Internet of Things Things

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1pcs UNO R3 Controller Board
1pcs LCD1602 Display Module (with pin header)
1pcs Breadboard Expansion Board
1pcs Power Supply Module
1pcs Joystick Module
1pcs IR Receiver
1pcs Servo Motor (SG90)
1pcs Stepper Motor
1pcs ULN2003 Stepper Motor Driver Board
1pcs Ultrasonic Sensor
1pcs DHT11 Temperature and Humidity Module
1pcs 9V Battery with DC
1pcs 65 Jumper Wire
1pcs USB Cable
1pcs Active Buzzer
1pcs Passive Buzzer
1pcs Potentiometer
1pcs 5V Relay
1pcs Breadboard
1pcs Remote
1pcs Tilt Switch
5pcs Button (small)
1pcs 1 digit 7-segment Display
1pcs 4 digit 7-segment Display
5pcs Yellow LED
5pcs Blue LED
5pcs Green LED
5pcs Red LED
1pcs RGB LED
2pcs Photoresistor
1pcs Thermistor
2pcs Diode Rectifier (1N4007)
2pcs NPN Transistor (PN2222)
1pcs IC 74HC595 Shift Register
30pcs Resistor
10pcs Female-to-male Dupont Wire
Network Shield
Startup stuff for Arduino

Download IDE from

https://www.arduino.cc/en/Main/Software

Learn how to connect your Arduino to a wired network, e.g.

https://support.apple.com/en-us/HT202617

(you’ll set your arduino’s IP in software, no need to dhcp)

Check out https://www.arduino.cc/en/Tutorial/HomePage, and many other sources of code to steal from… I mean learn from...

(“I’m not stealing code, I’m creating an homage.” -- Charles McGrew)
IOT Thing: Definition

One or more of

* Sensing (like?)
* Control (like?)
* Information (output to people or other IOT devices) (like?)

Plus

* Computing (like?)
* Communication (like?)
* Context (memory of what’s happened, what it means) (like?)
* Communication
  wired
  wireless (Cel)
  wifi
  bluetooth
  rfid
  radio-internet
**Context** (memory of what’s happened, what it means)

Locally-stored

remotely-stored

multi-state (react differently based on context changes)

locally determined vs. remotely determined

Context dependent on if device is mobile vs immobile
What's the difference between an IOT Thing and a computer?

Name things that aren't IOT Things, that some people think are

Could IOTs be Manufacturing IOTs?

Could IOTs be Self-replicating IOTs?
What's the difference between an IOT Thing and a computer? (sometimes they don’t do a lot of actual computing, just reporting)

Name things that aren't IOT Things, that some people think are

(fitbits – they are just display i/o devices. I think. Think of them as itty-bitty touchscreens)

(iranian centrifuges? Attacked by internet, but the attack was on the control mechanism)

Could IOTs be **Manufacturing** IOTs?
   (yes, most 3d printers and other devices are networked)

Could IOTs be **Self-replicating** IOTs?
   (not yet, but maybe)
**Temps ~300°C**

**SUITE FOR INTERMEDIATE USERS**

**BambooFill** by colorFabb

3 mm, 600g reel

BambooFill combines recycled bamboo fibers with premium colorFabb PLA to create natural looking, lightweight 3D printed objects.

**PRODUCT ALERT (2)**

WOOD ALLERGEN WARNING:
This product contains natural wood fibers. Discontinue use immediately if rash, irritation, discomfort or other allergic reactions develop. If skin irritation develops, wash thoroughly with soap and water. Consult your physician if the allergic reactions persist.

**US$65.00**

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**SUITE FOR ADVANCED USERS**

**Polycarbonate** by Village Plastics

3 mm, 1kg reel

Polycarbonate is strong and resists deforming at higher temperatures unlike other more common 3D printer filaments. Parts 3D printed in polycarbonate will be strong, stiff and rigid.

**US$74.95**

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**SUITE FOR INTERMEDIATE USERS**

**BronzeFill** by colorFabb

3 mm, 750g reel

BronzeFill combines finely ground bronze powder with premium colorFabb PLA for heavy 3D printed objects that can be polished to achieve your desired finish.

**PRODUCT ALERT (3)**

Compatibility Alert:
Due to the blended nature of this filament, we strongly recommend using a LulzBot Tool Head with a 0.5mm nozzle for optimal 3D printing performance.

**US$75.00**

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**SUITE FOR INTERMEDIATE USERS**

**Stainless Steel PLA** by Proto-pasta

3 mm, 500g reel

Stainless Steel PLA by Proto-pasta brings metal 3D printing home by combining the familiarity of PLA with finely ground stainless steel powder.

**PRODUCT ALERT (2)**

Compatibility Alert:
Due to the blended metal powder found in this filament, we strongly recommend using a LulzBot Tool Head with a 0.5mm nozzle for optimal 3D printing performance.

**US$56.00**

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It’s less than two months before his company’s initial product launch, and CEO Ric Fulop is excitedly showing off rows of stripped-down 3D printers, several bulky microwave furnaces and assorted small metal objects on a table for display. Behind a closed door, a team of industrial designers sit around a shared work desk, each facing a large screen. The wall behind them is papered with various possible looks for the startup’s ambitious products: 3D printers that can fabricate metal parts cheaply and quickly enough to make the technology practical for widespread use in product design and manufacturing.

The company, Desktop Metal, has raised around R1.3 billion from leading venture capital firms and the venture units of such companies as General Electric, BMW and Alphabet. The founders include four prominent MIT professors, including the head of the school’s department of materials science and Emanuel Sachs, who filed one of the original patents on 3D printing in 1989. Still, despite all the money and expertise, there’s no guarantee the company will succeed in its goal of reinventing how we make metal parts, and thus transforming much of manufacturing.

As Fulop moves about the large, open workspace, his excitement and enthusiasm seem tempered by anxiety. The final commercial printers are not yet ready. Employees are busy tinkering with the machines, and fabricated test objects are scattered about. Progress is being made, but it’s also obvious that the clock is ticking. In a corner near the front door and entrance area, the floor is empty and taped off; soon the space needs to be filled with a mock-up of the company’s planned booth for an upcoming trade show.

If it succeeds, Desktop Metal will help solve a daunting challenge that has eluded developers of 3D printing for more than three decades, severely limiting the technology’s impact. Indeed, despite considerable fanfare and evangelical enthusiasts, 3D printing has, in many ways, been a disappointment. Hobbyists and self-proclaimed makers can use relatively inexpensive 3D printers to make wonderfully complex and ingenious shapes out of plastics. Some designers and engineers have found those machines useful in mocking up potential products, but printing polymeric parts has found little use on the production floor in anything but a few specialised products, such as customised hearing aids and dental implants.

Though it is possible to 3D-print metals, doing so is difficult and pricey. Advanced manufacturing companies such as GE are using very expensive machines with specialised high-power lasers to make a few high-value parts. But printing metals is limited to companies with millions to spend on the equipment, facilities to power the lasers, and highly trained technicians to run it all. And there is still no ready available option for those who want to print various iterations of a metal part during the process of product design and development.

The shortcomings of 3D printing mean the vision that has long excited its advocates remains elusive. They would like to create a digital design, print out prototypes that they could test and refine and then use the digital file of the optimised version to create a commercial product or part out of the same material whenever they hit “make” on a 3D printer. Having an affordable
IOT and AI

Can AI techniques be used to improve the usefulness of IOT’s?

• Expert Systems
• Game-Theory Systems
• Neural Nets
• Image Analysis
• “Deep Learning”
• Medical Analysis

What sort of IOT systems might benefit from AI, as opposed to simple sense-and-control?
IOT and AI

Can AI techniques be used to improve the usefulness of IOT’s?

• Expert Systems – big brother/little brother systems

• Game-Theory Systems – techniques that maximize outcomes

• Neural Nets – using networks of small analysis agents to build up a ‘deeper’ view

• Image Analysis – edge detection, model-matching

• “Deep Learning” – statistical techniques over very large data

• Medical Analysis – special because of the precise requirements

What sort of IOT systems might benefit from AI, as opposed to simple sense-and-control?
Next week: Specifications of an IOT Thing

Programming it (in general)

The First IOT: Apollo AGC

(don’t laugh. It took us to the moon and back.)