HOPE XV

BADGE GUIDE

PRO MODEL

LEGAL

1. STATUS

The HOPE Badge team (“HBT”) is a hobby group. Novel Circuits ("NC") is a commercial entity with merchant registrations. Both HBT and NC deliver to computing enthusiasts, students, and researchers the HOPE XV Badge (“HB”), an educational developer product. It is not the intent of HBT or NC to form any partnership, joint venture, agency, employer-employee, or fiduciary relationship.

2. AUDIENCE

HBT and NC coproduce the HB for users (“Users”), who are qualified technicians familiar with handling electrical and mechanical components. Users voluntarily and knowingly assume the risks associated with handling such components, which could potentially lead to shock, fire, serious injury, loss, destruction, and/or irreversible damage to property. The HB is an unfinished product intended to be used for experimentation in a controlled research and development setting. Users acknowledge that they use the HB at their own risk and undertake to take all necessary measures to minimize these risks.

3. PURPOSE

The HB is a decorative device which is designed and packaged to be used at the event where it is distributed, and thereafter collected for hobby purposes. At the event users may learn to program the HB to gain experience in the electronic engineering discipline. Users are encouraged to design their own decorative light animations using the RGB LEDs. Various circuits (USB, IR, NFC, switching, and microcontrol) exist to encourage educational exploration at the event.

4. MISUSE

Applications outside the intended purpose are not supported. Misuse of the HB may involve cryptographic security, access control, storage or transfer of value, medical, finance, navigation, or any other application not relating to the purpose.

5. REPRESENTATIONS

Pictures of the HB may vary from the current state of production and distribution.

6. PERMISSIONS

ABOUT

IR, NFC, USB, vibration, air sensing, and RGB light animation are features of this ESP32 RISC-V powered badge. To obtain one, make one, or request production, please discuss it with the badge team.

Your sponsorship is needed, please help.

Sponsored by Signal

https://www.signal.org/

Sponsored by PCBWay

https://www.pcbway.com/

LINKS

Visit these resources, and remember to join the Signal group chat.

HOPE Badge Chat

https://www.novelcircuits.com/
https://gitlab.com/tidklaas/hip-badge/
mailto:hope.badge.team@hope.net
wiki:HOPE_XV_Electronic_Badge
GMRS FM channel 7 (462.7125 MHz)

0000101001010
1001000001
0010010010

HACK

MAKE 42

Personalise your badge in two ways.

1) Plug in third party SAO devices. Add chips (fuel gauge or IO expander) using the solder field SF1 for custom wiring.

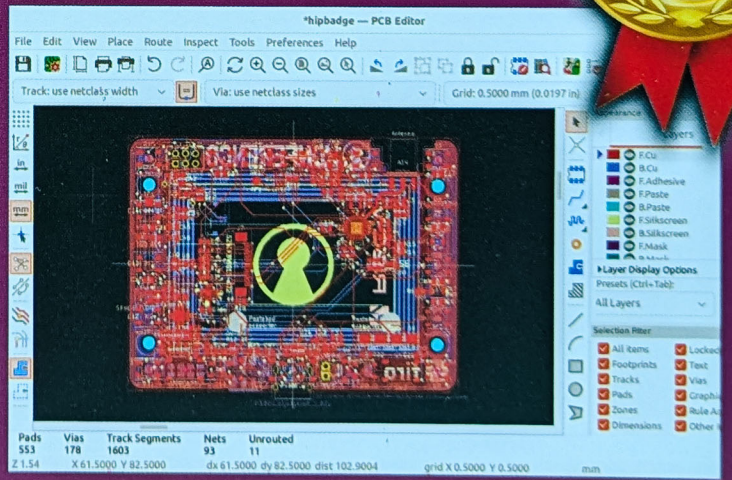
2) Write applications using firmware tools:

```
$ idf.py fullclean set target esp32-c3 menuconfig
$ idf.py build flash (rinse and repeat)
```

Program the chip with original firmware:

```
$ git clone https://gitlab.com/tidklaas/hip-badge.git
```

Press the RST button to reset the MCU.
Press BTN4 while resetting to program.



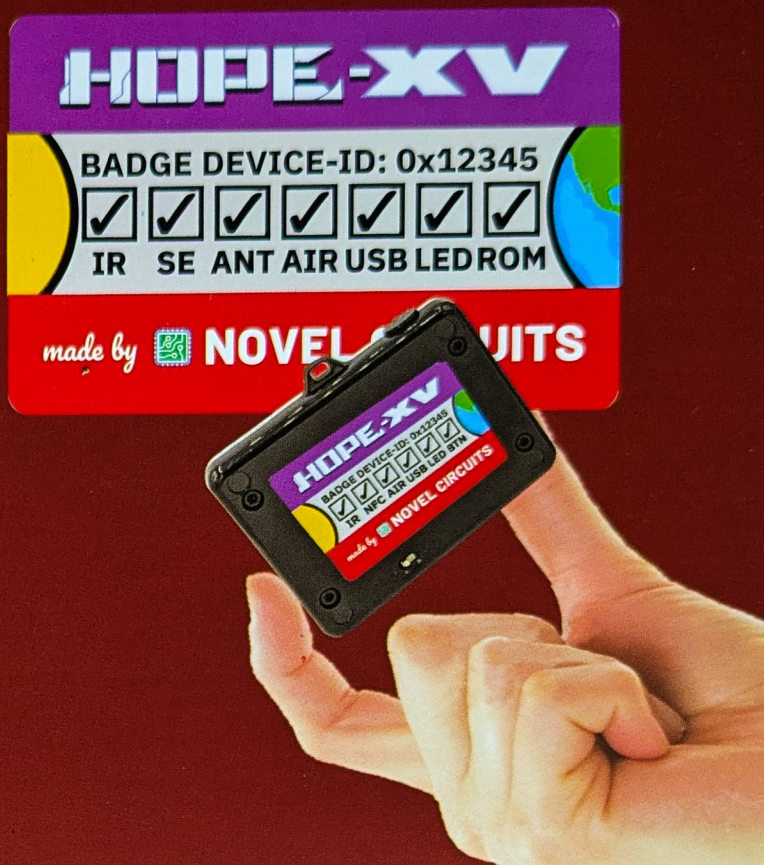
We used KiCad EDA application for schematic capture and layout design

RISC-V

FEATURES

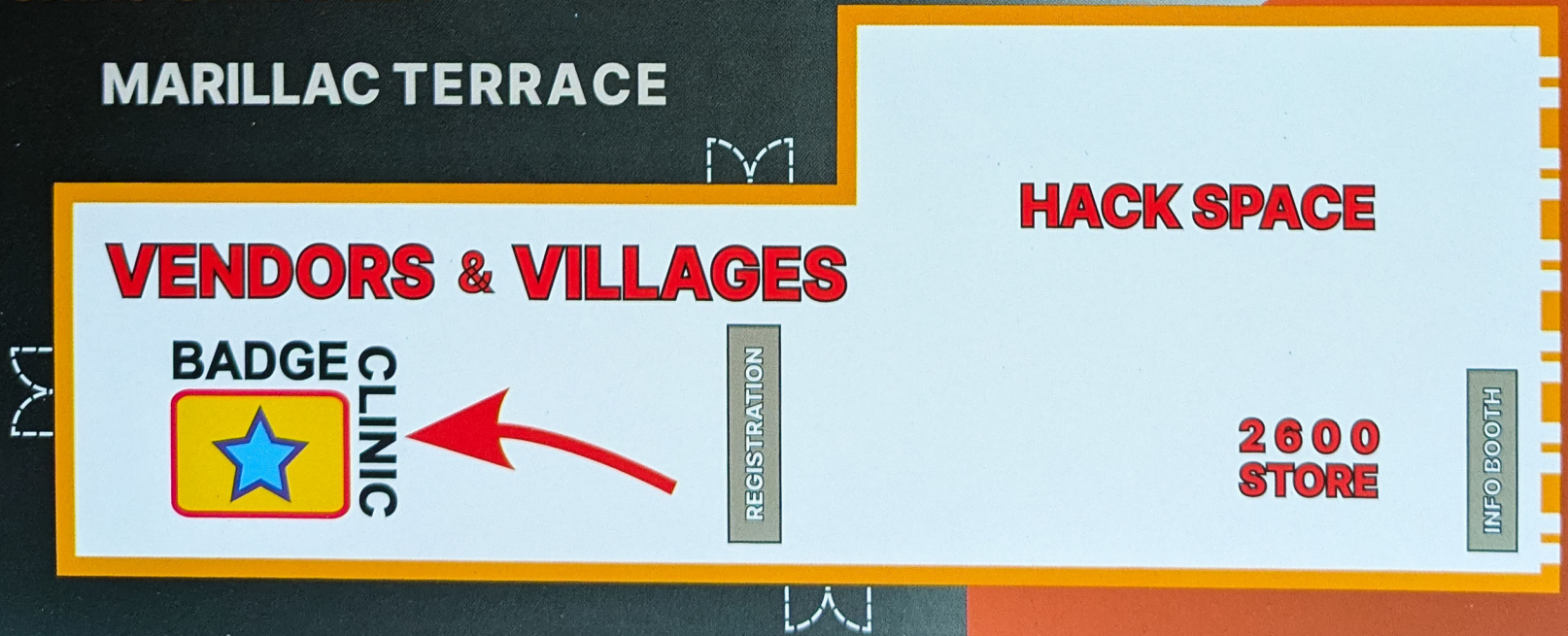
The badge hardware supports all the feature groups marked on the back. Firmware logic exposes features to a limited extent. Please boost your applications by hacking the badge!

IR	Infrared, aim carefully to zap friends!
SE	Secure element, generate ECDSA keys.
ANT	Bluetooth and Wifi high gain antenna.
AIR	Alarms on airborne pathogen congestion.
USB	Allows programming the chip over USB.
LED	Swirling colourful light animations.
ROM	Stores persistent data SPI accessible.



SUPPORT
GMRS CHANNEL 7

While this badge does not include long term support, you may find relevant answers and ideas at the HOPE XV event in New York.



FAQ

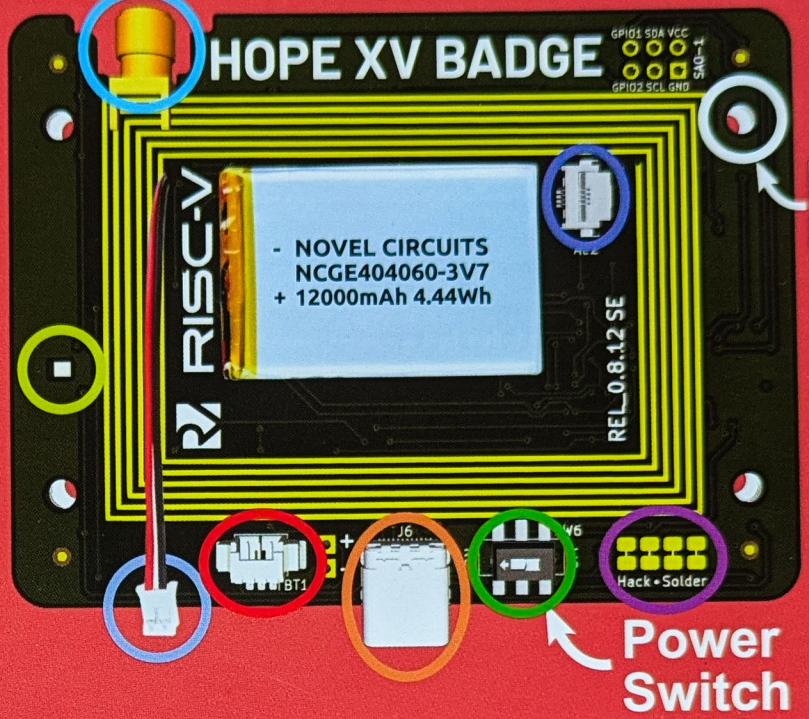
Q1: How do I check my badge data?
A1: You use an NFC powered phone.
Q2: What can my badge do for me?
A2: Anything you develop for RISC-V.
Q3: How long does the battery last?
A3: 30-50 hours, depending on use.
Q4: Is the badge design Opensource?
A4: Yes, on license terms CERN-OHL-S.
Q5: Is this badge design an original?
A5: No, it is derived from the HiP badge.
Q6: Why is input and output instable?
A6: Use of USB interrupts other features.
Q7: Vibration causes my badge to freeze?
A7: Disable the (alpha) vibrator for stability.

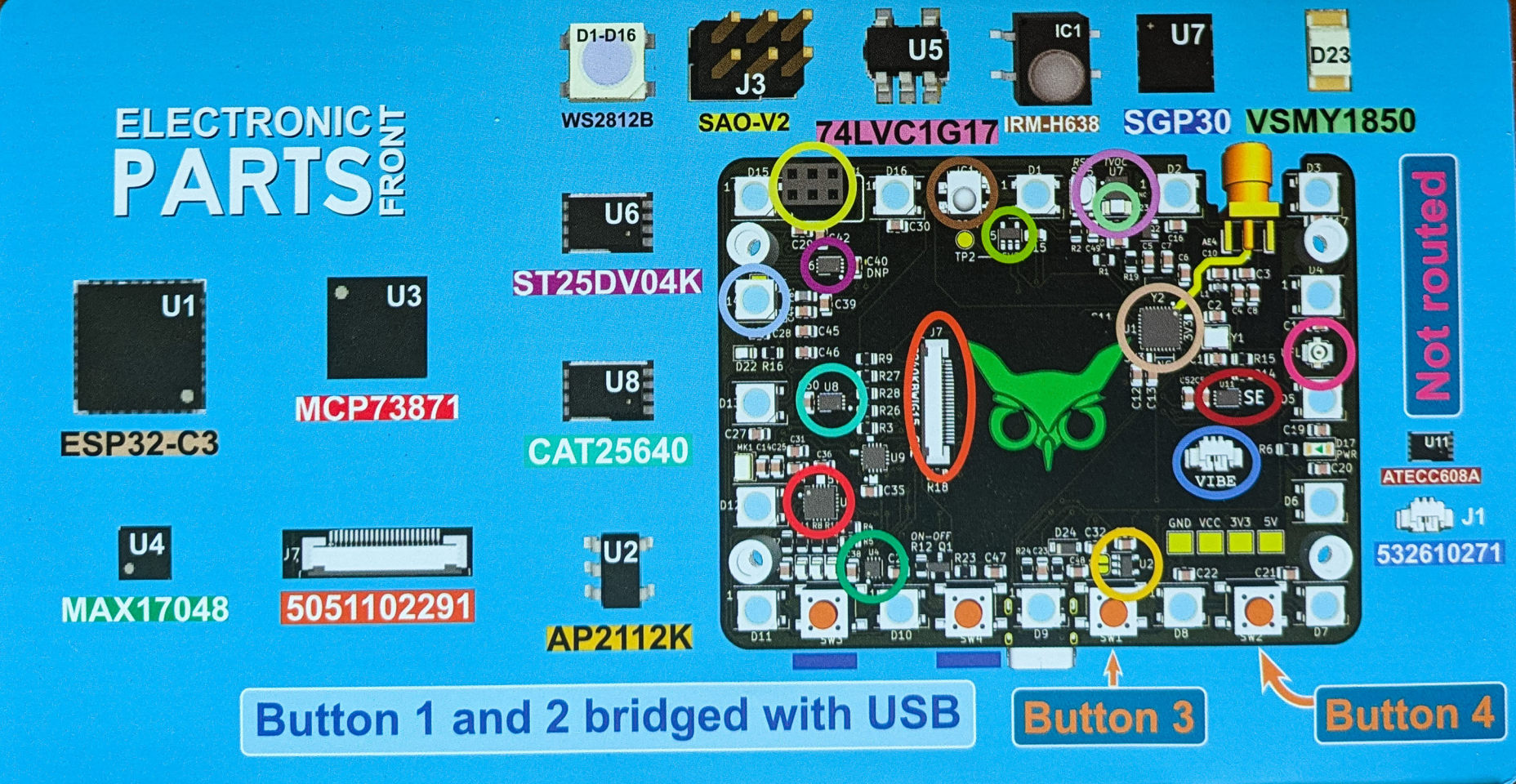
Q0: Why do I like my badge so much?
A0: Because you are a bodacious hacker!

NOVEL CIRCUITS

ELECTRONIC PARTS BACK

- SMA (Non RP) connector
- FPC RFID Loop connector
- Reversable power LED
- 3-Wire battery terminal
- Easy battery connector
- USB Type-C connector
- SPDT Power switch
- Unrouted hacker field




ELECTRONIC
PARTS
FRONT
D1-D16
WS2812B
J3
SAO-V2
U5
74LVC1G17
IC1
IRM-H638
U7
SGP30
D23
VSMY1850
U6
ST25DV04K
U1
ESP32-C3
U3
MCP73871
U8
CAT25640
U4
MAX17048
J7
5051102291
U2
AP2112K
Not routed
U11
ATECC608A
J1
532610271
Button 1 and 2 bridged with USB
Button 3
Button 4

BATTERY POWER

Charge State	Red	Green	Yellow
Shutdown	OFF	OFF	OFF
Standby	OFF	OFF	ON
Low Battery	ON	OFF	OFF
Charging	ON	OFF	ON
Charge Complete	OFF	ON	ON
Fault Condition	ON	ON	ON

The Pro Model 1200mAh battery serves about 48 hours per charge.

BUTTONS LIGHTS

Long press button three to iterate through the animations. Short press to change the light intensity or totally disable the lights.

The first two buttons act on light animation, but should be reimplemeted to your taste.

Animations interrupt on CO2 congestion.

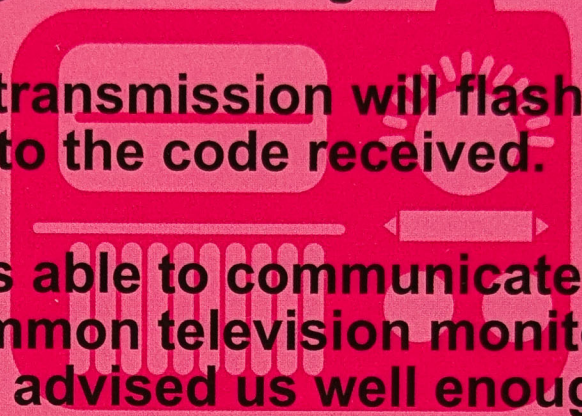
A white LED indicates a powered on state.

INFRARED ZAPS

Press the rightmost button four to fire a data code from the infrared diode. Aim carefully at another badge, to signal a RGB light animation.

A badge receiving a transmission will flash the lights according to the code received.

The infrared circuit is able to communicate with a number of common television monitors. The TV-B-Gone boss advised us well enough to allow kludging badge circuits accordingly.



NEAR FIELD RADIO

4Kbits of data are stored on the EEPROM by aligning the gold antenna with a smartphone. A NDEF Type-5 tag puts data in MIME structs.

Some readers cannot work with NDEF Type-5.

Reading and writing are supported, and this works even when the badge has no power. Some people use the NFC Tools application.

The 13.56 MHz FFC loop antenna is located under the PET label of the enclosure base.

TVOC AIR QUALITY

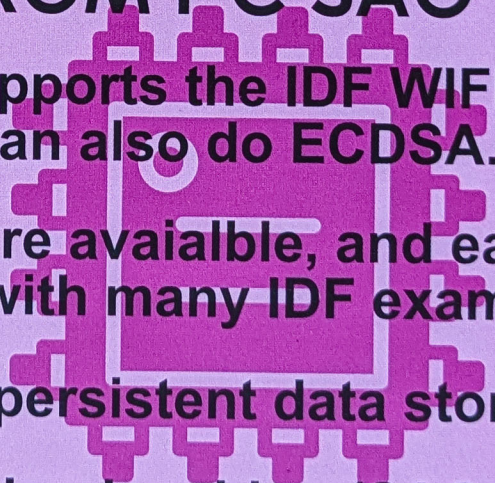
The total volatile organic compounds (TVOC) sensor flashes lights in a distinctive animation to alram on high levels of CO_2 congestion.

A common application involves polling the sensor's CO_2 level and informing of a need to ventilate a room full of airborne pathogens.

The TVOC communicates on the I^2C bus.

EXTRA FEATURES

SE BTLE WIFI SPI ROM I²C SAO



The secure element supports the IDF WIFI API, out of the box. It can also do ECDSA.

Bluetooth and 802.11 are avaialble, and easy to start implementing with many IDF examples.

The EEPROM enables persistent data storage.

Connect a third party simple addon (SAO.)