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 though 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)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CE Device Role</strong></td>
<td>Join Network [0]</td>
</tr>
<tr>
<td><strong>ID Extended PAN ID</strong></td>
<td>AAC</td>
</tr>
<tr>
<td><strong>ZS Zigbee Stack Profile</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>CR PAN Conflict Threshold</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>NJ Node Join Time</strong></td>
<td>FE x 1 sec</td>
</tr>
<tr>
<td><strong>NW Network Watchdog Timeout</strong></td>
<td>0 x 1 minute</td>
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</tbody>
</table>
## API Configuration
Change API mode configuration

<table>
<thead>
<tr>
<th><strong>AP</strong></th>
<th>API Enable</th>
<th>MicroPython REPL [4]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AO</strong></td>
<td>API Output Mode</td>
<td>0</td>
</tr>
<tr>
<td><strong>AZ</strong></td>
<td>Extended API Options</td>
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</tbody>
</table>

## UART Interface
Configuration options for UART

<table>
<thead>
<tr>
<th><strong>BD</strong></th>
<th>UART Baud Rate</th>
<th>115200 [7]</th>
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</thead>
<tbody>
<tr>
<td><strong>NB</strong></td>
<td>UART Parity</td>
<td>No Parity [0]</td>
</tr>
<tr>
<td><strong>SB</strong></td>
<td>UART Stop Bits</td>
<td>One stop bit [0]</td>
</tr>
<tr>
<td><strong>RO</strong></td>
<td>Transparent P...ation Timeout</td>
<td>3 x character times</td>
</tr>
</tbody>
</table>
XBEE 3 and MicroPython

- No more flashing
  --Interpreter
```python
print('ID:' + str(xbee.atcmd('MY')))  
# PIN DEFINITIONS  
USER_LED = Pin(machine.Pin.board.D4, Pin.OUT, value=0)  
PRI_MOSFET = Pin(machine.Pin.board.D12, Pin.OUT, value=0)  
ASSOC_LED = Pin(machine.Pin.board.D5, Pin.OUT, value=0)  
# FLAG DEFINITIONS  
priCutdownFlag = True  
secCutdownFlag = True  
while True:  
    packet = xbee.receive()  
    if packet != None:  
        print(packet.get('payload'))  
        check_for_command(packet.get('payload'))  
    USER_LED.value(1)  
    time.sleep(0.2)  
    USER_LED.value(0)  
    time.sleep(0.2)  
```

Questions?