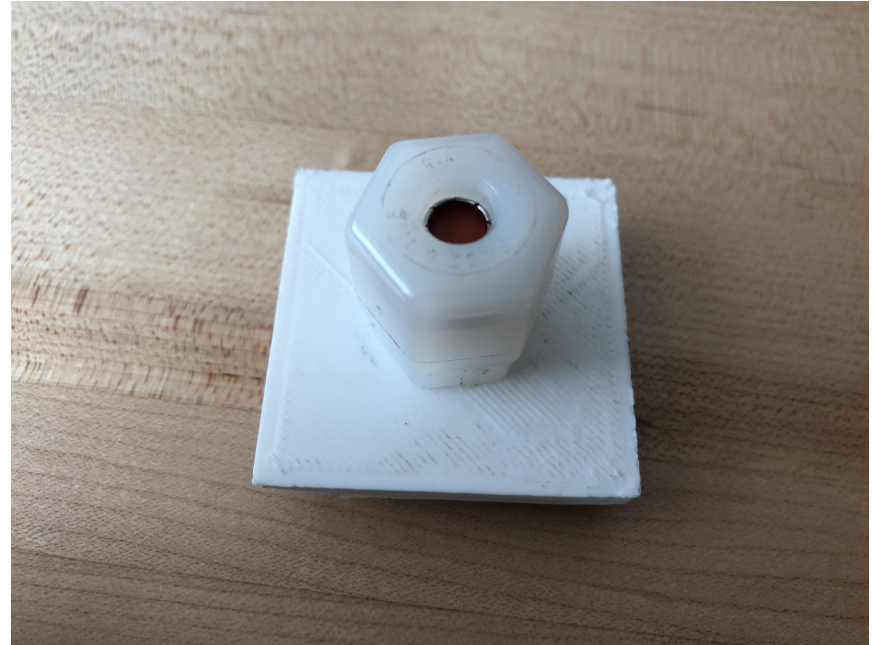
3D Printed Box

- Can it be done
- What material
- Testing



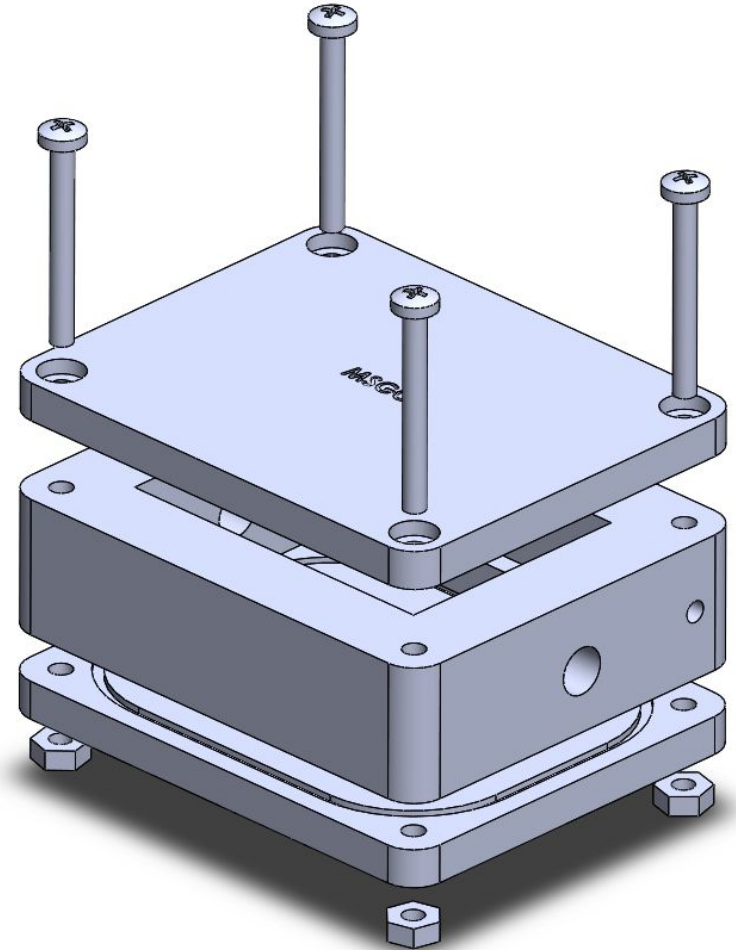
Tapping a 3D Print

- Will it work
- Will it be waterproof



Final Design

- Opens from both sides
- Waterproof
- String through both sides
- Seat Belt
- O-Ring choice



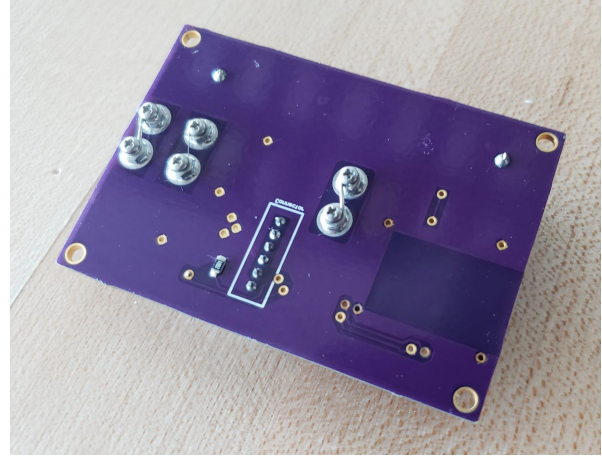
Final Manufacturing

- 3D printed in ABS
- Silicone seals cut with sharpened metal pipe
- Nylon screws



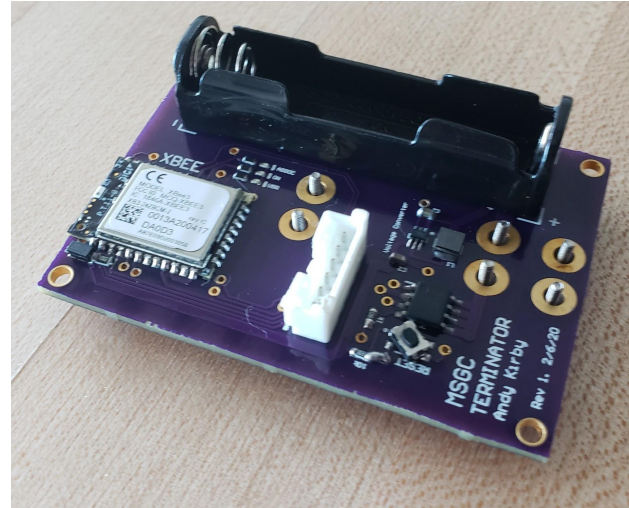
Hardware Overhaul And Specialization

- XBEE 3
- Smaller BOM
- Onboard MOSFET
- Board Mounted Nichrome



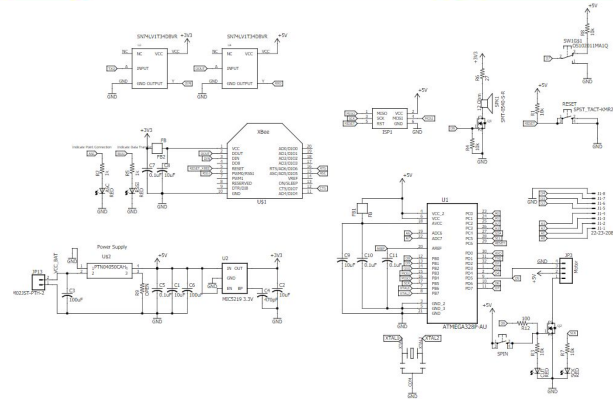
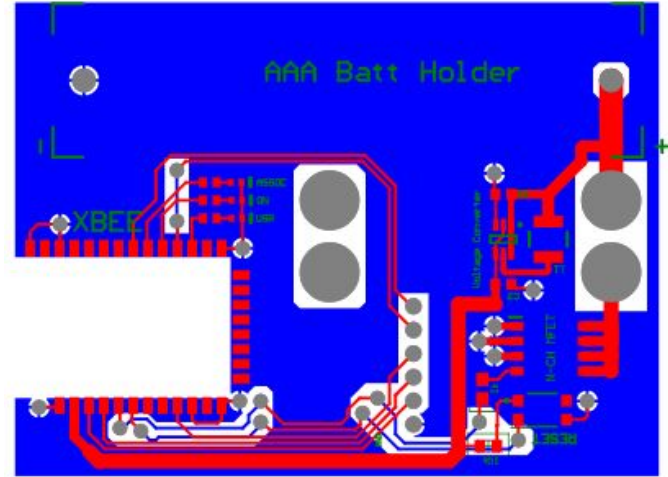
New Operating Voltage

- XBEE 3 3.3v
- AAA battery 1.5v



Microcontroller and Radio Integration

- Simpler Overall Hardware



XCTU

- “Commands” (settings)



















Product family: XB3-24

Function set: Digi XBe...gbee 3.0

Firmware version: 100A









▼ Networking

Parameters which affect the Zigbee network

 CE Device Role	Join Network [0]	 
 ID Extended PAN ID	AAC	 
 ZS Zigbee Stack Profile	0	 
 CR PAN Conflict Threshold	3	 
 NJ Node Join Time	FE x 1 sec	 
 NW Network Watchdog Timeout	0 x 1 minute	 




▼ API Configuration

Change API mode configuration

i AP API Enable	MicroPython REPL [4]	▼	 
i AO API Output Mode	0	Bitfield 	 
i AZ Extended API Options	0	Bitfield 	 

▼ UART Interface

Configuration options for UART

i BD UART Baud Rate	115200 [7]	▼	 
i NB UART Parity	No Parity [0]	▼	 
i SB UART Stop Bits	One stop bit [0]	▼	 
i RO Transparent P...ation Timeout	3	x character times	 

XBEE 3 and MicroPython

- No more flashing
--Interpreter



main.py

```
50
51 print('ID: ' + str(xbee.atcmd('MY')))
52 # PIN DEFINITIONS
53 USER_LED = Pin(machine.Pin.board.D4, Pin.OUT, value=0)
54 PRI_MOSFET = Pin(machine.Pin.board.D12, Pin.OUT, value=0)
55 ASSOC_LED = Pin(machine.Pin.board.D5, Pin.OUT, value=0)
56
57 # FLAG DEFINITIONS
58 priCutdownFlag = True
59 secCutdownFlag = True
60
61 while True:
62     packet = xbee.receive()
63     #print(packet)
64     if packet != None:
65         print(packet.get('payload'))
66         check_for_command(packet.get('payload'))
67     USER_LED.value(1)
68     time.sleep(0.2)
69     USER_LED.value(0)
70     time.sleep(0.2)
71
```


Questions?