HackerBoxes 0020: Summer Camp by

HackerBoxes (/member/HackerBoxes/) in kits (/tag/type-id/category-technology/channel-kits/)

Hacker Summer Camp: This month, HackerBox Hackers are working with Electronic Conference Badges while exploring embedded wireless communications and user interface functionality with the ESP32 platform.

This Instructable contains information for working with HackerBoxes #0020, which can be purchased here (https://hackerboxes.com/collections/frontpage/products/hackerbox-0020-summer-camp). If you would like to receive a box like this right in your mailbox each month, now is the time to subscribe at HackerBoxes.com (http://www.hackerboxes.com) and join the revolution!

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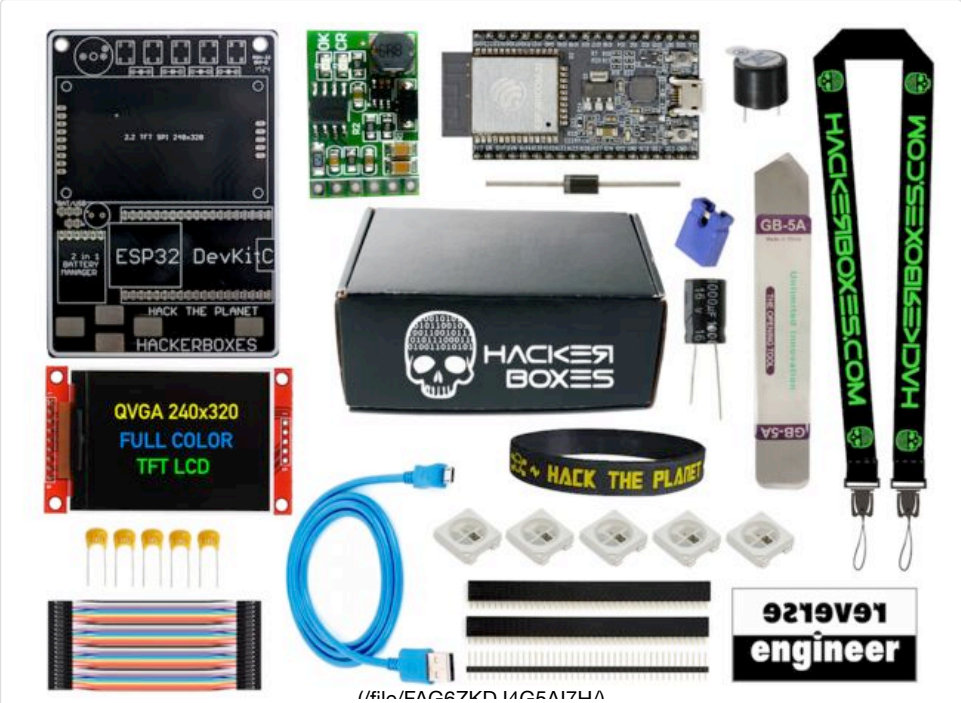
Topics and Learning Objectives for HackerBox 0020:

- Explore the social history of hacker conferences and badges
- Assemble a custom "conference badge" platform
- Configure the Arduino IDE for use with the ESP32 processor
- Use interrupt handlers for capacitive touch sensor inputs
- Bit-bang melodies on a simple buzzer
- Demonstrate color-cycling on single-wire LED pixel chains
- Display text and graphics on a color TFT LCD Display
- Integrate embedded functions for a wireless game of tag demo

HackerBoxes is the monthly subscription box service for DIY electronics and computer technology. We are hobbyists, makers, and experimenters. And we are the dreamers of dreams.

Step 1: HackerBoxes 0020: Box Contents



- HackerBoxes #0020 Collectable Reference Card
- HackerBoxes "Conference Badge" PCB
- Components and Connector Kit for PCB
- ESP32 DevKitC Processor Module
- QVGA Color TFT LCD Display
- Two-in-One LiPo Battery Manager
- WS2812 RGB LEDs
- Piezo Buzzer
- MicroUSB Cable
- Female DuPont Jumper Wires
- Opening Tool for Mobile Devices
- Exclusive "Hack The Planet" Silicon Wristband
- Exclusive HackerBoxes Badge Lanyard
- Exclusive "reverse engineer" Decal

Some other things that will be helpful:

- Soldering iron, solder, and basic soldering tools

Related


HackerBoxes 0015: Connect Everything (/id/HackerBoxes-0015-Connect-Everything/) by HackerBoxes


HackerBoxes 0002: Stepping up to ARM32, MCU Video, Wii Nunchuck (/id/HackerBoxes-0002-Stepping-Up-to-


HackerBoxes 0006: Internet of Things (IoT) Projects Featuring the Particle Photon (/id/HackerBoxes-0006-


Arduino and 3.5 Inch (320x480) TFT LCD (ILI9488) SPI Interface With DHT22 Temperature... (/id/Arduino-


HackerBoxes Starter Workshop (/id/HackerBoxes-Starter-Workshop/) by HackerBoxes

- LiPo battery pack or USB power supply
- Double-sided tape or velcro for battery pack
- Computer with Arduino IDE

Most importantly, you will need a sense of adventure, DIY spirit, and hacker curiosity. Hardcore DIY electronics is not a trivial pursuit. It's a real challenge and when you persist and enjoy the adventure, a great deal of satisfaction can be derived from learning new technology and hopefully getting some projects working. Just take each step slowly, mind the details, and don't hesitate to ask for help.

Step 2: Hacker Summer Camp 2017

Hacker Summer Camp is a term of endearment for the collective activities of one week each summer when tens of thousands of us descend upon Las Vegas, Nevada. These activities center around three conventions: DEF CON, Black Hat, and BSides Las Vegas. For a flavor of the awesomeness, check out the feature length DEF CON Documentary Film (https://youtu.be/rVwaIe6CiHw). Here are the details for 2017:

JULY 25-26:BSIDES LAS VEGAS (https://www.bsideslv.org/)
Tuscany Suites
Free Admission
Approximately 3,000 Attendees Expected
Keep an eye out for HackerBoxes in the big Chill-Out Room. We are an auction/raffle sponsor, so Lady Luck may come bearing Elite DIY Electronics. Always split Aces and Eights.

JULY 26-27:BLACK HAT (https://www.blackhat.com/us-17/)
Mandalay Bay
Over 15,000 Attendees Expected
We will be out surfing "The Bay" so hit us up for some free commemorative Summer Camp swag.

JULY 27-30:DEF CON 25 (https://www.defcon.org/html/defcon-25/dc-25-index.html)
Caesars Palace
Over 20,000 Attendees Expected
Stop by the HackerBoxes table in the vendor room.
Attend the "Hardware Hacking: Old Sk00l and New Sk00l" talk in the Hardware Hacking Village by hwbxr from HackerBoxes. [*Details will be updated here once the event schedules are finalized.*]

HACKERBOXES STREET TEAM
All around Summer Camp, keep an eye out for the *BIT HEAD* logo on the back of our shirts and hit us up for some stickers or other cool items.

HACKERBOXES DEF CON 25 MEETUP
Check back here as event schedules solidify. There will be a HackerBoxes Meetup in Caesars Palace on Thursday and/or Friday night. All are welcome - subscribers, friends, haters, phreaks, wifi-curious...
SEE YOU THERE!

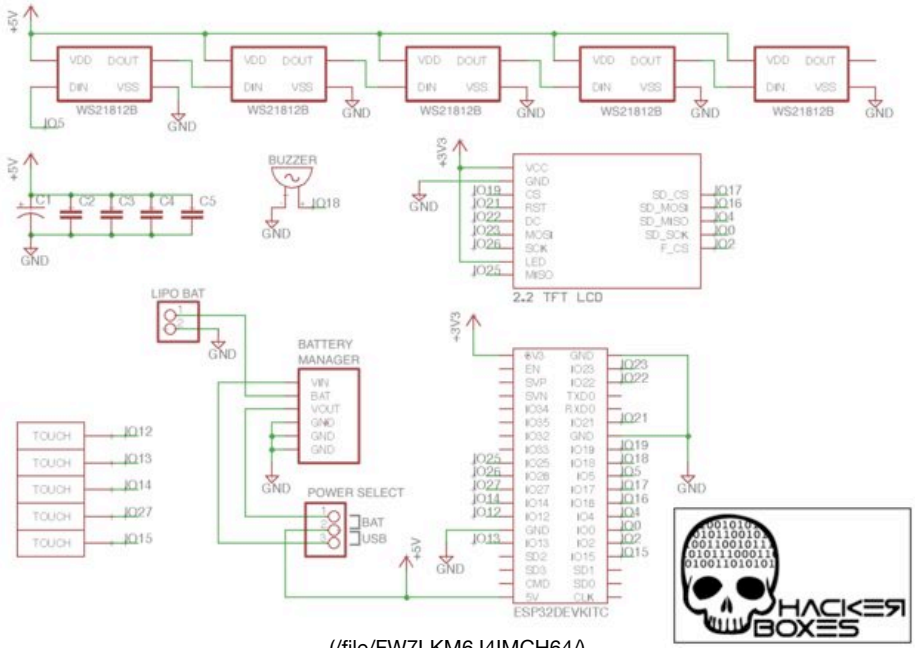
Step 3: DEF CON Badges

Over its 25 year history, DEF CON has become known for awesome badges (https://www.defcon.org/html/links/dc-badge.html).

There are the official badges that are purchased (or earned) and are worn to access the con itself. There is also an entire world of custom unofficial badges.

- ENGADGET gallery (https://www.engadget.com/2016/08/13/def-con-2016-badges/) of DEFCON badges
- WIRED Magazine article (https://www.wired.com/2014/08/defcon-2014-badges-revealed/) on DEFCON Badges
- HACKADAY on the unofficial badges (http://hackaday.com/2015/08/10/all-the-unofficial-electronic-badges-of-def-con/) of DEF CON 23

Step 4: HackerBoxes Badge Platform



Even if you are not going to DEF CON, your summer will be complete with this cool wearable platform of hackable electronics. Build it, customize it, wear it, display it... endless summer fun.

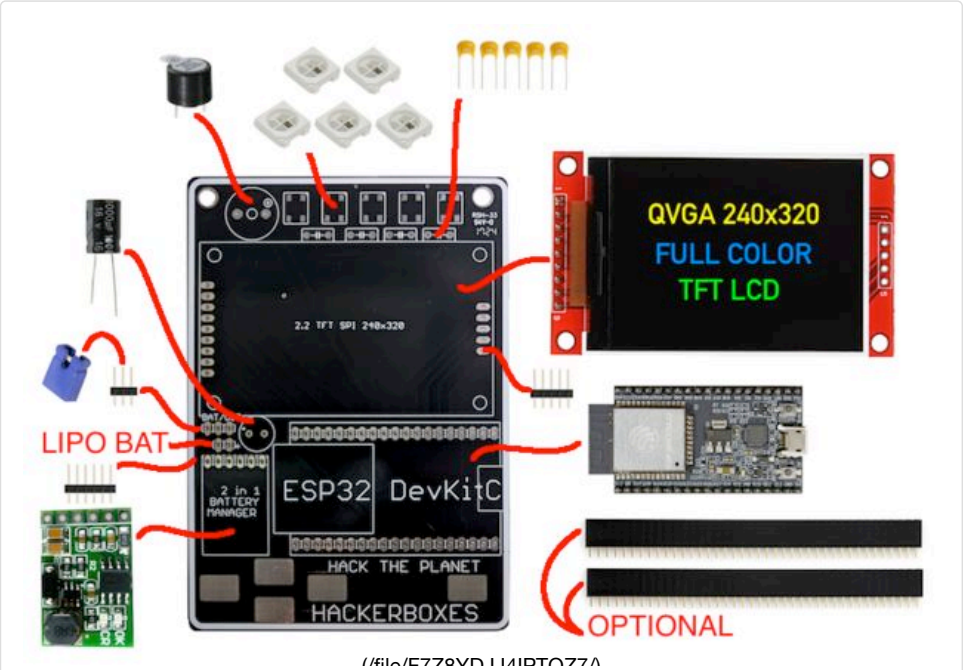
The HackerBoxes Badge PCB has been designed to support a variety of components and modules. It can be worn on a lanyard, used as a handheld, mounted on the wall, or deployed pretty much anywhere in countless wireless and colorful applications.

Features:

- ESP32 Dual Core 160MHz Processor

- 2.2 inch QVGA Color TFT LCD Display
- WiFi 802.11 b/g/n/d/e/i/k/r
- Bluetooth v4.2 BR/EDR and BLE
- Five Touch Pad Inputs
- Five RGB WS2812 LEDs
- Piezo Buzzer
- LiPo Battery Charger and Manager

Step 5: Assembling the Platform



The PCB and components can be assembled with a few options depending upon how you would like to use them. Read through this step and also the information about the power supply before deciding on the details of your build and beginning assembly.

Assembly Order:

- The WS2812 RGB LEDs should be soldered first since they are surface mount devices and the leads are easier to reach without other components in the way.
- The battery leads should be soldered in from the read of the PCB (solder on the front of the PCB) prior to attaching the battery management module, which may block the battery leads a bit.
- The electrolytic capacitor should be mounted before the LCD module.
- The buzzer should be mounted after the LCD module.
- All other components may be assembled in pretty much any order.

Component Polarities:

- The WS2812 RGB LEDs have a diagonal notch on one corner to match up with the same marking on the PCB silkscreen.
- The electrolytic capacitor has a negative (-) stripe above the negative lead. The PCB has a positive (+) marking for the other lead.
- The ceramic capacitors are not polarized.
- The buzzer has a positive (+) marking to match up with the same marking on the PCB.

- The LiPo battery holes have a positive (+) marking on one side - this is for the red wire.

WITHOUT Female Header Sockets:

- The female headers can be used to make sockets for the ESP32 and the LCD so that the modules can be removed for debugging or reuse. However, the sockets make the assembled PCB much thicker, so they are definitely not the best option for wearable or handheld applications.
- Mount the battery manager module first.
- The ESP32 board can be spaced a couple of millimeters up off of the PCB to ensure that the antenna portion clears over the battery manager module. Put something to hold it into place (or just use fingers) while starting the soldering. After that, the solder will hold it in its (very slightly) elevated position.
- Also, to create more space, the Battery Manager module can be mounted flush against the PCB using only header pins (without the black plastic spacer). Put the pins in from behind (with the black spacer on the rear of the PCB), solder the pins to the PCB (from the top), stack on the module, solder the pins to the module, snip off the plastic spacer and any portions of the pins on both side. Now it should be very low profile.

WITH Female Header Sockets:

- To cut the female headers to length, just use small wire cutters to snip through the hole ONE PAST where you want the socket strip to end. The pin/hole that you cut through is sacrificed.

Minimal Build Considerations:

- You may wish to focus on making a lighter and thinner build (to wear it).
- As mentioned above, the female sockets should be avoided.
- All five of the capacitors can probably be left off. There is reasonable decoupling on the modules.

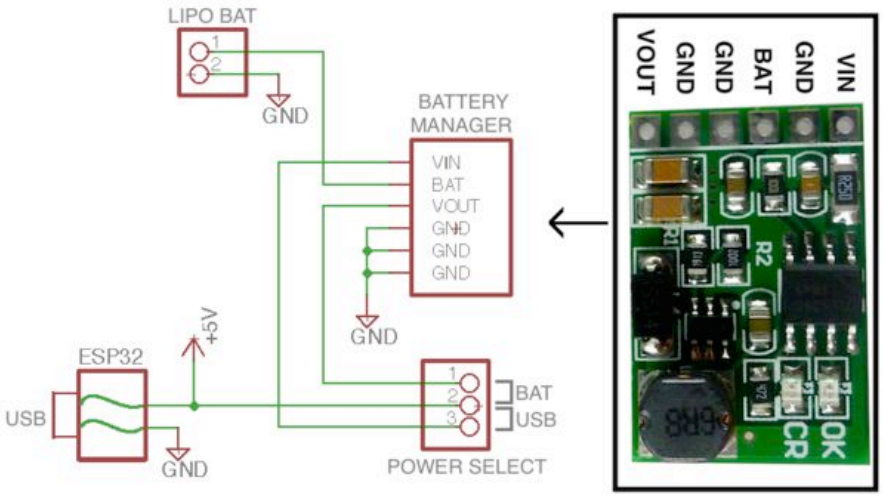
Access to SD Slot on LCD Module:

- We do not use the SD slot in any examples here, but you need to make some accommodations if you plan to use it.
- The ceramic capacitors need to be left off, or mounted on the rear of the PCB, or replaced with chip capacitors of the same value (100nF).
- The LCD module should be spaced a couple of millimeters up off of the PCB to clear SD card slot access over the WS2812 LEDs.
- A shorty MicroSD to SD adapter (http://amzn.to/2tpHUOA) can be used to prevent a flash card from extending out from behind the LCD module and obstructing the RGB LEDs.

Stabbies and LiPo Battery Mounting:

- After soldering is complete, there will be a lot of "stabbies" or pin leads protruding from the bottom side of the PCB. These should be trimmed down with small wire cutters (while wearing safety glasses, of course).
- The LiPo pack can be attached to the back of the board using thick double sided tape or velcro strips. The tape or strips should be thick enough to protect the battery pack (and your shirt) from the remaining stabbie stumps. If not, a bit of card stock or thin plastic can provide a nice mechanical barrier between the back of the PCB and the battery or anything else that the PCB might rub against.

Step 6: Power Supply



The Badge can be powered by either a LiPo (lithium polymer) Battery Pack or by USB. The power supply mode is selected by the jumper block.

POWER OFF

- Switch jumper block to USB side
- Unplug USB cable so no power is applied

USB POWERED

- Switch jumper block to USB side
- Plug MicroUSB cable into ESP32 module
- Power other end of USB cable with a computer, hub, USB wall supply, or mobile power pack
- The battery manager will automatically charge the LiPo Battery (if one is connected)

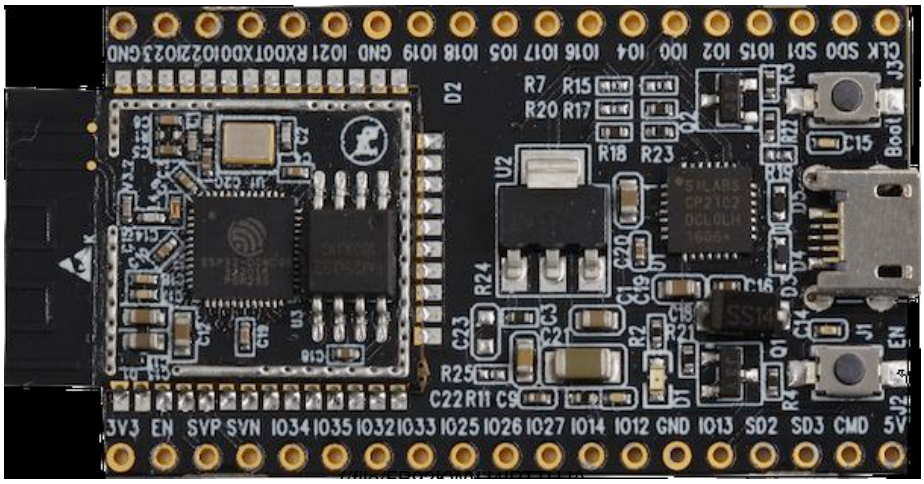
LiPo BATTERY POWERED

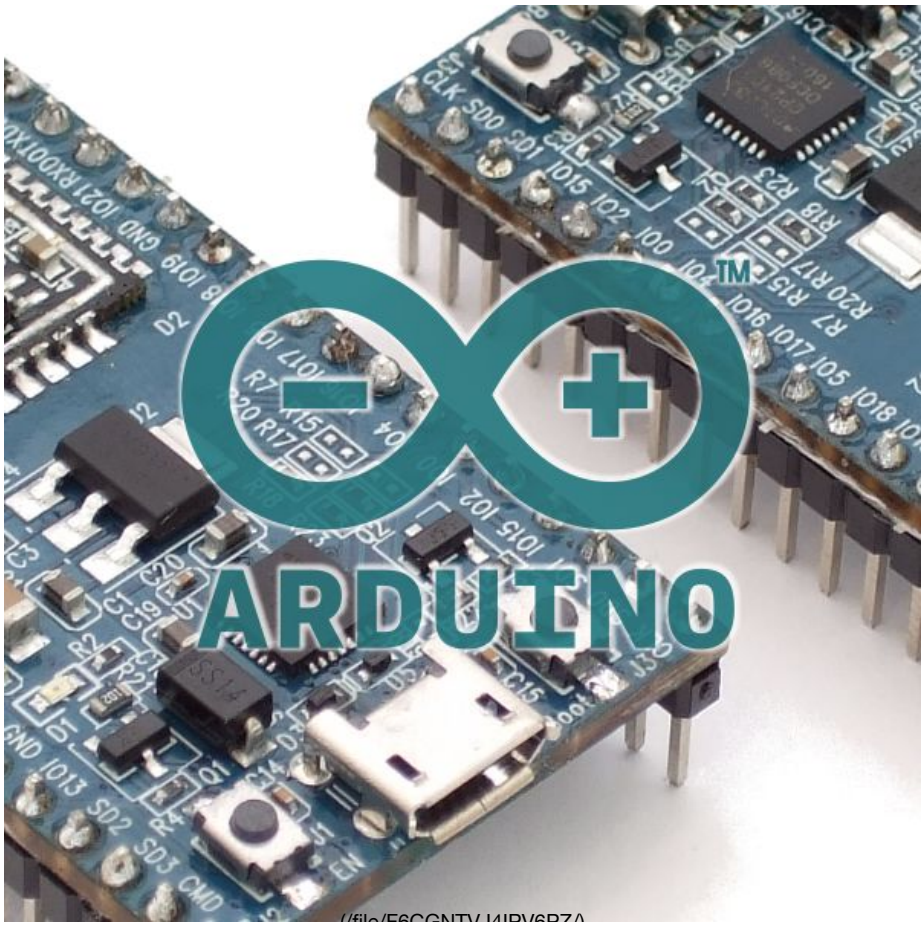
- Remove MicroUSB cable so no power is applied
- Switch jumper block to BAT side
- Battery manager discharges battery and boosts it up to 5V

It is suggested not to use a socket for the battery manager. Solder it (using header pins) directly to the PCB. This LiPo battery (http://amzn.to/2smBCzx) is a good example of the type to use. They are a little large, but very thin. They fit perfectly on the back of the PCB and they provide many hours of operation between charges.

BATTERY WARNING: Always be aware when charging or discharging LiPo batteries. In rare instances, they can get warm, swell up, or even burst. Do not leave them unattended. These are the type of batteries in mobile phones, tablet computers, and laptops, so they are generally safe and trustworthy for a long time, but it is always better to be safe than sorry.

Step 7: ESP32 and Arduino IDE





The ESP32 is a single chip 2.4 GHz Wi-Fi and Bluetooth combo solution. It is highly integrated, requiring less than ten external components. The ESP32 integrates the antenna switch, RF balun, power amplifier, low noise receive amplifier, filters, and power management modules. As such, the entire solution occupies minimal Printed Circuit Board (PCB) area.

The ESP32DevKitC is a small ESP32-based development board produced by Espressif. Most of the I/O pins are led out to the pin headers on both sides for easy interfacing. A USB interface chip and voltage regulator are integrated into

the module.

While the ESP IDF (link below) can be used to directly program and flash the ESP32, support for the ESP32 within the Arduino ecosystem and IDE has been continuously evolving. This Arduino route is a very quick and easy way to work with the ESP32.

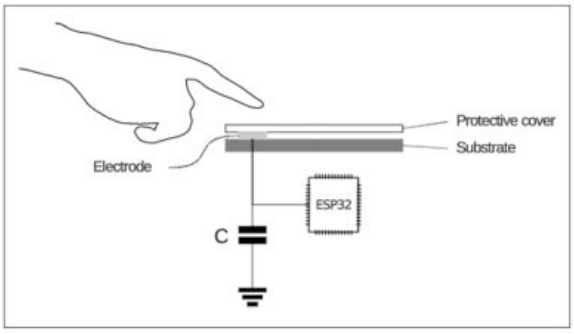
The Arduino ESP32 github (https://github.com/espressif/arduino-esp32) repository includes installation instructions for LInux, OSX, and Windows. Click to that link and follow the instructions that correspond with the operating system on your computer.

More Resources:
ESP32 Datasheet (http://www.espressif.com/sites/default/files/documentation/esp32_datasheet_en.pdf)
ESP32DevKitC Schematic (https://dl.espressif.com/dl/schematics/ESP32-Core-Board-V2_sch.pdf)
ESP32 Technical Reference Manual (https://espressif.com/sites/default/files/documentation/esp32_technical_reference_manual_en.pdf)
ESP IDF (IoT Development Framework) Programming Guide (https://esp-idf.readthedocs.io/en/latest/index.html)

Step 8: Touch Sensor Inputs

Capacitive Touch Sensor

A touch-sensor system is built on a substrate which carries electrodes and relevant connections under a protective flat surface; see Figure 69. When a user touches the surface, the capacitance variation is triggered and a binary signal is generated to indicate whether the touch is valid.



The Badge PCB includes five metal pads to serve as user input buttons. These pads are attached to the ESP32 I/O pins numbered 12, 13, 14, 15, and 27. These I/O pins each support touch sensor input.

The attached ***touch_demo*** sketch shows how to set up interrupt handling (https://en.wikipedia.org/wiki/Interrupt_handler) functions to be called whenever one of the touch sensors is triggered. Use the Arduino IDE to compile and flash the demo onto the ESP32DevKitC module. Once flashed, open the Arduino IDE serial monitor, and touch the sensor pads.

touch_demo.ino

(https://cdn.instructables.com/ORIG/F61/5P2S/J4IPVBX5/F615P2SJ4IPVBX5.ino)

Step 9: Buzzer Output

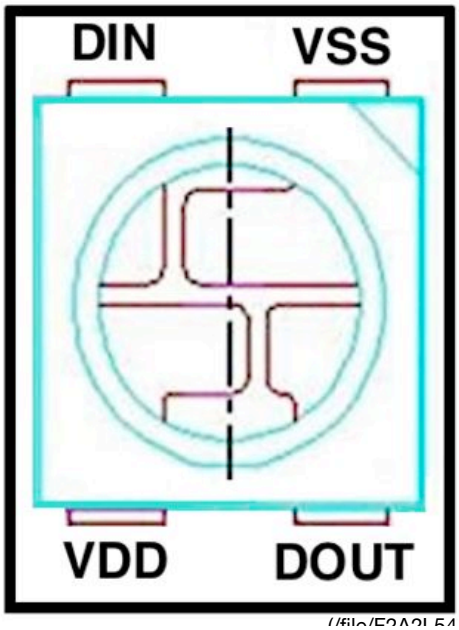
The Badge PCB has the Piezo Buzzer (https://en.wikipedia.org/wiki/Buzzer) pads wired to ESP32 I/O pin number 18.

The attached ***buzzer_demo*** sketch shows how to bit-bang some very retro sounding tones on the simple buzzer.

buzzer_demo.ino

(https://cdn.instructables.com/ORIG/FBN/D46A/J4IPVLCH/FBND46AJ4IPVLCH.ino)

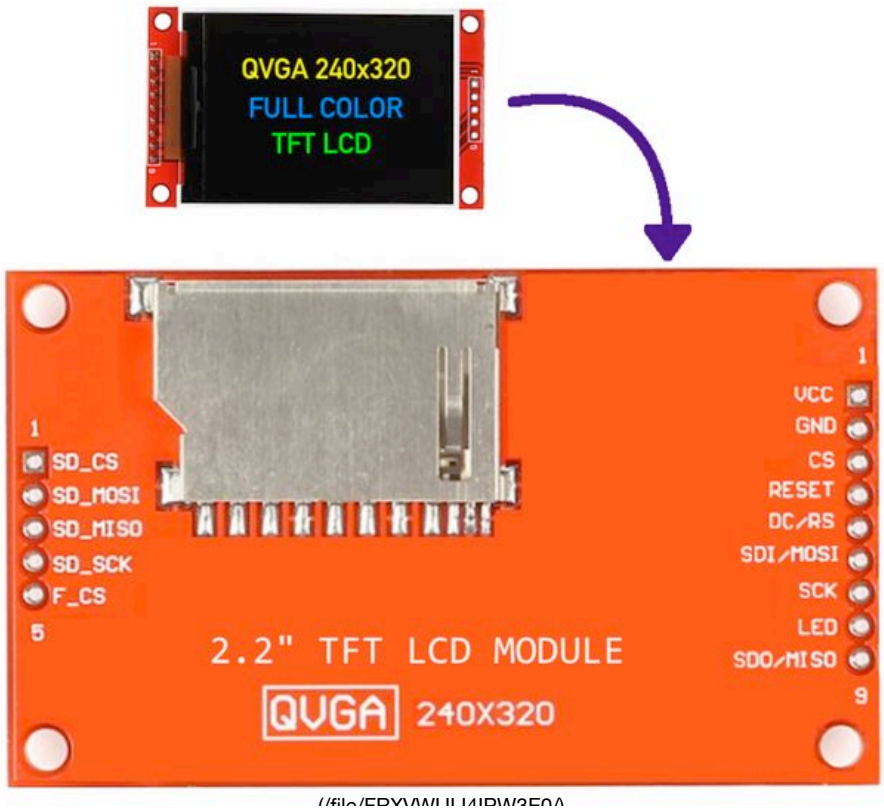
Step 10: NeoPixel RGB LEDs



The Badge PCB has landing pads for five NeoPixel RGB LEDs (WS2812). They are wired in a chain off of ESP32 I/O pin number 5.
The attached ***rgbled_demo*** sketch shows how set and cycle the colors of the five RGB LEDs. The demo uses the popular Adafruit NeoPixel Library, so be sure to have that installed and updated within your Arduino IDE beforehand.

rgbled_demo.ino
wnload (https://cdn.instructables.com/ORIG/F40/Q6LB/J4IPW0UL/F40Q6LBJ4IPW0UL.ino)
(https://cdn.instructables.com/ORIG/F40/Q6LB/J4IPW0UL/F40Q6LBJ4IPW0UL.ino)

Step 11: Color TFT LCD Display



The Badge Graphical Display is provided by a 2.2 inch TFT LCD Module. The display has 320x240 full color pixels (QVGA). The module is 3.3V compatible and has a 4-Wire SPI Serial Interface to the ILI9340C controller chip.

This MartyMacGyver demo (https://github.com/MartyMacGyver/ESP32_Adafruit_ILI9341/blob/master/demos/arduino-esp32/graphicstest_mod/graphicstest_mod.ino) using the Adafruit ILI9341 driver can be loaded to show some really nice graphics features. Just be sure to change the pin numbers to match those on the Badge PCB by pasting this block over the stock pin assignments:

```
// TFT Display Pins<br>#define TFT_CS    19
#define TFT_DC    22
#define TFT_MOSI  23
#define TFT_CLK   26
#define TFT_RST   21
#define TFT_MISO  25
```

Step 12: Badge Demonstration Firmware - Wireless Tag

Combining all of these functions together, along with some of the wireless communication features of the ESP32, can make for a very cool, interactive badge including a "wireless tag" mode.

HB020_Badge_A
Using this sketch, put your handle into the following line after the underscore:
char ssid[]="HackerBoxer_L33tHaX0r";

Your handle text is transmitted via 802.11 as SSID broadcast packets for all to see. Any detected wireless network SSIDs are listed on the display. Detected SSIDs starting with the text "HackerBoxer_" are assumed to be from other such badges and are displayed as IDs that have been tagged.

If two or more such badges encounter each other (for example, at DEF CON), they will display lists of handles from all of the other badges they have tagged. Of course, the badges play sounds and cycle the LED colors along the way. The single touch pad on the right is used to toggle the mute setting on the audio.

HB020_Badge_B (and beyond)
T.B.D.: Check back here for updated Badge Firmware - especially if you are going to Summer Camp. For optimum interactivity (such as the example "tag" functionality) it would be cool if any HackerBoxes badges at DEF CON 25 had common firmware, or at least common wireless processes.

Needless to say, if you come up with something cool to incorporate into the firmware, please let us know.

Non-Badge Applications for Platform
This ESP32 + QVGA platform can support packet sniffing (http://blog.podkalicki.com/esp32-wifi-sniffer/), games (https://youtu.be/yk263wgtKUE), and various other challenges. An interesting

application for an office (or other environment where the same people are around day after day) would be to gather packets and then associate the MAC addresses (such as from mobile phones) with the names of their owners. Then, the system could greet your friends and coworkers by displaying their name whenever their MAC address is detected. Unique sound effects and LED modes could even be associated with different identified MAC addresses.

HB020_Badge_A.ino
wnload (https://cdn.instructables.com/ORIG/F2F/8REX/J4IPXGJW/F2F8REXJ4IPXGJW.ino)
(https://cdn.instructables.com/ORIG/F2F/8REX/J4IPXGJW/F2F8REXJ4IPXGJW.ino)

Step 13: Opening Mobile Phones and Tablet Computers

(/file/FADSB12 J4IPXUI9VA

This might be the perfect tool (https://youtu.be/Aezlcvb5CPQ) for getting inside mobile devices... "THE OPENING TOOL" from Unlimited Innovation.

Step 14: Hack the Planet

Thank you for joining our adventures into the world of Electronic Conference Badges while exploring embedded wireless communications and user interface functionality. If you have enjoyed this Instructable and would like to have a box of electronics and computer tech projects like this delivered right to your mailbox each month, please join us by SUBSCRIBING HERE (http://www.HackerBoxes.com).

Reach out and share your success in the comments below and/or on the HackerBoxes Facebook page. Certainly let us know if you have any questions or need some help with anything. Thank you for being part of HackerBoxes. Please keep your suggestions and feedback coming. HackerBoxes are YOUR boxes. Let's make something great!

be nice We have a be nice comment policy. Please be positive and constructive. I Made it! Add Images Post Comment

JeffG187 (/member/JeffG187) 5 days ago Reply

Has anyone gotten the sd card reader / writer to work? I've been trying since the box arrived and can't seem to figure it out.

MoahM (/member/MoahM) ▸ JeffG187 (/member/JeffG187) 4 days ago Reply

Negative. Been fighting the same fight. Pretty sure it comes down to reassigning the pins and using SPI to access it. I haven't been able to figure out the right incantation though. Any pointers would be greatly

appreciated.

JeffG187 (/member/JeffG187) ▸ MoahM (/member/MoahM) 3 days ago Reply

That's what I'm thinking too, although I can't seem to find a version of the SPI Begin function with a parameter signature that would let us do that in higher level Arduino code. Also, I have yet to find a single code example online of people using 2 SPI ports at the same time (I assume it's possible, but how would it work?!)

DavidM903 (/member/DavidM903) ▸ JeffG187 (/member/JeffG187) Reply 2 days ago

Would love to figure out how to store .mp4 clips on an SDcard and have the Arduino loop play them.....

MoahM (/member/MoahM) ▸ DavidM903 (/member/DavidM903) Reply 2 days ago

If we can figure out how to store data on the SD's, we can make a proper game out of them. Notification and identification is cool, but being able to transfer files and other info on a connect opens up tons of doors. Been looking at the MQTT support, which is cool as hell too. But that requires getting the badges online.

JeffG187 (/member/JeffG187) ▸ JeffG187 (/member/JeffG187) 3 days ago Reply

HackerBoxes?

(I think) I see that there is a way to change VSPI pins, but I don't see a way to do it from within Arduino code. This must be the intended usage as the pins you chose for the SD card do not seem to correlate to any particular set of SPI pins, including the port the TFT display is on. So what did you have in mind for the usage given this choice of pins? If it's setting up custom pins for one of the SPI ports, is this even possible without going lower level then the typical Arduino language?

MoahM (/member/MoahM) ▸ JeffG187 (/member/JeffG187) 2 days ago Reply

I've been playing with the examples in the SdFat Library and might be getting a little further. I _think_ the internal flash has the same pinouts as the external SD... The quickstart example is reading spi info, and gives you a chance to disable any of the other spi devices before initializing the card. I tried every value possible and kept getting the same result. Maybe you can see something I'm missing. Lib is at https://github.com/greiman/SdFat

chris25b (/member/chris25b) 8 days ago Reply

found bug in the HB020_Badge_A sketch, I set my Mobile hotspot to act like a badge by giving it the SSID of HackerBoxer_T3chG1rlMN, and it showed up just fine. But when I turned the hotspot off, to replicate being out of range, it still showed as a tagged ID until I reset the badge.

Racer1TN (/member/Racer1TN) ▸ chris25b (/member/chris25b) Reply

2 days ago

Isn't the idea to capture the Hacker SSID's from other hacker boxes? If matching scanned SSID's got erased each loop, you would not capture a logging essentially. To add complexity, it would be a good loop to avoid duplicates already logged.

DavidM903 (/member/DavidM903) ▸ Racer1TN (/member/Racer1TN) Reply

2 days ago

Agreed....from reading the code, that seems to be the intended output - only resets after the 14th HackerBoxer_ is found

sconklin (/member/sconklin) 8 days ago Reply

Great fun! The beep() function wasn't generating tones correctly in either the buzzer_demo or the HB020_Badge_A sketches. Here's a replacement function that fixes that:

```
void beep(int tone, int duration)
{
int noteDelay = int(500000.0/tone);
for (float i = 0.0; i < float(duration/1000.0); i += (1.0/tone))
{
digitalWrite(buzzerPin, HIGH);
delayMicroseconds(noteDelay);
digitalWrite(buzzerPin, LOW);
delayMicroseconds(noteDelay);
}
delay(30);
}
```


rob_hunt (/member/rob_hunt) ▸ sconklin (/member/sconklin) 5 days ago Reply

I swapped in your beep code and yeah, it does sound better!

Building on that, I added the underworld theme from super mario bros :

```
// ----------------------------------------------------------------
void UnderworldTheme() {
const int measure = 1000;
const int n8 = measure / 8;
```

```
const int n4 = measure / 4;
const int n3 = n4 / 3;
for (int i = 0; i < 2; i++) {
beep(c4, n8);
beep(cH, n8);
beep(a3, n8);
beep(a, n8);
beep(aS3, n8);
beep(aS, n8);
vTaskDelay(1200 / portTICK_RATE_MS);
}
for (int i = 0; i < 2; i++) {
beep(f3, n8);
beep(f, n8);
beep(d3, n8);
beep(d, n8);
beep(e3, n8);
beep(dS, n8);
if (i < 1) {
vTaskDelay((n4 * 2) / portTICK_RATE_MS);
}
vTaskDelay(n4 / portTICK_RATE_MS);
}
beep(dS, n3);
beep(d, n3);
beep(cS4, n3);
beep(c4, n8);
vTaskDelay(n8 / portTICK_RATE_MS);
beep(dS, n8);
vTaskDelay(n8 / portTICK_RATE_MS);
beep(d, n8);
vTaskDelay(n8 / portTICK_RATE_MS);
beep(a, n8);
vTaskDelay(n8 / portTICK_RATE_MS);
beep(g3, n8);
vTaskDelay(n8 / portTICK_RATE_MS);
beep(cS4, n8);
vTaskDelay(n8 / portTICK_RATE_MS);
```

```
beep(c4, n3);
beep(fS, n3);
beep(f, n3);
beep(e, n3);
beep(aS, n3);
beep(a, n3);
beep(gS, n3);
vTaskDelay(n3 / portTICK_RATE_MS);
beep(dS, n3);
vTaskDelay(n3 / portTICK_RATE_MS);
beep(b3, n3);
vTaskDelay(n3 / portTICK_RATE_MS);
beep(aS3, n3);
vTaskDelay(n3 / portTICK_RATE_MS);
beep(a3, n3);
vTaskDelay(n3 / portTICK_RATE_MS);
beep(g3, n3);
}
// ---------------------------------------------------------------------
```

Oh, I had to fill in some missing notes in the constants section too :

```
// ---------------------------------------------------------------------
// Audio Buzzer Values
const int buzzerPin = 18;
const int c3 = 131;
const int d3 = 147;
const int e3 = 165;
const int f3 = 175;
const int g3 = 196;
const int a3 = 220;
const int aS3 = 233;
const int b3 = 247;
const int c4 = 262;
const int cS4 = 277;
const int d = 294;
const int dS = 311;
const int e = 330;
const int f = 349;
const int fS = 370;
```

```
const int gS = 415;
const int a = 440;
const int aS = 466;
const int b = 494;
const int cH = 523;
const int eH = 659;
const int fH = 698;
const int e6 = 1319;
const int g6 = 1568;
const int a6 = 1760;
const int as6 = 1865;
const int b6 = 1976;
const int c7 = 2093;
const int d7 = 2349;
const int e7 = 2637;
const int f7 = 2794;
const int g7 = 3136;
// ---------------------------------------------------------------
```


Racer1TN (/member/Racer1TN) ▸ rob_hunt (/member/rob_hunt) Reply

2 days ago

I like the Underworld theme, added it in and got it to work. Now if we just had more...Donkey Kong, Defender, Galaga or others.....

ewagnerjr2000 (/member/ewagnerjr2000) 2 days ago Reply

Does the lipo charger have a spec? How are the light suppose to blink? I am getting charged but want to make sure there aren't any shorts.

Ed

Racer1TN (/member/Racer1TN) 4 days ago Reply

Assembly was a breeze. Setting up the IDE took me a couple of days to debug. Esspecially after working all weekend...Got it working tonight. This is pretty cool! Only made it thru the first three sketches. Looking forward to playing more tomorrow!

Racer1TN (/member/Racer1TN) ▸ Racer1TN (/member/Racer1TN) Reply

3 days ago

Got a fresh start this am and got them all running. McGuyver was ingenious.

Now what else can it do?

ibkozi (/member/ibkozi) made it! 3 days ago Reply

Had lots of fun with this! Now to do some serious costomization.

(https://cdn.instructables.com/FRX/KVWZ/J4YFQXQ0/FRXKVWZJ4YFQXQ0.LARGE.jpg)

G'lenH (/member/G'lenH) made it! 4 days ago Reply

I made it, basic for now, but i'm on the road to fun! Thinking of making a display for the NEXRAD radar from Miami.

(https://cdn.instructables.com/F8I/AYV3/J4YFS6CH/F8IAYV3J4YFS6CH.LARGE.jpg)

Earthwormchris (/member/Earthwormchris) 5 days ago Reply

For some reason I had to change the line

WiFi.softAP(ssid, NULL, 1, 0, 1);

to

WiFi.softAP(ssid, NULL, 1, 0);

No idea why that line was like that in the code, but it works for me now.

HackerBoxes (/member/HackerBoxes) (author) ▸ Earthwormchris (/member/Earthwormchris) 4 days ago Reply

You might be using an older library.

grtyvr (/member/grtyvr) 7 days ago Reply

if you have not heard the embedded.fm episode where they interview Addie (@atdiy (https://twitter.com/atdiy)) and Whisker (@whixr (https://twitter.com/whixr)), the Toymakers (@Tymkrs (https://twitter.com/Tymkrs)) it is well worth a listen.

http://embedded.fm/episodes/205 (http://embedded.fm/episodes/205)

Addie and Wisker made the conference badges for

https://cyphercon.com/cyphercon-20 (https://cyphercon.com/cyphercon-20)

mkelusky (/member/mkelusky) 14 days ago Reply

Can I use a bare unprotected lipo cell with this badge? Or does it need built in protection like the suggested battery? Does the included battery manager have over/under-charge protection?

MoahM (/member/MoahM) ▸ mkelusky (/member/mkelusky) 7 days ago Reply

I've tested a couple 1s lipo bats from quads and other projects and they've all worked fine. I'd say if it's 1s, you're good.

chris25b (/member/chris25b) made it! 9 days ago Reply

I made some revisions to the hardware, switch not jumper, big cap hidden under display and of course the ring of neopixels. Firmware revisions; different display patterns to accommodate the neopixel ring, and adding a splash screen that pops up twice duning the main loop.

(https://cdn.instructables.com/FVU/MUTA/J4OFU09Y/FVUMUTAJ4OFU09Y.LARGE.jpg)

(https://cdn.instructables.com/FDQ/QFNX/J4OFU0A2/FDQQFNXJ4OFU0A2.LARGE.jpg)

seaprimate (/member/seaprimate) ▸ chris25b (/member/chris25b) Reply

Thanks for the switch tip. It's such an obvious revision, yet I still overlooked it. Desoldered the jumper pins, then added a spdt switch for much easier use. Thanks! 7 days ago

chris25b (/member/chris25b) ▸ seaprimate (/member/seaprimate) Reply

YW, it helped that I had a bag of them on my desk, since I needed one for another project. Otherwise I may have overlooked it as well. ;) 7 days ago

chris25b (/member/chris25b) ▸ chris25b (/member/chris25b) 9 days ago Reply

link for video of full loop https://youtu.be/p0An_Sbbj4A

JoelB23 (/member/JoelB23) made it! 9 days ago Reply

Just working from the basic build and nothing fancy just yet. But everything seems to work for me after assembly on this one. Nice box this month!

(https://cdn.instructables.com/FJY/CN6L/J4OFUA7B/FJYCN6LJ4OFUA7B.LARGE.jpg)

park_ind_ent (/member/park_ind_ent) 10 days ago Reply

Silicon Labs make the USB to UART/Serial chip. If needed the drivers for the chip are available on their website at: http://www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers. Windows, Mac, Linux, and Android variants are available.

r3dc0rn (/member/r3dc0rn) 11 days ago Reply

Im having some problems, I have everything "hooked up" (soldered) correctly, screen and everything comes on but just shows white, I tried to follow the steps above and tried every board (Tools>Board) and none of them worked, Am i doing something wrong? Someone please help! Thank You!

rob_hunt (/member/rob_hunt) ▸ r3dc0rn (/member/r3dc0rn) 10 days ago Reply

If you have a magnifying glass, use it to look over the board for bad solder joints and shorts. Also, clean off any residual flus with rubbing alcohol or flux wash. If everything looks good there, then take your multimeter and check for continuity between each of the LCD pins and the corresponding pin on the ESP32. If you used the female headers for the LCD or the ESP32, try unplugging them and plugging them back in (reseating). Make sure they are pushed all the way down into the sockets. If you didn't use the female headers, I suppose it's possible that something got heat-damaged during soldering.

TimGTech (/member/TimGTech) 12 days ago Reply

Just loaded the HB020_Badge_A firmware and getting "not declared in this scope" errors on...

'mutebutton'

'RainbowLEDcycle'

'wifiScan2LCD'

...and on down the line.

Did this code work as-is for everyone else?

TimGTech (/member/TimGTech) ▸ TimGTech (/member/TimGTech) Reply

11 days ago

UPDATE - Now that I've had my Dunkin Donuts this morning... I headed ovet to the HXB Reddit page and found my problem.... Just needed to update my Arduino to the latest version. All working good now!

"Never a duh moment around here" :)

seaprimate (/member/seaprimate) made it! 13 days ago Reply

Built it! Looks like it works! Reads local SSIDs. But broke a couple of the LEDs while trying to solder them (I'm mediocre at dip soldering, but horrible at smds). Ordered 15 more leds from sparkfun, hopefully I can fix it.

(https://cdn.instructables.com/FGI/YR6Y/J4IQ23T7/FGIYR6YJ4IQ23T7.LARGE.jpg)

kensweeney (/member/kensweeney) ▸ seaprimate (/member/seaprimate) Reply

11 days ago

I made quick work of the leds, with a good iron. I purchased a zeny 853D SMD rework station for ~75$ from amazon. You don't need to go that far to get good results, just get an iron with a temperature control in the 50 to 75 watt range and a very sharp tip. p.s. +3.25 reading glasses and a bright work lamp help too.

Natebob (/member/Natebob) ▸ seaprimate (/member/seaprimate) Reply

13 days ago

Looks like I'm in the same boat. Everything works but the leds. Just out of curiosity, what's your plan on how to pull the old off and put the new on? I really don't want to pull the screen off but I can't see any other option.

rcooper5 (/member/rcooper5) ▸ Natebob (/member/Natebob) Reply

12 days ago

Check that you have the neopixel library installed. I'm 99% sure it compiled and uploaded correctly the first time I tried, and the led's didn't work. I tried to upload again and got an error, only to find out I was missing the library, and now they work.

Natebob (/member/Natebob) ▸ rcooper5 (/member/rcooper5)11 days ago Reply

That's all it was. Tisboyo gave me the idea over the weekend about checking my Adafruit library version. It turns out I was a few versions behind. Upgraded the library and everything is working like it should.

seaprimate (/member/seaprimate) ▸ Natebob (/member/Natebob) Reply

12 days ago

I used the female/male standoffs for the screen (it's the only thing I used them for) so I can just unplug it and swap out the LEDs then plug it back in. I chose to do that so I could access the SD card slot in the future, and also because I'm clumsy and could see that as something I'd break

Natebob (/member/Natebob) ▸ seaprimate (/member/seaprimate) Reply

12 days ago

Yeah, i really should have done the same. Oh well, lesson learned.

BrianMcKinnon (/member/BrianMcKinnon) made it! 12 days ago Reply

Finished it and threw a 2400mAh LiPo I had lying around on it. Pretty happy with it. I'm going through the demos then ill try to write my own program for Dragon Con (i don't live near any of the hacker cons)

(https://cdn.instructables.com/FQ2/2Z1N/J4IQ6VTA/FQ22Z1NJ4IQ6VTA.LARGE.jpg)

(https://cdn.instructables.com/FEU/NQMB/J4IQ6VZT/FEUNQMBJ4IQ6VZT.LARGE.jpg)

djcc2012 (/member/djcc2012) made it! 12 days ago Reply

Well it is done! WooHoo! OK, so a couple of the lights don't work, but the rest does! There were a few challenges with Linux as well as the LEDs, but it's all good.

(https://cdn.instructables.com/FAY/Q9M4/J4IQ4G5W/FAYQ9M4J4IQ4G5W.LARGE.jpg)

seaprimate (/member/seaprimate) 12 days ago Reply

One thing I noticed is that every so often, the screen will be a blank white while still playing the music at the normal intervals, and other times It would be a blank white screen with no music. some times it works as it's supposed to. This is with using the same usb power supply as when it works okay. I don't see any loose connections or solder bridges. anyone else have the same intermittent issue?

rwslaugh (/member/rwslaugh) made it! 13 days ago Reply

Up and running! Great HackerBox. I look forward to the DEFCON meetup!

(https://cdn.instructables.com/F48/Z8ZI/J4IQ2ZJD/F48Z8ZIJ4IQ2ZJD.LARGE.jpg)

SuperMechaCow (/member/SuperMechaCow) 13 days ago Reply

Hey guys! Be sure to check out the hackerboxes fan subreddit and Discord server at reddit.com/r/hackerboxes

NoviceAttempts (/member/NoviceAttempts) 14 days ago Reply

Is there an intended use for the included diode?

HackerBoxes (/member/HackerBoxes) (author) ▸ NoviceAttempts (/member/NoviceAttempts) 14 days ago Reply

It is the same type of diode as the one on the 5V USB input of the ESP32, but obviously not SMD. In theory, one could "combine it" with that one to isolate the USB and BAT voltage sources instead of using the jumper switch. It is probably a really bad idea though since the battery charger will also use the boosted battery voltage to charge (cannibalize?) itself. I'd suggest just sticking with the jumper switch. :)

Swansong (/member/Swansong) 14 days ago Reply

Those are neat badges :)

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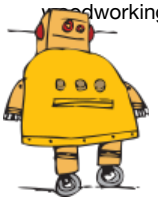

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