

Making hackercamp installations for cheap

Jarkman Industries
jarkman.co.uk
#cccamp19

What is this all about ?

- Things I've made
- What people found to do with them
- What I've learned
- Maybe a manifesto

Who am I ?

- Computers
- Making stuff
- Robots = computers + making stuff

Computers



Making stuff

The stuff of everyday life. Usually not made with much of a plan, but just to see how they came out..













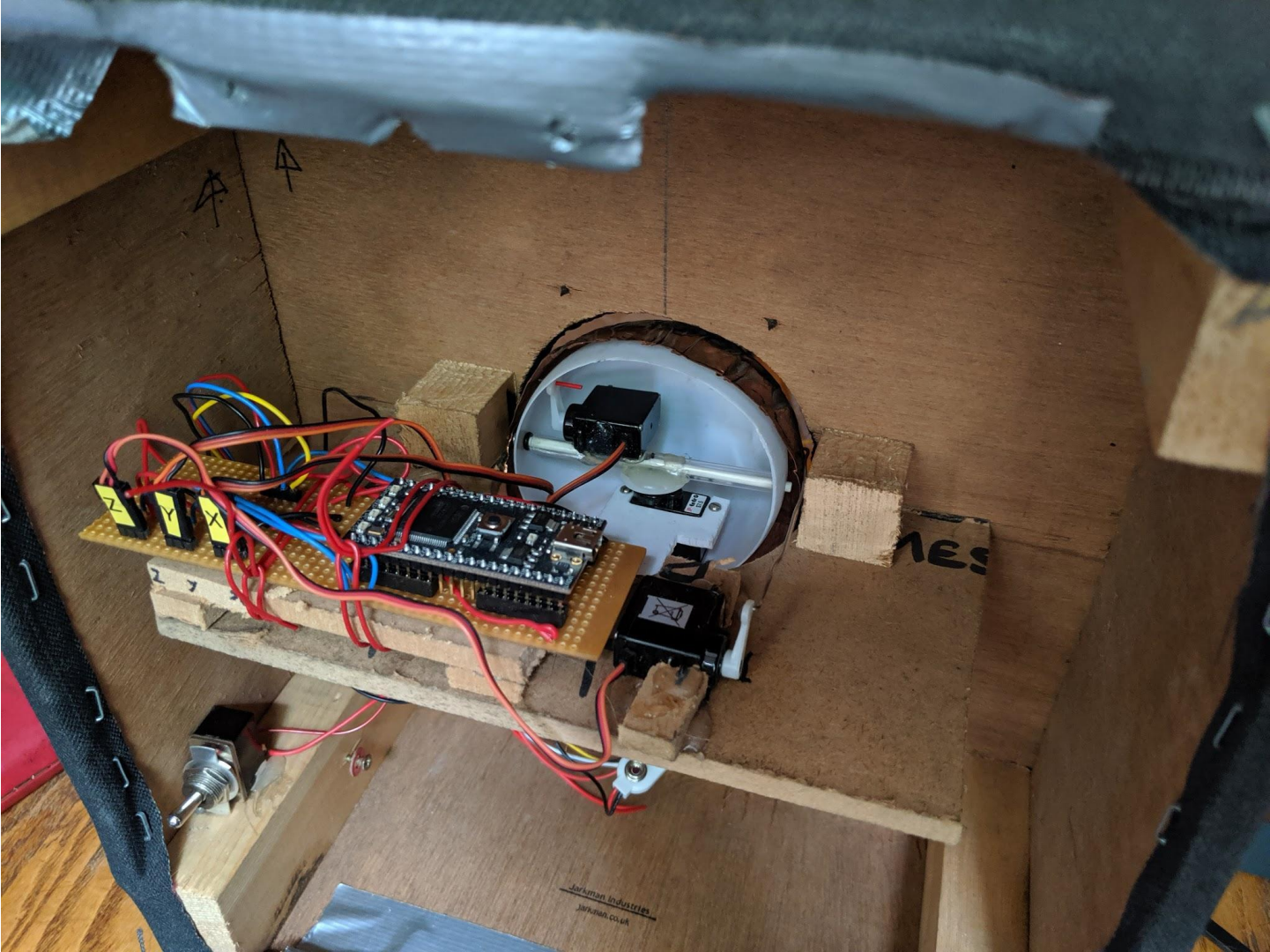
Robots = computers + making stuff

theyestheeyes, with Ben (2009)



What do people do with it ?

- A brief period of startlement & delight
- Waving (often very close-up)
- Moving around & watching it watching them
- Trying to work out what it knows
- Rarely, looking in the back (which was open, so they could)



Jorjation Industries
jorjonia.co.uk

Implementation

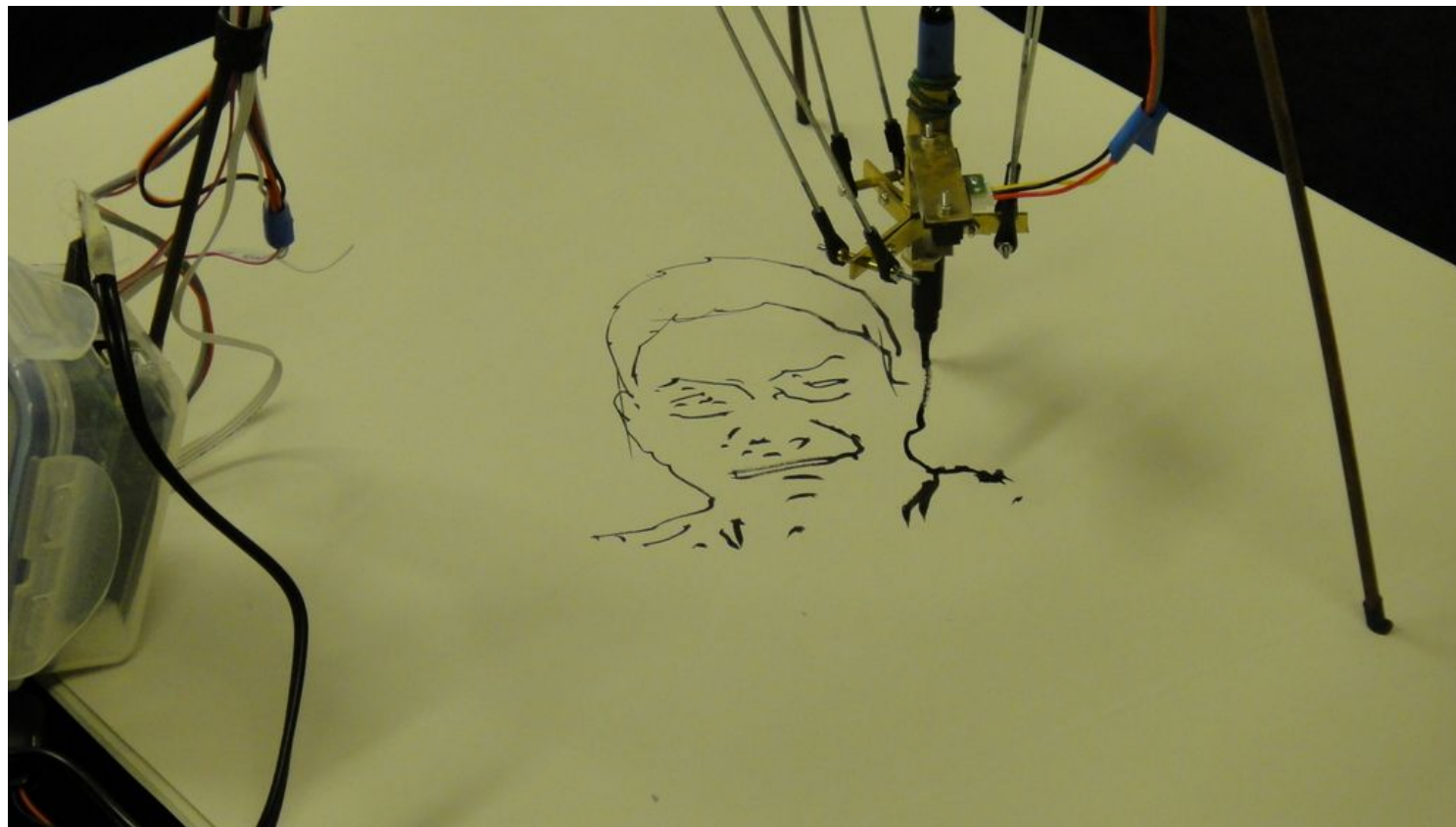
- An mbed (a strange ARM platform with a browser-based IDE)
- A cheap serial camera running at the lowest possible resolution
- Frame-to-frame difference detection
- Three servos
- One christmas-tree ornament

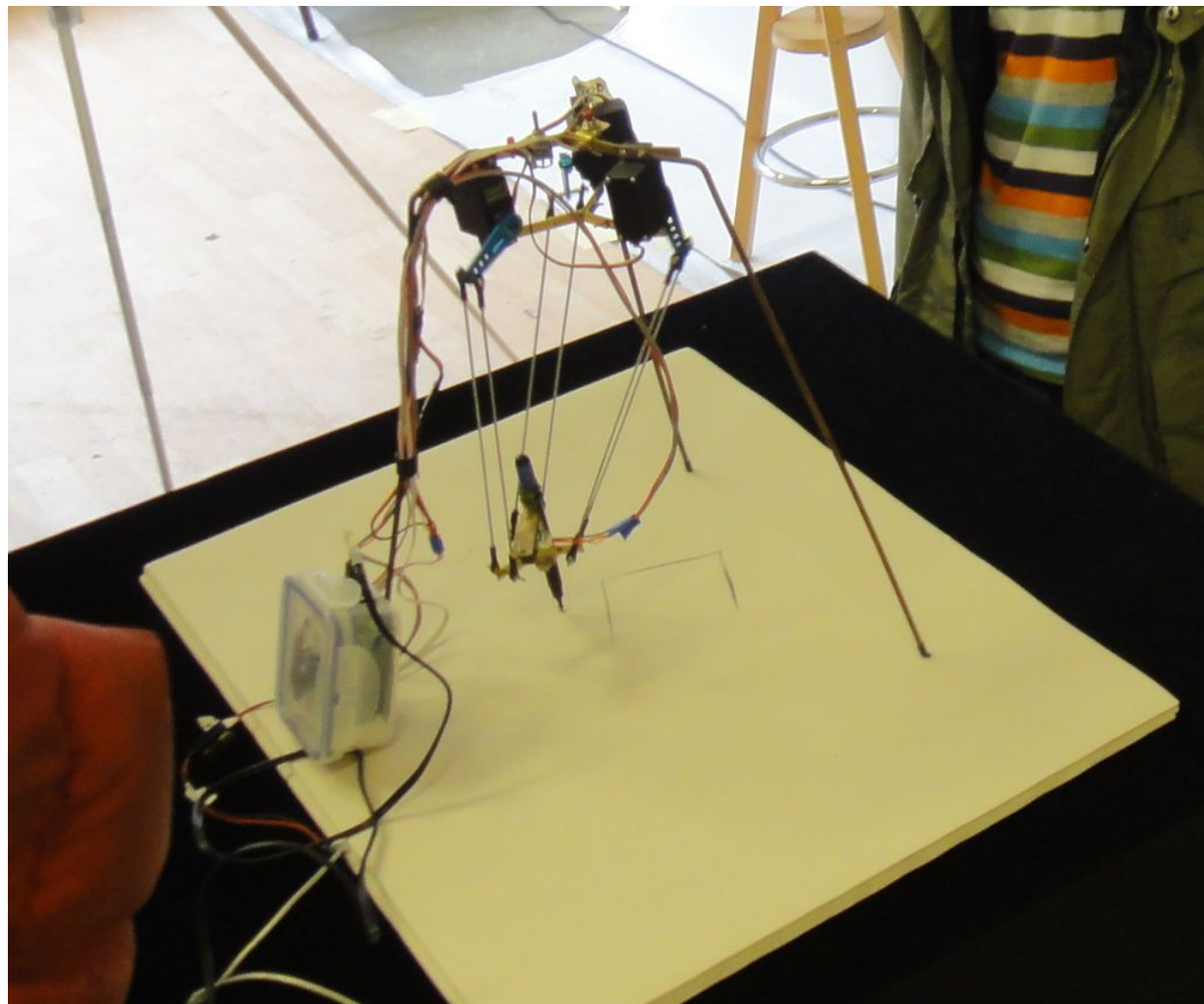
<http://jarkman.co.uk/catalog/robots/theeyestheeyes.htm>

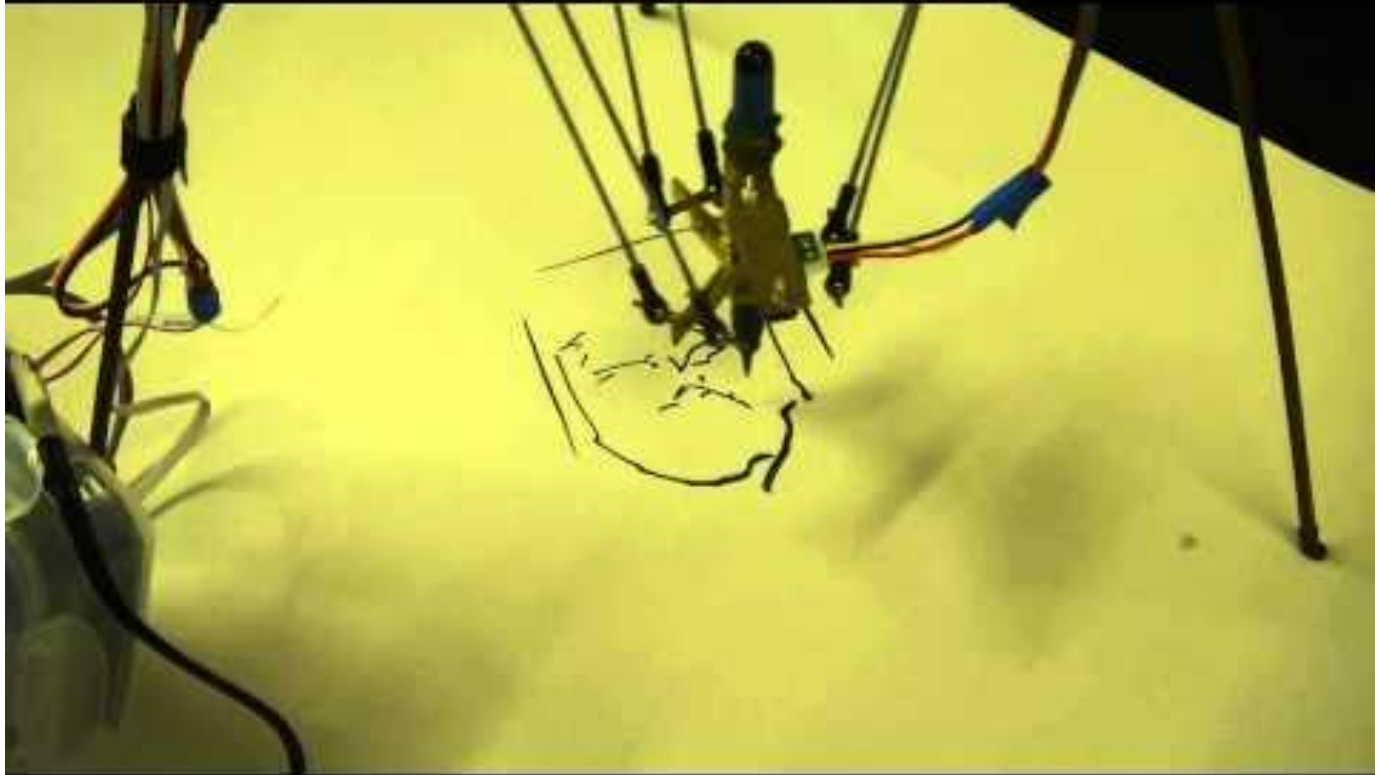
Trickery

- Just uses the center of gravity of all the changed pixels
- Most of the time, there's only one person and that works well enough

Sketchy, with Anton (2010)







What do people do with it ?

- Very engaged, they have to have their picture taken
- And the experience is definitely about them
- Some want to know a lot about how it works, most don't care
- Always has a queue

Implementation

- Android app, doing edge detection and a lot of vectorisation and cleanup
- Arduino with a Bluetooth serial module, just converting serial path instructions into motion
- Three servos
- One brushpen

<http://www.jarkman.co.uk/catalog/robots/sketchy.htm>

Trickery

- Distinguishing people from background is hard
 - So take a plain backdrop
- Rig the lighting to get decent face shadows

Giant Staring Eye, with Anton (2013)





What do people do with it ?

- Staring matches
- Dancing around
- Trying to work out what it knows
- Occasionally, epic startle

Implementation

- Beaglebone, with a webcam and a 360 degree lens
 - They were cheap then, in the aftermath of a failed mobile app
- Python running (I think) OpenCV, looking for changed areas
 - Tries to track the largest change area
- Three servos
- One blower
 - Salvaged from a central-heating boiler
 - These are good blowers, meant to run a long pipe
- Hand-sewn nylon envelope

<http://jarkman.co.uk/catalog/robots/giantstaringeye.htm>



Trickery

- Needs a visually quiet background, so don't have a big walkway in view
- Terrible slowness is apparently forgivable, maybe because it is large

Tune on a Stick, with Russ and Phill (2014)



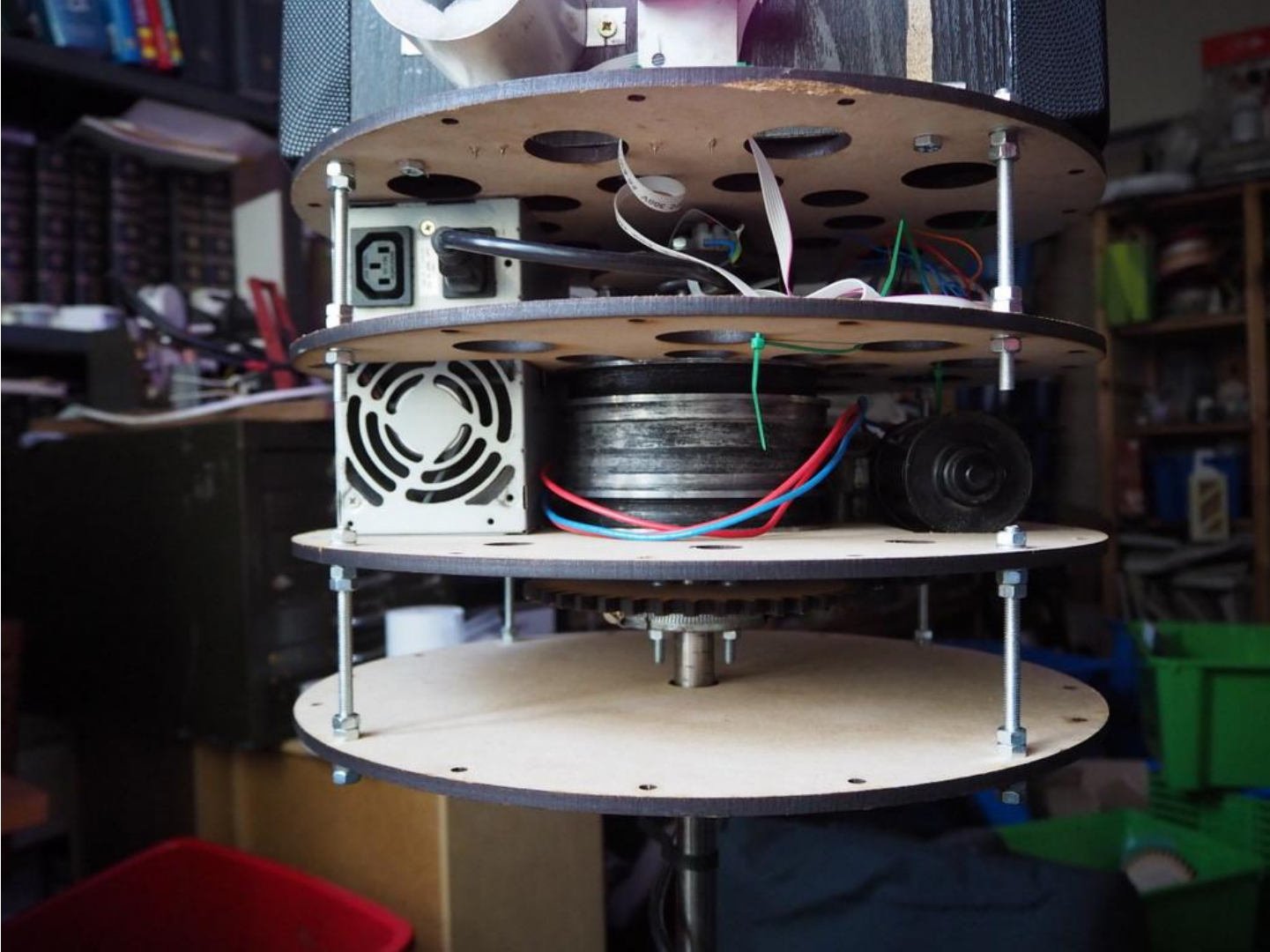
What do people do with it ?

- Stand about being puzzled
- Wake hands at it (very close) to try to work out where the sensor is
- Stand about in groups trying to make tunes
- Passers-by (who already knew the thing) would occasionally linger or loop it to have a tiny little tune on their way elsewhere

Implementation

- Windscreen-wiper motor
- Lasercut MDF cogs
- Slipping
- One ultrasonic rangefinder
- Arduino with a MIDI shield
 - Tune generated from detected ranges as the whole thing spins
- Terrible car amp

<http://jarkman.co.uk/catalog/robots/tuneonastick.htm>



Trickery

- Picks notes from a scale (actually a subset of a scale) so always in tune
- Ranger measurement and hence note times are always on the beat

Code

```
int note = noteForRange( this_beat_range, LEAD_CHANNEL );
```

```
setAndPlayNote( LEAD_LINE, beat, note );
```

World'O'Techno, with Julia (2015)



emf
2018

VILLAGES

Add your village

Handwritten notes and diagrams on a whiteboard, including:

- Moose Village
- Board Games
- EMERGENCY TEST - MATHS VILLAGES
- AMATEUR RADIOS! CBRS ME
- DATA LABS
- EMF
- QUANTUM TECHNOLOGY
- Hand-drawn diagrams and sketches.



VILLAGES

Add your village

Handwritten notes and diagrams on a whiteboard, including:

- Hand-drawn diagrams and sketches.
- Text: "Square Hackers & makers"
- Text: "MOVIES"
- Text: "EMF HACKERS AT THE HACK VILLAGES"
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- Text: "EMF HACKERS AT THE HACK VILLAGES"







PLEASE TAKE THE ART FOR A WALK

 CoderDojo

ARTS

What do people do with it ?

- Wander about the camp with it, just going for a stroll with some techno
- Find a favourite spot with the best music
- When it breaks, try to charge/fix it
- Or bring it back
- Who knows ?









Implementation

- USB GPS receiver
- Pi, running Sonic Pi
- Terrible car amp
- Charity shop speakers
- Nice big wheels
- Obvious handle

<http://www.jarkman.co.uk/catalog/robots/worldotechno.htm>



Code

```
8.times do |i|
  sample :bd_fat, amp: 5
  use_random_seed latInt() % 1412041
  loopChord = chooseChord( lonInt() % 656753 )
  4.times do
    gspeed = speed().modulo(1)
    #puts gspeed
    play chord(loopChord, :minor).choose, attack: 0, release: locationRelease(0.05), cutoff: rrand_i(70, 98) + i, res: gspeed
    sleep 0.125
  end
end
```

Trickery

- The handle. Give a thing wheels and a handle, and people will push it.
 - 'Affordances'
- Trust the camp.
- Turns out everybody likes a bit of techno

Giant Tentacle (2017)





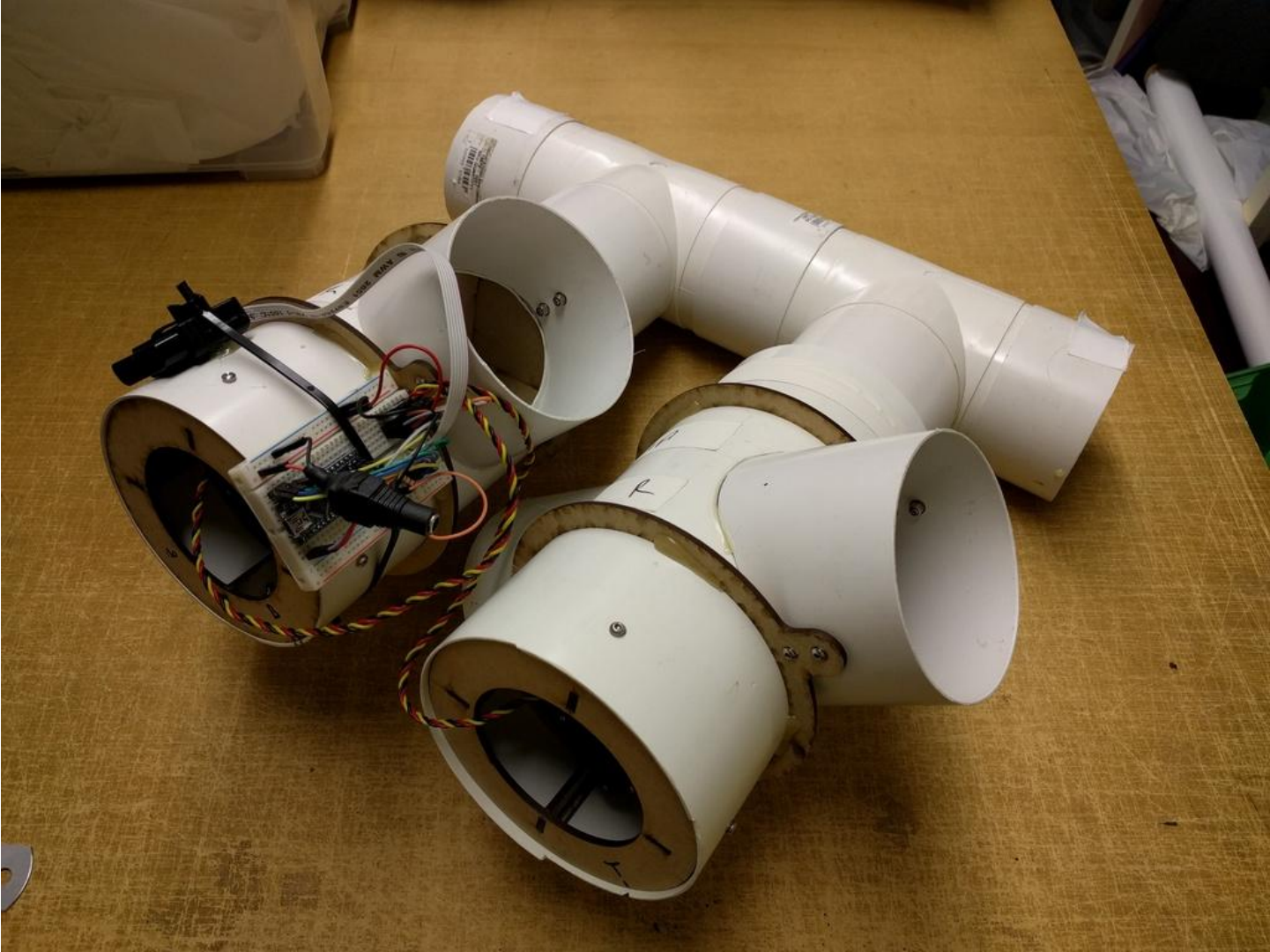
What do people do with it ?

- Hug/squeeze
- Play the chase/be chased game
- Try to get the attention of the head, clapping & waving
- Talk about how it works

Implementation

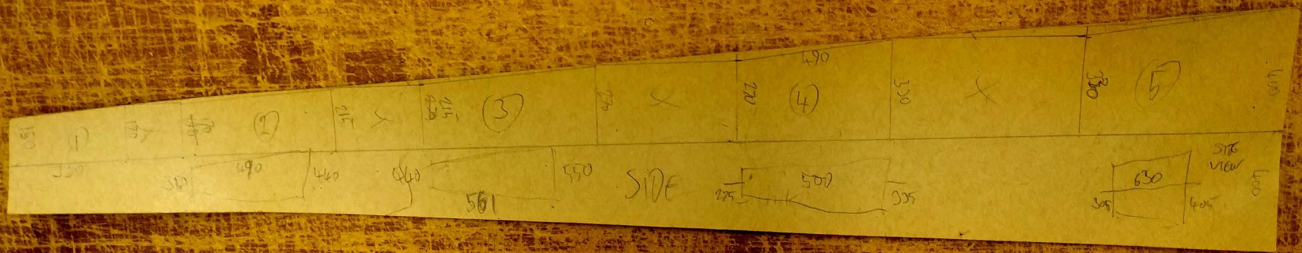
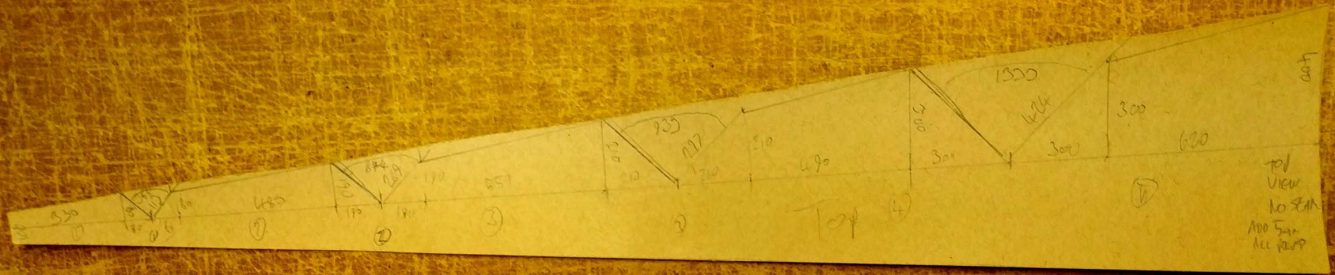
- Cheap bouncy-castle blower
- 100mm bore changeover valves made from lasercut MDF and ventilation ducting
- LSM303 compass sensors to measure bend angles (so it can servo to a target pose)
- VL53LOX time-of-flight rangefinders to detect nearby people
- WEMOS D1 (ESP8266) to run it all
- Lots of sewing

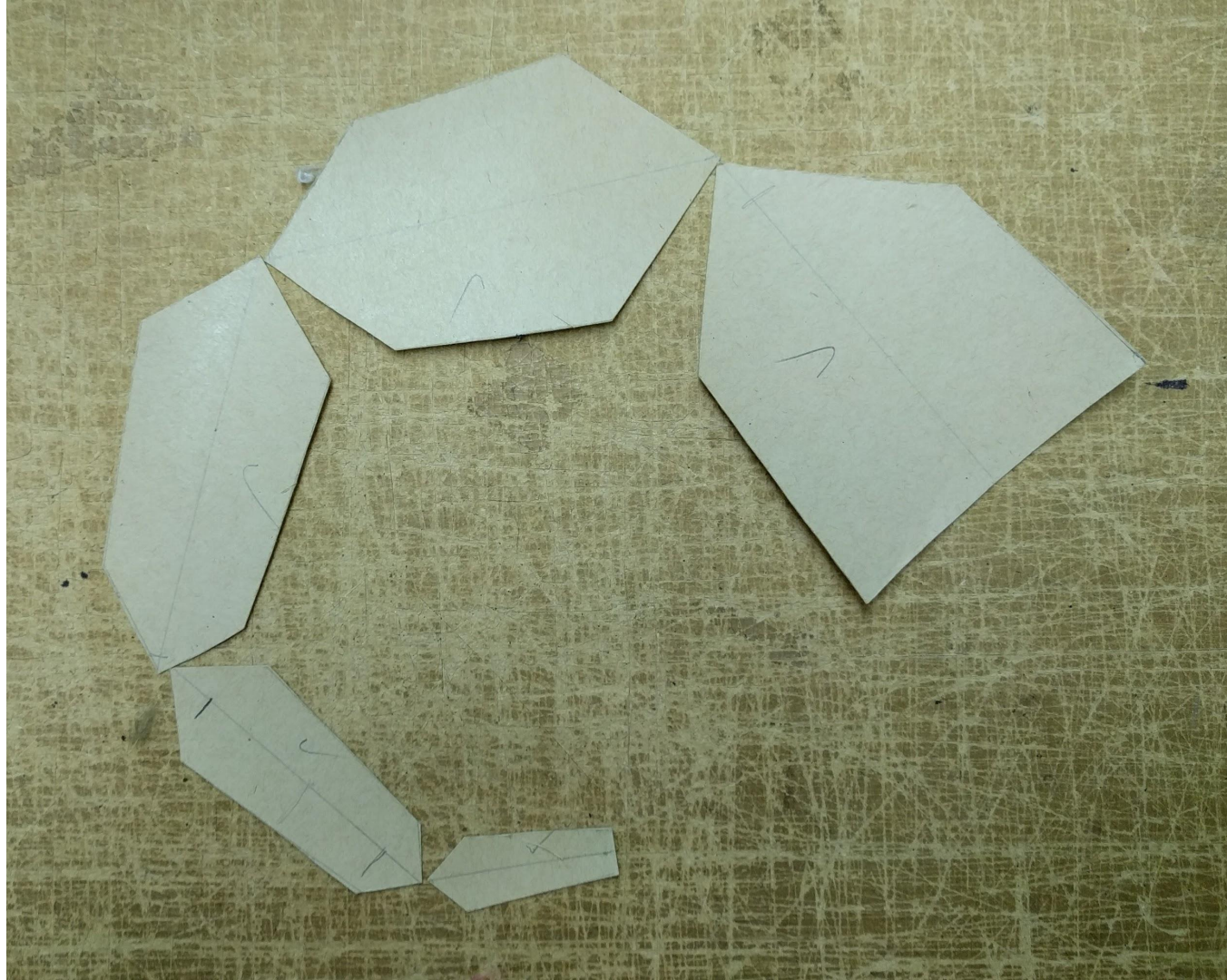
<http://www.jarkman.co.uk/catalog/robots/gianttentacle.htm>



Trickery

- Geometry for inflated structures is hard. But if you design it as a bunch of cuboids it will probably work.
- Big blowers mean leaky seams are OK.
- Even very slow and limited responsiveness is enough to engage people.





How To Build A Robot (Rusty Squid, 2016)



What do people do with it ?

- Looking
- Talking
- Tactile / caring interactions

See it in action

<https://www.channel4.com/programmes/how-to-build-a-robot>

Triffid (with Robert, Izzy, Nick)







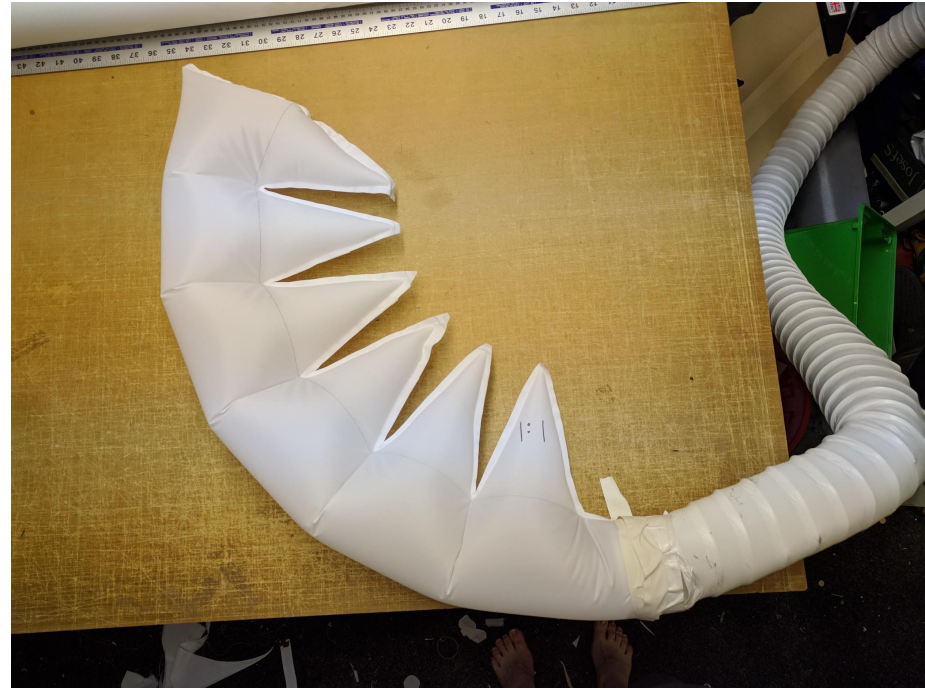
What do people do with it ?

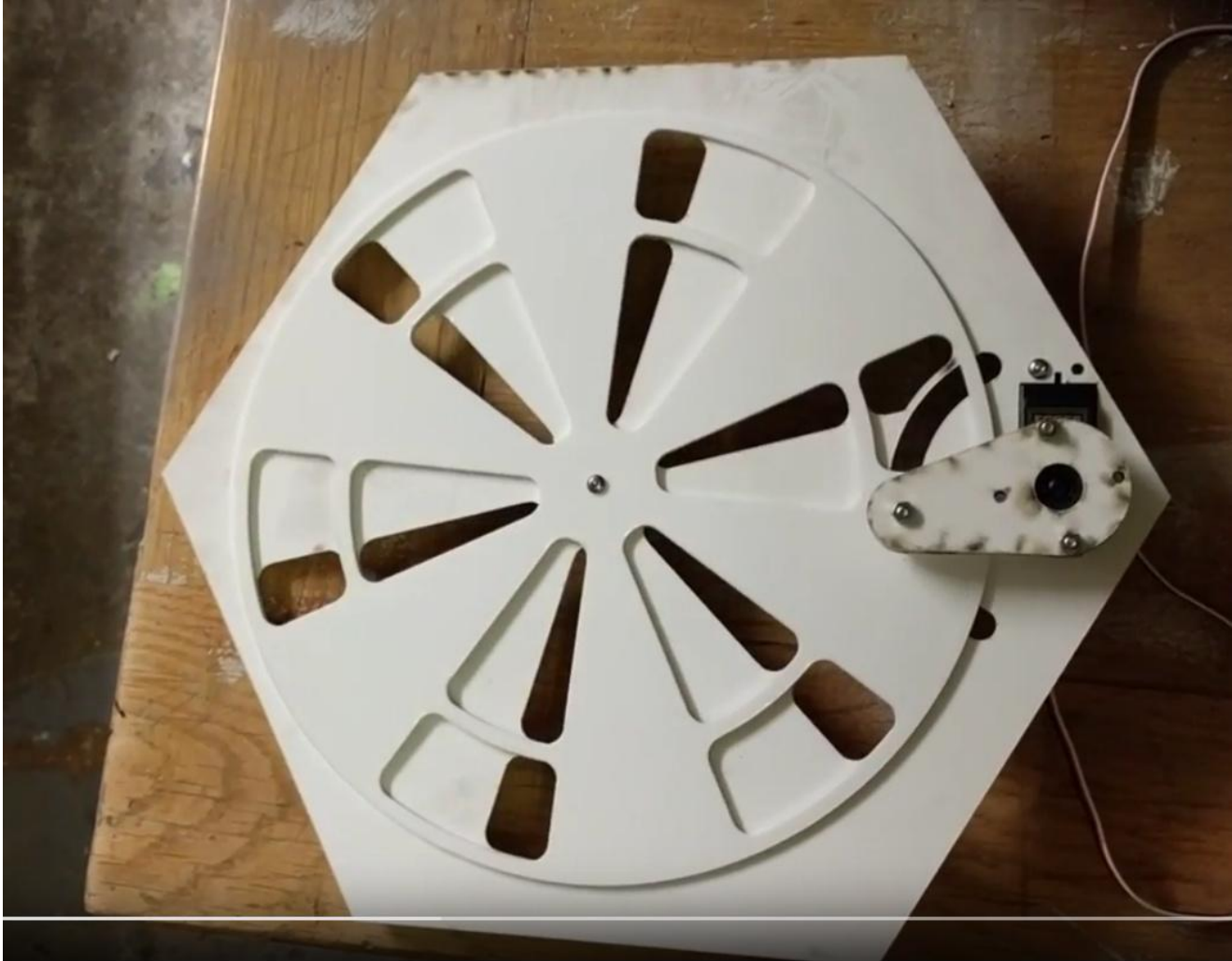
- Sensing & interaction is still a work in progress
- Even when it's not successfully interactive, gets a lot of speculation about its motives
- Lots of chase & catch games
- Lots of hugs
- Interested to see what they do with the new inputs

Implementation

- Big bouncy-castle blower
- 6 servo-driven valves
- BMP280 pressure sensors
 - Servos to target pressures in each chamber
- Sewing (a lot)
- LEDs
 - Really quite a lot
- Sensing via PIRs
 - Not very well
- Now sensing via camera & Jetson Nano
 - Go try it in the EMF village! Maybe not today!

<http://www.jarkman.co.uk/catalog/robots/airtriffid.htm>









Trickery

- Turns out people love big squooshy shapes
- Especially if they light up
- Packs up small

Anemone (with Robert, Izzy, Nick)





What do people do with it ?

- Lots of hugs
- Sticking heads into it



Implementation

- Big bouncy-castle blower
- Two servo-driven valves
- BMP280 pressure sensors
 - Servos to target pressures in the main chamber
- Bungee cord to retract the nubbins
- Sewing
- No sensing at all, not interactive
 - Still seems to get interesting interactions

<http://www.jarkman.co.uk/catalog/robots/airanenome.htm>

Trickery

- All the motion comes from just varying the pressure in the main chamber

What's next ?

- Better audience sensing & interaction design for inflatable things
- Something something tactile experiences & inflatables

Cheap

- Making this kind of stuff is generally easier than it looks once you get started.
- It doesn't have to be made very well, it just has to work well enough on the day.
- I aim for the worst thing that might possibly work, and it usually does
- Cableties, gluegun, sewing, trickery

Good

- Many of these wouldn't have been imaginable without their predecessors.
 - Iterate, iterate, iterate
 - Test on real, naive audiences to know what to do next
- Designing the experience makes more difference than designing the object.
 - Is also much harder.
 - Give people a thing to do and a way to learn it
- There's some kind of simple attractiveness that powers most of these
 - Big squoosy inflatable shapes
 - Bobbly techno
 - The pleasure of wheeling wheely things

Some kind of conclusion

- Making an awesome thing is good, making an awesome thing with an involving experience is better.
- In the end, the experience is all you deliver into another human's head.
- All of this seems obvious in retrospect.
 - But I only worked it out by trying it
 - Never underestimate the power of futzing with stuff
- Go make some things.

Questions ?

<http://www.jarkman.co.uk>

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