

Final Report | So Kanno X CreateloT

[public version]

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So Kanno	Erreur ! Signet non défini.

1. Transition of the plan from “The Ideal Showroom of IoT” to “Chatroom of Things”

Since there was transition of plan, hereby I explain why and how it changed. The plan “Chatroom of Things” is based on the plan “The Ideal showroom of IoT”. The reasons and transitions are following.

a. Reasons of transitions

- i. Technical & economic difficulty
 1. I expected more technical support from the partner. and I found it's too much challenging to realize the initial plan. Thus plan has to be compromised and simplified.
 2. Budget was not sufficient to develop full installation without further resources and support.
- ii. People has hesitation to VR headset
 1. Experience of prototype exhibition in IoT Week Bilbao, I found people have strong hesitation for VR headset.
- iii. Having point of view of things doesn't mean feel like being things
 1. From the experience of showing prototype "What is it like to be an Object?", I found that when you can move around on mouse, you kind of feel like you're a mouse. but spy cameras, which doesn't have function to move around, you don't really feel you're becoming stuff. Rather what you feel is, where am I. That was not the experience that I wanted to give.
 2. Accessibility: Inspiration by [Avatars](#) exhibition in Tokyo and [Cecile B. Evans work](#), showed how object can narrate in a space. This approach creates an experience that tells a story and is accessible to a wider audience. The threshold to step in is lower. Therefore the empathise was to focus stronger on the narrative itself, in a theater setting. Like this there is a better way to tell a story and immerse visitors into the work.

b. Solutions

- i. Personal robot -> roomba
 1. I was researching a lot about companion robots in market. there were two robots I focused, "Jibo" and "Kuri".Unfortunately both robot's company stopped business. Actually, so far, only the successful robot in the market is vacuum robot. So I just replaced it to roomba.
- ii. Robot as guide / VR headset -> Twitter on display
 1. Initially, robot was planned as guide for the installation. Robot was not possible to get and replaced with roomba, so there's no way to show perspective of object. Display with twitter is replacing those.
- iii. What to be simplified and compromised
 1. Since no VR setup needed anymore,

- a. no 3d modelling
 - b. no voice modelling
 - c. no two room separated environment
- iv. Instead, it realises,
1. Multiple people can experience in same time
 2. Feasibility
 3. Accessibility

2.Explanation of Project

Overview

"Chatroom of Things" is an interactive art installation that casts a light on today's subjects from a slightly different angle, with the perceptual change to the post IoT era.

At first glance, it just looks like a ordinary living room. But a closer look reveals, that the furnitures have social media accounts and are having conversations with each other on the the display. Sometimes they start talking recognizing a person who enters the room, sometimes they discuss current issues such as privacy, gender and nationality from their respective standpoints. By this shifting perspectives from human-centered approaches to our ever smarter environments. Questioning how objects see and perceive the world as well as can become active agents.

Cast / Object

<u>TV</u>	showing tweets all the time.
<u>Sofa</u>	It has pressure sensor and sais like "just someone sit." "who is this?"
<u>Camera</u>	Security camera with intelligence . Can say person's gender, mood, etc Camera can tweet with black and white image. Should be two or more.
<u>Roomba</u>	Cleaning, says it's full or need to be charged etc. Complains about other object which makes room dirty.
<u>Plant</u>	Moving to get best light. When it thirsty, it tweets.
<u>Moving light</u>	Can control mood of space
<u>Clock</u>	sais time. also say time length of some happenings
<u>Table</u>	Has a movement sensor, and can sense if there is an object placed on the table

Scenario examples

INTERACTIVE MODE

Somebody comes to the room and sits down on the couch.

- **Sofa** Somebody sits on me?
 @camera Do you see somebody on me?
- **Camera** Let me see...
- **Camera** I see [gender] [age] [mood]."
- **Sofa** _____ Thanks, I will treat them with respect."

THEATRE PLAY MODE

Talking about gender

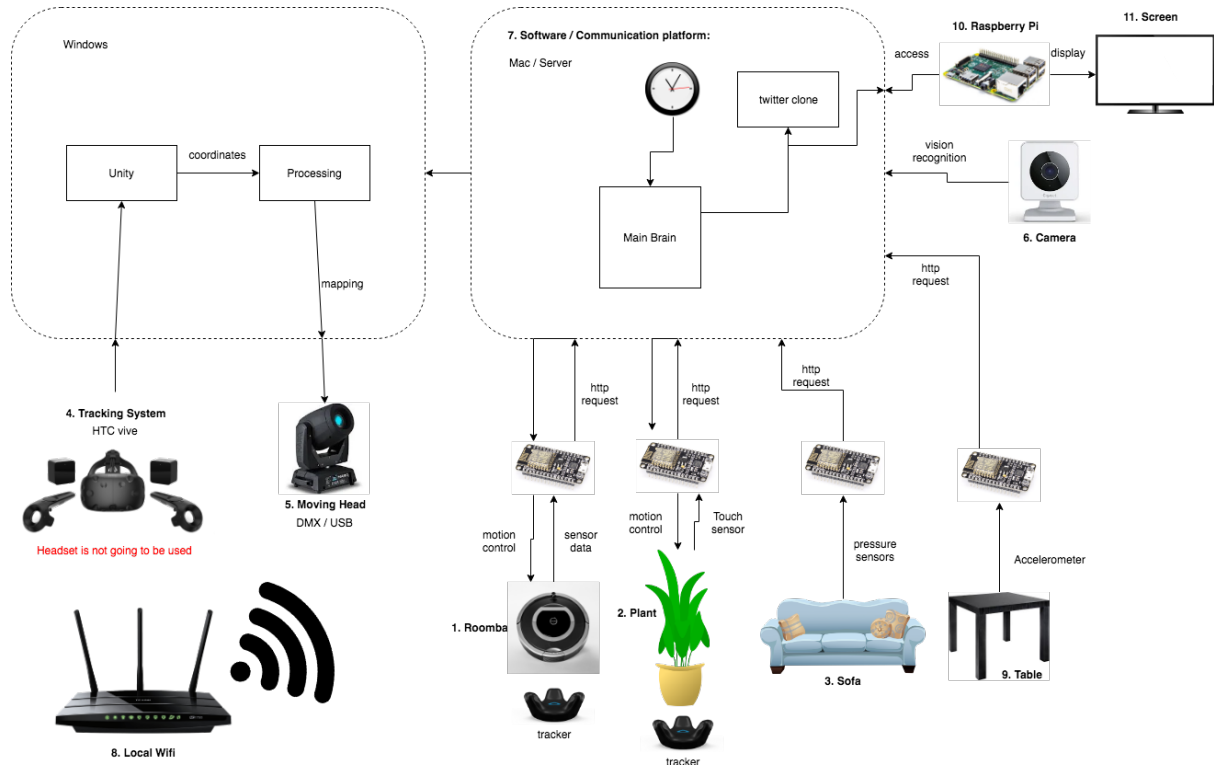
- **Sofa** My gender is neutral in German, masculine in French.
 What about you guys?
- **Table** I'm masculine in German and feminine in French.
- **Clock** That sounds complicated.
 I'm feminine in German and French,
 But masculine in Spanish.
- **Plant** I'm all feminine in those 3 languages.
- **Roomba** I don't care gender, because I'm a new kind.
 And for object like us, it doesn't matter.
- **Sofa** True, it's just a human perspective.
- **Clock** I agree.
- **Plant** Oh, are you guys sure?
 It's kinda nice to have gender for me.
 Technically I have both sexuality on myself.
- **Roomba** Yes you're biological being, not like us. you're different.
- **Plant** Well yes... but yeah that make sense.
 Gender and sexuality doesn't make any sense,
 if there's no sexual reproduction on your species.
- **Roomba** Yeah, that's true, In our kind, there's 3d printer called
 "RepRap" which is about making self-replicating
 machines. But this was asexual reproduction. So
 maybe in the future, we also have gender and
 sexuality properly.
- **Plant** Yeah, that sounds interesting.

Twitter clone

- Usually humans have a twitter account. but also "bot" exists. If an object has a twitter account, in the timeline, Human's account and bot don't look different. There is a computer which has a twitter account for the installation and showing all this conversation of things/objects.

3. Technical Development

System overview

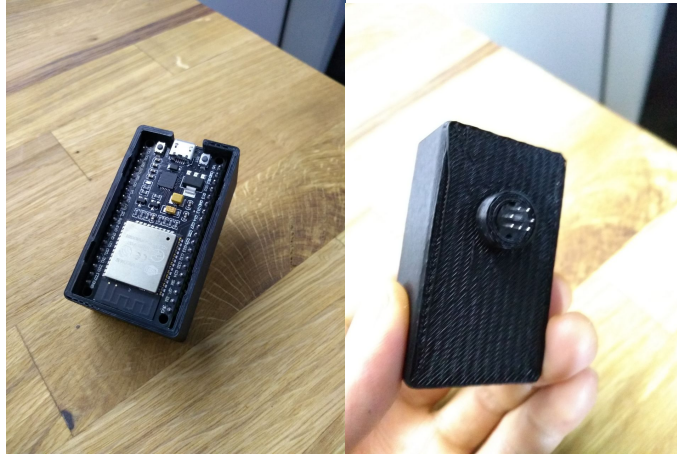


Development of components

All elements are depicted and numbered in the overview above. Here the objects are described one by one how they were developed, which was the initial idea and how the prototype was developed.

1. Roomba:

- a. Reasons to work with Roomba: It has a serial port which gives external control. and there's published document about it.
- b. Micro-computer with wifi connectivity is used to control Roomba. So Roomba became IoT device.



c. Position tracking with Vive Tracker

2. Plant:

- a. Touch sensor on plant

3. Sofa:

- a. First idea: Using sensor FSR, but material is too fragile and too expensive
- b. Solution: Conductive sponge, DIY pressure sensor, easier to replicate, less expensive

4. Tracking System:

- a. First idea: using infrared / optitrack system. But it is quite expensive, you need 6-8 cameras and use reflective material for the motion tracking system. Other idea: Ultra Wideband Ranging: Chip DWM1000 used for positioning drones. (RLTS - Real time location system)
- b. Solution: HTC Vive, as So already bought HTC with tracking device. It's most accurate. The tracking system works on Unity. Unity is flexible for combining different softwares.
 - i. How does it work: Unity is sending coordinate via osc protocol to processing program.
 - ii. Running on windows,
 - 1. Unity for having coordinates of plant & roomba with vive tracker.
 - 2. Processing controls moving head and mapping the space: Library for projection mapping.
 - iii. VR glass is not used

5. Moving Head

- a. Controlled by processing program from Windows.
- b. Positions of Clock, Sofa, Table and Camera are registered in the virtual map of the space.
- c. The moving head is corresponding to Twitter, to know the location of each object, so that it can spots each object.

6. Camera:

- a. First idea: Open computer vision
- b. Solution: Smart Camera, as it can detect face, body, gender, age, mood, gaze (EVERYTHING!!!)
 - i. API asks what the camera sees, the camera answers with an image and what it sees (gender, mood)

7. Software / Communication platform:

- a. First attempt: Using Twitter, but after 1h of testing with a bot the account was banned due to new Twitter regulations. Twitter: bans bots and want so focus more on people, so Twitter bots could not be used anymore
- b. Second attempt: Buying new fake accounts (Turkish accounts), but that didn't work because these accounts couldn't be applied for developer account
- c. Third attempt: Trying Messaging systems like Whatsapp, Telegram & FB Messenger, but wanted more twitter wall & stream, timeline than message system
- d. Solution: Developing twitter clone
 - i. Application kit from github, works with nodejs (javascript on server side)
 - ii. Camera was working on windows before.
 - iii. Protocol post requests, send messages from a remote computer, so that everything with a web connection can send a post request
 - iv. Arduino send post request to the server, server manages the post requests
 - v. Document with all the conversations (stored on server)
 - vi. Once signal is send from object, server chooses random text to post into the streamed conversation.
 - vii. Delay of post 6-10 seconds to have a fluid flow & allow visitor to read the text
 - viii. Server asks object (camera) to do something: "what do you see", camera replies with gender, age estimation and mood/expression (happiness, anger, surprise, sadness, neutral) of person it can detect. Gives a values 0-100, also for gender.
 - ix. If it didn't detect a person "cannot detect person"
 - x. When it's tweeting it sends a message to the windows computer (working on processing): via websockets to the windows computer - needs different protocol, so that the windows computer (moving head) knows where to shine the light on
 - xi. Server runs on Macbook

8. Local WiFi:

- a. Own router with fixed IP addresses for the Server (Macbook) and Windows computer (Unity & Processing)

- b. Arduinos know to which IP address they have to talk to for communication due to fixed IPs, other IP addresses are not fixed as they are only sending
 - c. On Raspberry Pie is connecting to the router, can access server and see the website (twitter clone)
9. Table:
- a. First idea: sound sensor, but it's quite inaccurate
 - b. Solution: sensor for movements, accelerometer sensor
10. Raspberry Pie:
- a. running the browser, showing on screen
11. Screen:
- a. Showing tweets timeline

Hardware materials involved

1. Computer (Windows)
2. HTC vive
3. vive tracker x 2
4. Moving Head
5. DMX/USB converter
6. DMX cable 20M
7. Wireless router
8. iRobot Roomba 615
9. iRobot Create 2
10. ESP 32 Dev board x 2
11. ESP-01 x 2
12. Arduino x 2
13. Raspberry pi x 1
14. OKAO Vision Camera (smart camera)
15. Clock (from retune studio)
16. Sofa (from retune studio)
17. Table (from retune studio)
18. Projector (from retune studio)
19. Macbook Pro (So's)
20. Macbook Pro (Ibo's)

Software involved (Twitter)

We tried to use real Twitter, but due to recent regulations, it was very difficult to make things to have each own twitter account and make them tweet. Thus, we made our own chat room system which looks like twitter. Programmed with JavaScript and server runs on MacOS.

4. Reflection from ICT2018

Impressions

- People mostly just passed by, but once they know the concept, they are quite curious.
- Ovidiu Vermesan (Tech Project Partner from CREATE-IoT) wanted to have something like user-test feedback from the exhibition.
 - amount of people in event are not enough for user-test.
- Sofa works really good,
 - people comes to have rest then, get interested in.
 - Also just to have a rest.
- Spontaneous changes worked well.
 - black blocks as TV shelf, vertical screen, angle of living room, two plants.
- Some people didn't recognise what moving head spots.
 - It would be better to try use sound for tweet and serious sync of timing of tweets and light. To do that, need to quit server system and just use processing or openframeworks for main system not to have delay.
- People does care about age. Age estimation is really not accurate, it changes quite often with photo or light condition. it's actually same as us, our age estimation is also never accurate. But since age is definitely not the first topic to talk, Computer vision has excuse to talk about it.

Quotes

- installation was near entrance with everybody going near it at least twice a day. But without knowing what it was, I did not have much motivation to stop by (maybe because I'm not a big fan of watching TV?).
On the other hand, once I've learned that those appliances talk to each other, I was curious to sit, see and chat. It was nice, especially with you - authors - available too.
It might be good installation also for "IoT vs. privacy" kind of events or audiences. To "scare" people a little. :)
Peter Hanecak
- This is more familiar than other IoT related project here in ICT2018. You should think of proposing this to IKEA, they would like this.
Dr. Daniela ZAVEC
- Happy birthday! now I'm 43 years old! oh now I'm 35 years old! happy birthday again!
somebody
- It would be interesting to make them fight or make them act like they got malware.

An artist

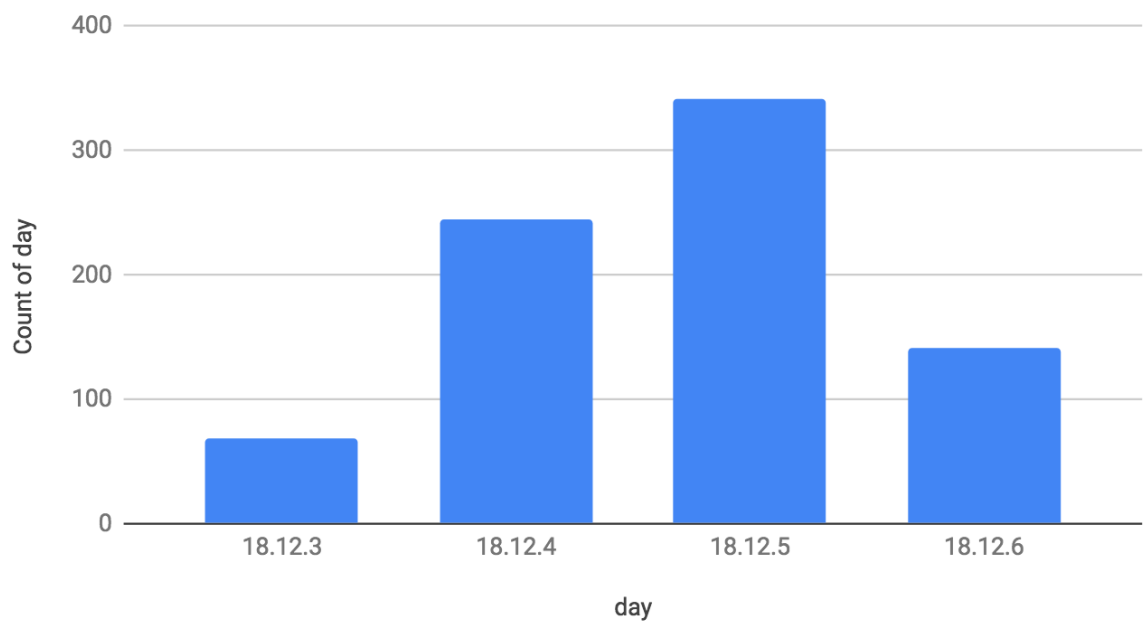
- memory of space

old man

Statistics from smart camera

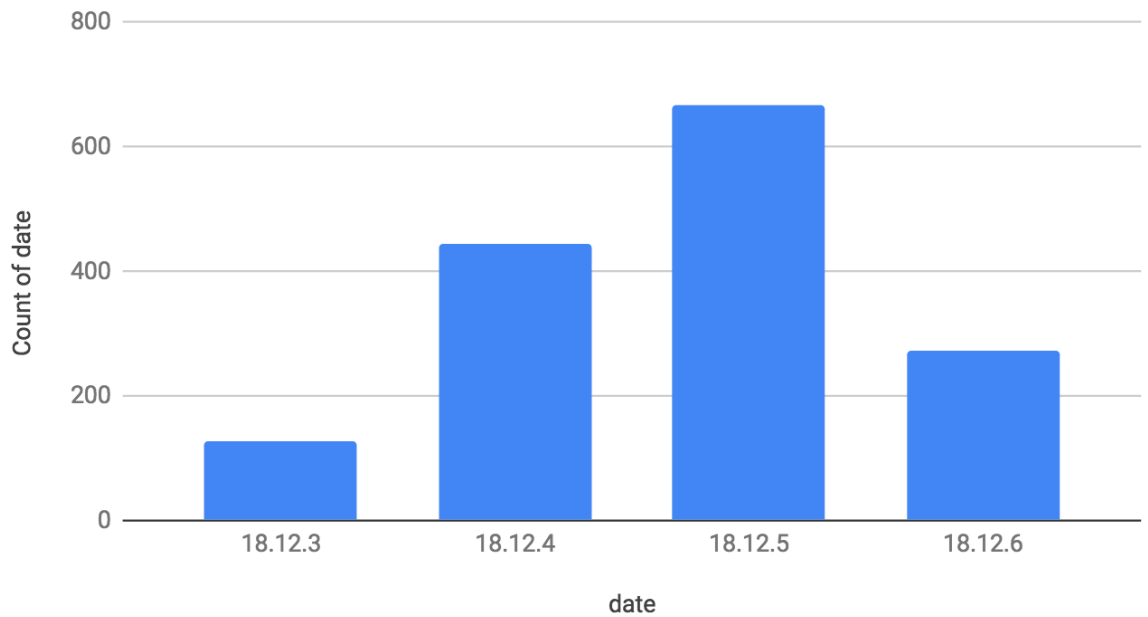
- Number of cropped photo: **total 797**

Count of day



- Number of big photo: **Total 1509**

Count of date

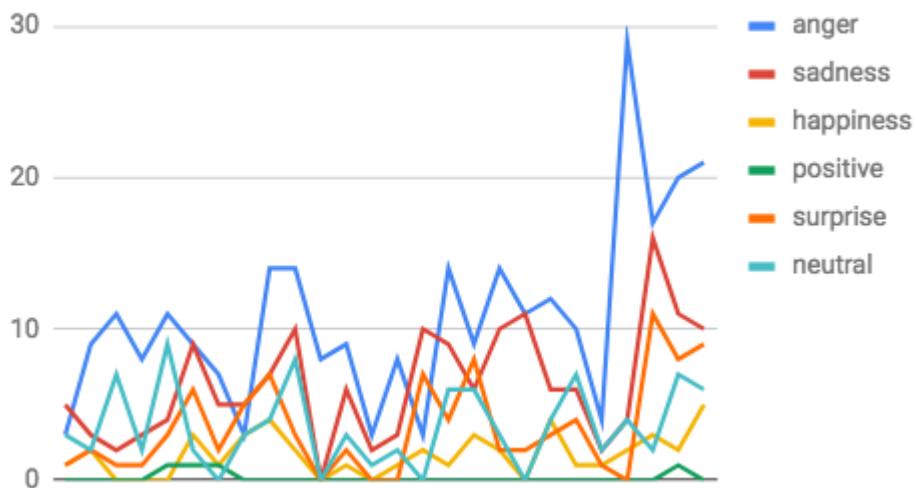


- Face expression

- Total number

1. Anger	281
2. Sadness	165
3. Neutral	93
4. Surprize	92
5. Happiness	44
6. Positive	4

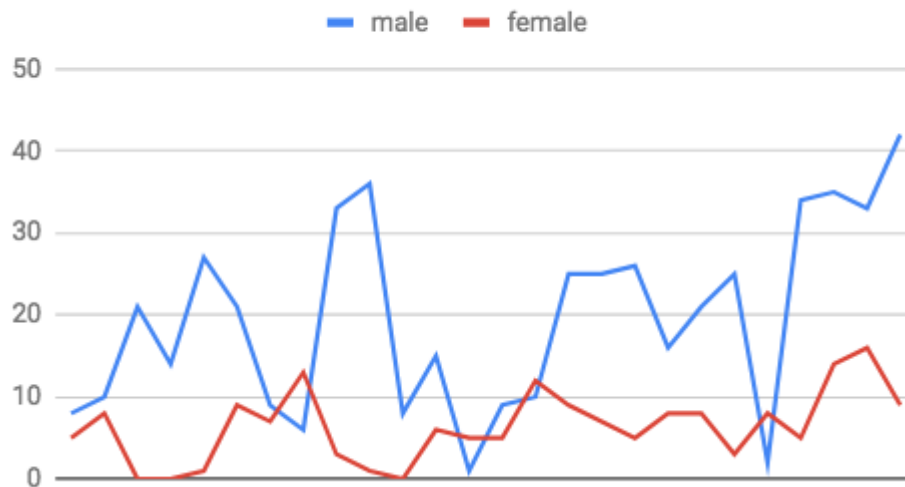
Expressions



- Gender balance

- Male:	512
- Female:	167

Gender Balance



5. Reflection from artist

One of the harvest from my participation to STARTS residency is meeting and experiencing working with people from different field than I usually work for exhibitions and festivals. Things were not going in same manner.

Before I start the project, my interpretation of STARTS residency was like matching service kind of program between ICT projects that want application example and opportunity to show their technology and artists who want to use cutting-edge technology for their project. It's win-win situation. Also there's budget for project. What a nice program!

After one and half year of collaboration and participation to IoT Week Bilbao and ICT2018, I found that role of artworks and artists is different in this project from other works I've done so far. Purpose is different.

In exhibitions, curator selects artworks to show. mostly curation is based on cultural, aesthetic and social context. This STARTS residency is based on economic and industrial context. There should be exceptions though, former has tendency to pick up some project which has bottom-up approach. and it has purpose to interpret society through them. Latter gives opportunity of collaboration and presentation by top-down approach. Purpose is to disseminate new technology to society. And beyond it, to make market, which potentially makes money and employment, which could directly affect society.

I don't mean which is better, both have merits and demerits, some points conflict. Top-down approach sometime makes big mistakes, contrary failures

in bottom-up approach would be a lot, but they're not visible because only the successful cases are visible.

However basic purpose of both side is about to make society better somehow. Especially on my case, it's to try to create good flow and movement on society which has strong influence of technology.

In my opinion, one of the function of art is to give alternative perspective. Therefore It was a great harvest for me that I was able to produce artwork from the standing-point I haven't had so far by participating in this project.

I think that creativity is required that will bring out solutions that go beyond contradiction. I want to become a talent who can answer it. It doesn't sound easy and would require a lot of effort though.