Smart Textiles Go Clubbing
Sensing Audience at the Amsterdam Dance Event

@SergioCabrero
Smart Textiles & Soft Robots Symposium @RCA, London, 26.09.2017
The Party

CWI x BYBORRE
RedBull Playrooms: https://vimeo.com/207023703
PARTY LIKE IT’S 2099!

- 2 nights, 7 hours & ~ 500 guests per night
- Michelin* Dinner: 75 Friends of RedBull
- 2 Dance Floors, Chill-out (overdrive) Room, Bars…
- Selected Artists/DJs
- Iconic Building: Bugenhuis
SMELL
SIGHT
TASTE
HEAR
TOUCH
CAPTURE THE EXPERIENCE & SHARE IT BACK
Capturing the Experience
HOW DO WE MAKE PEOPLE FORGET ABOUT BEING TRACKED?
SENSOR-TEXTILE INTEGRATION

BLE-ENABLED WRISTBANDS
900 X VIP
Estimote Stickers
Programmed in the factory
Data: Temperature & Accelerometer
Period: 1.25 / 2.5 seconds

100 X FOR
TI SensorTag CC2650
Programmable
Data: Temperature & Accelerometer
Period: 1.25 seconds
LED
HOW DO WE MAKE THE CLUB LISTEN TO THE CROWD?
FROM DATA TO INSIGHTS

CWI x BYBORRE
INDIVIDUAL & CROWD

- Temperature
- Location
- Energy level
ARE YOU DANCING?

- Dancing not an ‘exercise’ activity
- Sensors can go to sleep/low broadcast mode
- Broadcast rates of BLE beacons are between 0.4Hz–0.8Hz
  Most activity recognition is done at > 30 Hz
- Packet loss by function of BLE delivery
SOLUTIONS

- Dancing not an ‘exercise’ activity
- Sensors can go to sleep/low broadcast mode
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- **First:** We collect some ‘bootstrap’ data
SOLUTIONS

• Dancing not an ‘exercise’ activity
• Sensors can go to sleep/low broadcast mode
• Broadcast rates of BLE beacons are between 0.4Hz–0.8Hz
  Most activity recognition is done at > 30 Hz
• Packet loss by function of BLE delivery

• First: We collect some ‘bootstrap’ data
• Second: We measure expected packet loss
NEURAL NETWORK

- High Energy
- Medium Energy
- Low Energy
DATA PIPELINE

Data collection, processing & interpretation

500x iBeacons
60x SensorTags

30x Raspberry Pi

1x Server

Processing

Signal Strength Analysis & Triangulation
Multi-layer Convolution Neural Network

Unified feed

Feed

JSON
OSC

Output

Data Visualization

Light Installations

4D SOUND

Guests
Room Infrastructure
AN OPEN DATASET

40M BLE PACKETS

• Timestamp
• Receiver (RPI)
• Address (hashed)
• Sensor Id
• Type of Device
• Payload (hashed)
• Payload Length

14M SENSOR READINGS

• Temperature
• Accelerometer (X, Y, Z)
• Is moving? (Estimote)
• Previous Motion State (Estimote)
• Current Motion State (Estimote)

https://github.com/cwi-dis/CWI-ADE2016-Dataset
Creating Experiences from Data

CWI x BYBORRE
FROM DATA TO SOUND

Giving the club a voice
ON-SITE LIVE VISUALIZATION

Creating Meaningful Data Summaries
VISUAL EXPERIENCE SUMMARY

Guest > Data > Club Energy > Flight of the Night
PERSONALISED SCARF

Club Energy > Data Visualisation > Pixel to Needle > Scarf
Project Cairo
An intelligent soft-robotic jacket
Video: https://www.youtube.com/watch?v=maKILHxcGAE
DATA
• User profile
• Internal sensors
• External sensors (e.g. in the bike)
• Other data sources (e.g. weather)

REACTIVE
• Soft-robots / origami

PERSONALISED & INTELLIGENT
THE FUTURE, I’LL SEE YOU THERE.
- THE CHEMICAL BROTHERS

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Clever&Franke

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Dataset: https://github.com/cwi-dis/CWI-ADE2016-Dataset
RedBull Playrooms movie: https://vimeo.com/207023703