

Maker Trends: The Path of Least Resistance

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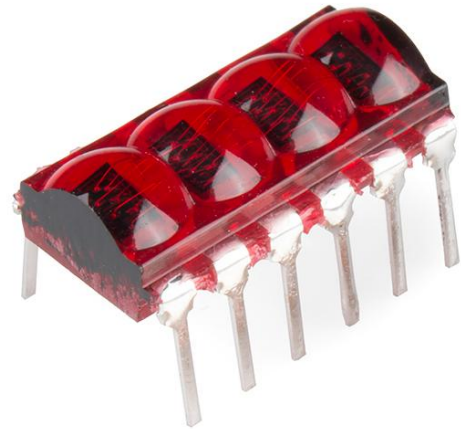
What We're going to cover here today...

- Some history of SFE
- What drives our market (more interesting than you might think!)
- Why anything you hear me say may or may not be credible
- Microcontrollers and SBC's
- RF and IoT
- Sensors

Who or What is SparkFun?

We are a value-added retailer of electronic gadgetry that loves to teach

- Microcontrollers and SBC's
- Any and all sensors we can find
- BT, Wifi, Cellular, IoT (data.sparkfun.com)
- Robotics (we dabble)
- Wearables
- “Inspirational” electronics
- All of our in-house products are open source
- ...and about a zillion tutorials and videos (learn.sparkfun.com)



How did we get here?

- We were disgruntled students, hungry for cheap parts and free docs
- *Really* unwilling to pay for an IDE
- We wanted to help others to get out from under the thumb of “The Man”
- We wanted to make hard packages easier to work with
 - Not because we thought there was a market, but because we wanted to play with the parts ourselves
- We're driven by passion more than dollars

Who's driving this, anyway?

Community vs Corporations with \$\$\$

- Big corps want to seed the market for future gains
- Makers largely want cheap parts that are easy to use
- ...which puts SFE in a funny place

Why should you trust me? Because I don't represent any one vendor.

And where do I get my information? Various hacker sites (like Hackaday, Reddit), our own community forum as well as others, and our own sales numbers.

Commander Murphington

OK, I'll get on with it...



...because Arduino!

Atmel ATSAMD21 (on the new Arduino Zero)

- 32-bit ARM Cortex M0+, 48MHz
- 256K Flash, 32K SRAM
- 6 com ports that can act as USART, SPI, I2C
- 12-bit ADC, 20 channels, up to 350KSPS
- 10-bit DAC (! DAC's are FUN!)
- DMA controller, USB, capsense
- **Lots of potential!**

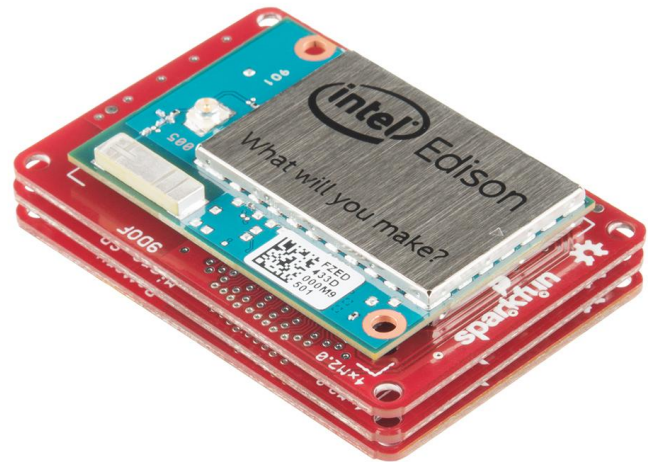
But...

- 3.3V only, 7mA per I/O
- You can program it with Arduino... but you have to program it with Arduino

There will be a lot of zero knock-offs, we have two on deck ourselves.

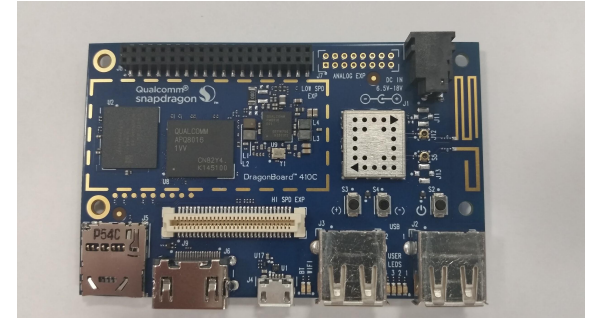
Edison

- Atom Dual Core CPU @ 500MHz + Quark uC @ 100MHz
- 4Gig Flash, 1Gig RAM, Wifi, BLE
- Runs Yocto (and Debian) Linux, programs with Arduino, Eclipse and Intel XDK
- Growing community, lots of hardware and tutorial support
- Heavily targets IoT and wearables, but it's still a really good stand-alone SBC



...more...

Qualcomm Dragonboard 410c



- Snapdragon 410c quad-core “up to 1.2GHz per core”
- Wifi & BLE (integrated antennas), audio & video
- USB, I2C, SPI... all the usual suspects
- Android 5.1, Ubuntu of some flavor, Windows 10 IoT

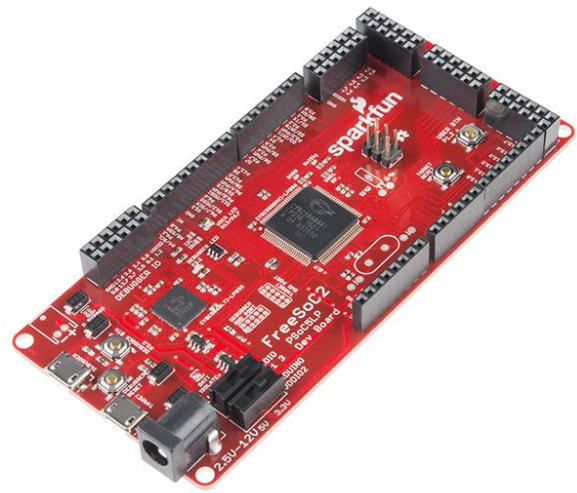
...but aren't SBC's somewhat ubiquitous these days? Why's this cool?

- GPS... and maybe cell?
- Linaro 96Boards open spec for SBC's
- “Enigma” factor

Somewhere between a uC and an SBC (or FPGA)

FreeSoc2

- CY8C5888AXI-LP096 (ARM Cortex M3, 80MHz)
- 256K Flash, 64KSRAM
- 72 I/O, reassignable pins to any function!
- 4 op amps, 4 comparators
- USB 2.0, CAN, capsense
- 8-bit DAC's, 12-bit ADC's
- PSoC Creator (free, no limits)
- on and on and on...

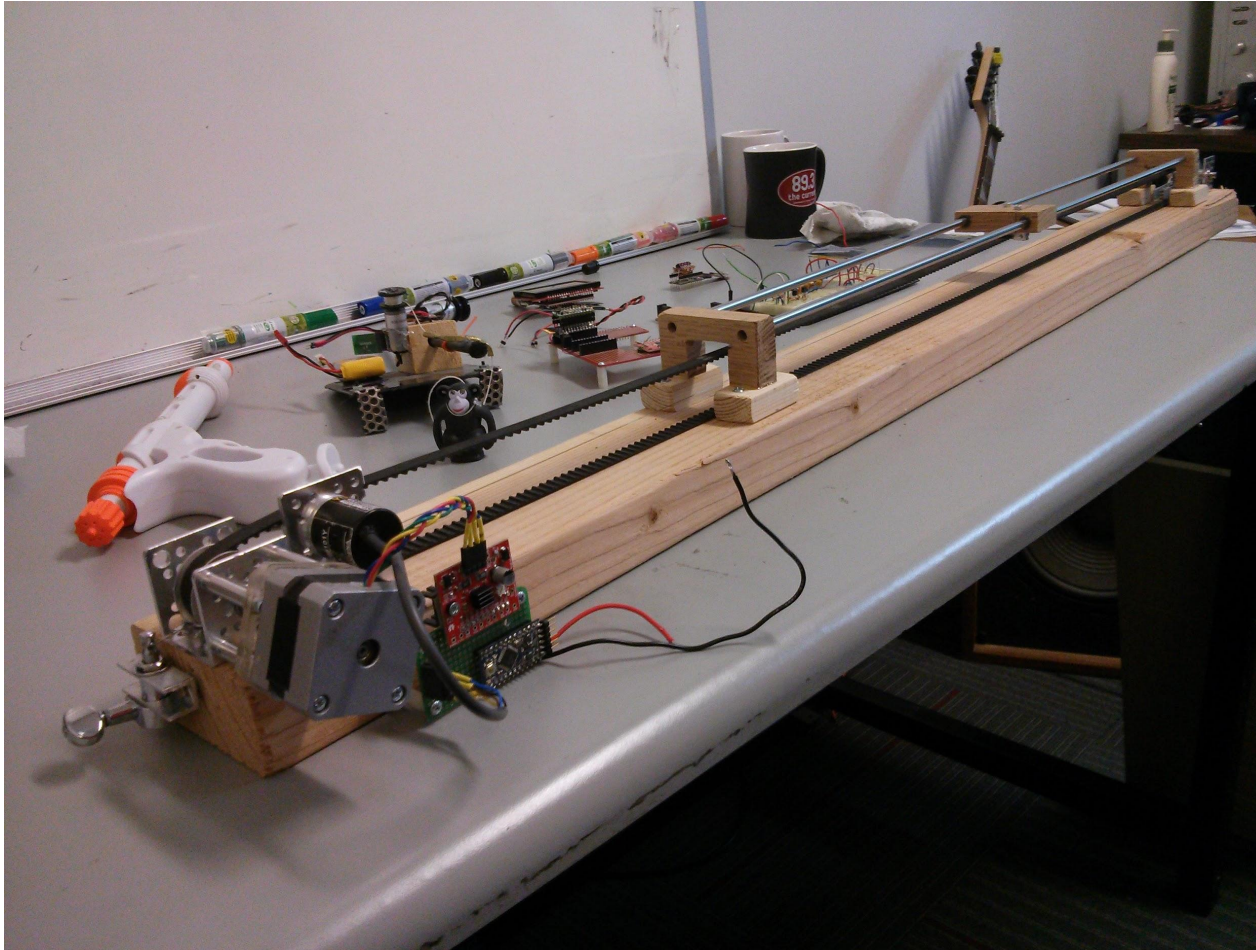


Super-freaking capable chip.

Also, PSoC Creator has a bunch of examples that'll tame the learning curve. But I'm not just trying to sell you parts...

Ulterior motives

I've got a project...

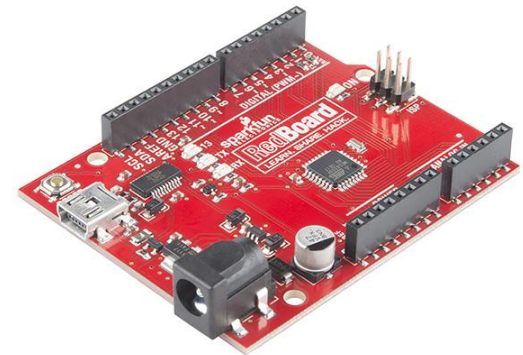
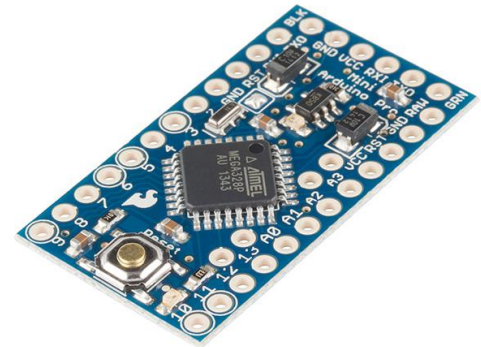


A little more Arduino

Aduino Pro-Mini and SFE Redboard

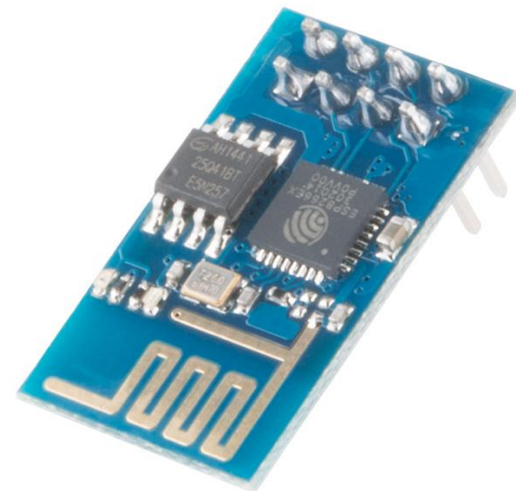
Look, I know these aren't new and shiney tech. But the fact of the matter is that we sell a zillion of these things, and the numbers are still increasing. And that's a trend.

Take away: there will always be a place for a cheap, easy-to-use 8-bit micro running at 8MHz.



ESP8266 and the Thing (and Phant)

- 1.8-3.3V, up to 300mA draw
- 50 ohm output, all RF contained
- Can be used as a WiFi bridge, or with onboard 32-bit uC for app
- +20.5dBm in 802.11b
- <10uA in power down
- **Community driven, sub 5 bucks**



The “**Thing**” is just our spin on the ESP8266. More IO broken out, more tutorials, and a shiny red PCB! Might be looking at FCC...

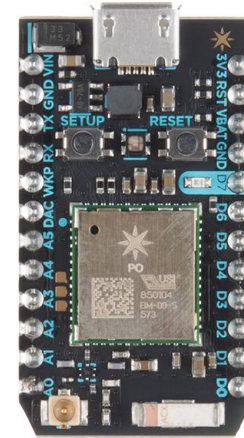
“**Phant**” is our free “cloud” where users can post their hamster wheel data.



Particle (formally “Spark”) Photon

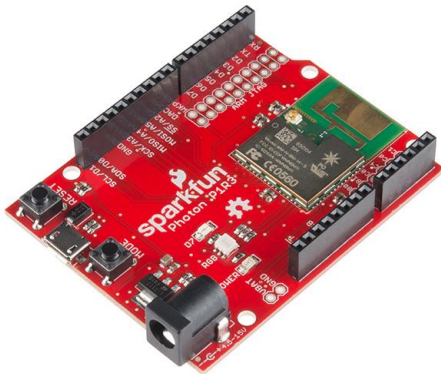
Photon P0 Kit

- STM32F205 ARM Cortex M3, 120MHz
- Broadcom BCM43362 WiFi
- 1M Flash, 128K RAM
- 18 mixed signal GPIO
- FCC, CE certified
- Particle cloud service, IDE and over-the-air code updates give it a big “I don’t want to screw with this too much” factor



Photon P1 Redboard

- Arduino formfactor
- ...and that's really it.



Simblee RFD77101 module

- ARM Cortex M0
- “Flash code space available for user app”
- 6 ADC, 4 PWM, 2 SPI and I2C, 1 UART
- 29 GPIO
- OTA programming with Arduino (!)
- Integrated antenna/shield/crystals
- Battery monitor (1.8-3.6V), temp sensor
- Can mesh with other Simblee modules
- All the certs you could want!

We've got a few designs pending that use this module...

nRF51822

- ARM Cortex M0, 31GPIO
- RedbearLab, mbed are all over this, other will be soon
- Less money up front, but more effort to integrate

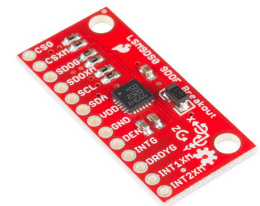
Cypress

- PSoC 4 BLE
 - M0, 48MHz, 256K/32K, 12-bit ADC, 4 op amps, Capsense
- EZ-BLE PSoC Module
 - M0, 48MHz, 128K/16K, 12-bit ADC, only 16 GPIO
 - 1.9-5.5V, **Certified!**
- Oh, that IDE...

...because you gotta know what the real world is up to, starting with “what is my thing up to?”

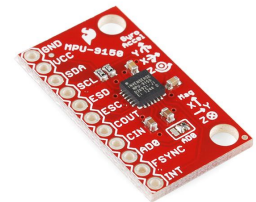
LSM9DS0/LSM9DS1, \$29.95

- 2,4,6,8,16g, 245-500-2kdps, 2,4,8,12 gauss
- “16-bit output”, SPI-I2C,



MPU-9150/MPU-9250 (export controlled), \$34.95 (sells better)

- 2,4,8,16g, 250-500-1k-2kdps, “compass” 1200uT scale
- 16-16-13bit ADC's, I2C



MPU-9150 seems to be a more complete solution (algorithms!), slightly more active community?

Lawsuits...

1T = 10,000 gauss, so 1200uT = 0.0012T = 12 gauss. The more you know...

...followed by “what’s the world doing around my thing doing?”

Bosch BMP-180 Barometric Pressure Sensor

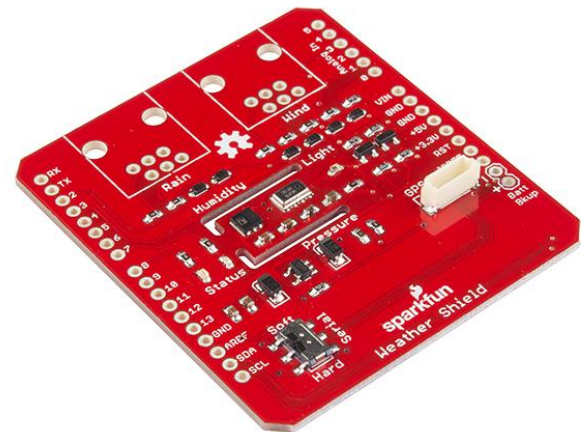
Measurement Specialties HTU21D Temp and Humidity Sensor

Maxdetect RHT03 Temp and Humidity Sensor

...Bosch BME280 Pressure, Humidity, Temp

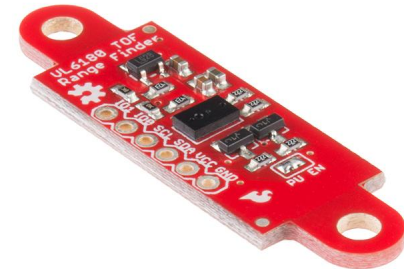
Weather Shield

- HTU21D, MPL3115, ALS-PT19 light sensor
- We'll spin a new version soon



New and weirder ways to talk to our things...

- ZX Distance and Gesture Sensor
 - XYZ Interactive collaboration
 - 3.3-5V, I2C or UART
 - 6" of X, 10" of Z
 - Simple gestures
- VL6180 ToF Distance Sensor
 - 10cm (25), I2C
 - Gesture?
 - Check the form factor
- LIDAR Lite
 - 40m range, 0.02s acq., I2C or PWM
 - More expensive, but super solid
 - ...and export controlled



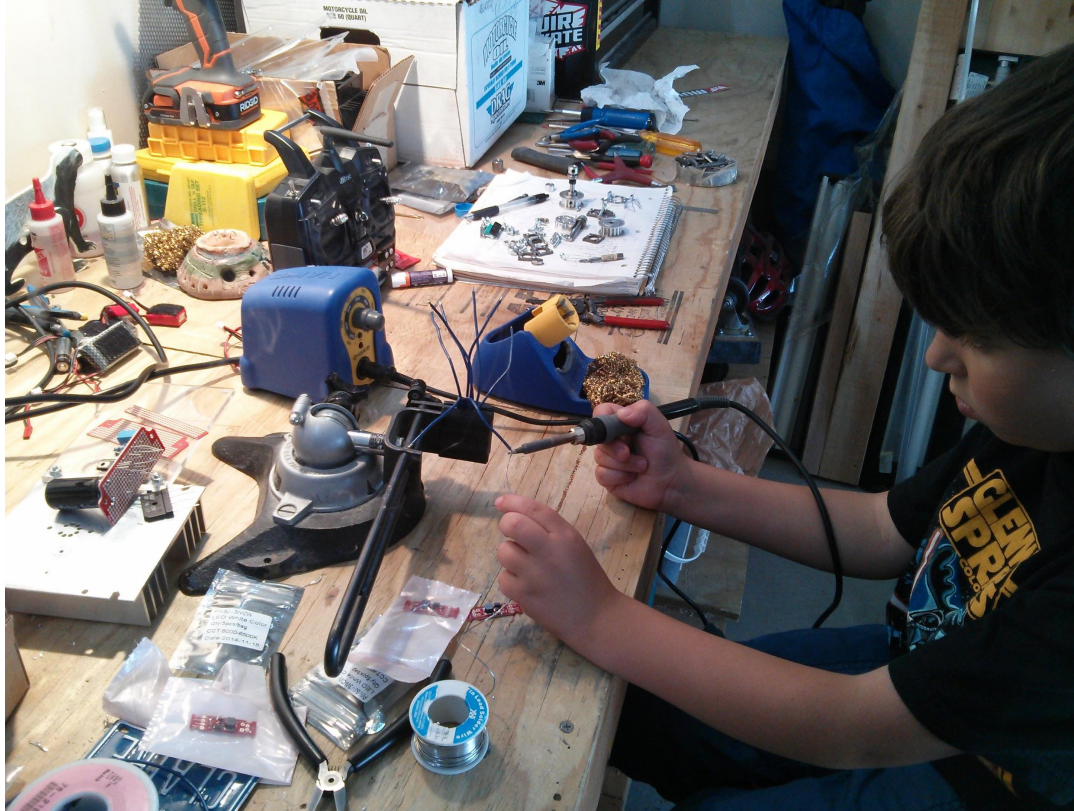
Intel Curie and the Shrinking of Everything

- Quark 32-bit
- 384K Flash, 80K RAM
- DSP
- BLE
- 6DOF
- Coin cell with charging capability
- *Wash you car
- *Mow lawns
- *Track down ex-lovers

* Future release? Please?

Ultimately, all things will become one thing that does all things, because it will be cheaper and easier than integrating all of the individual components, even if you require reduced functionality.

To Conclude, Wrap Up, Thank You...



The world is going to hell in a handbasket, and you should all invest in tin foil. Thanks much, now go build something.

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