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## Nahee Kim

Master's Student

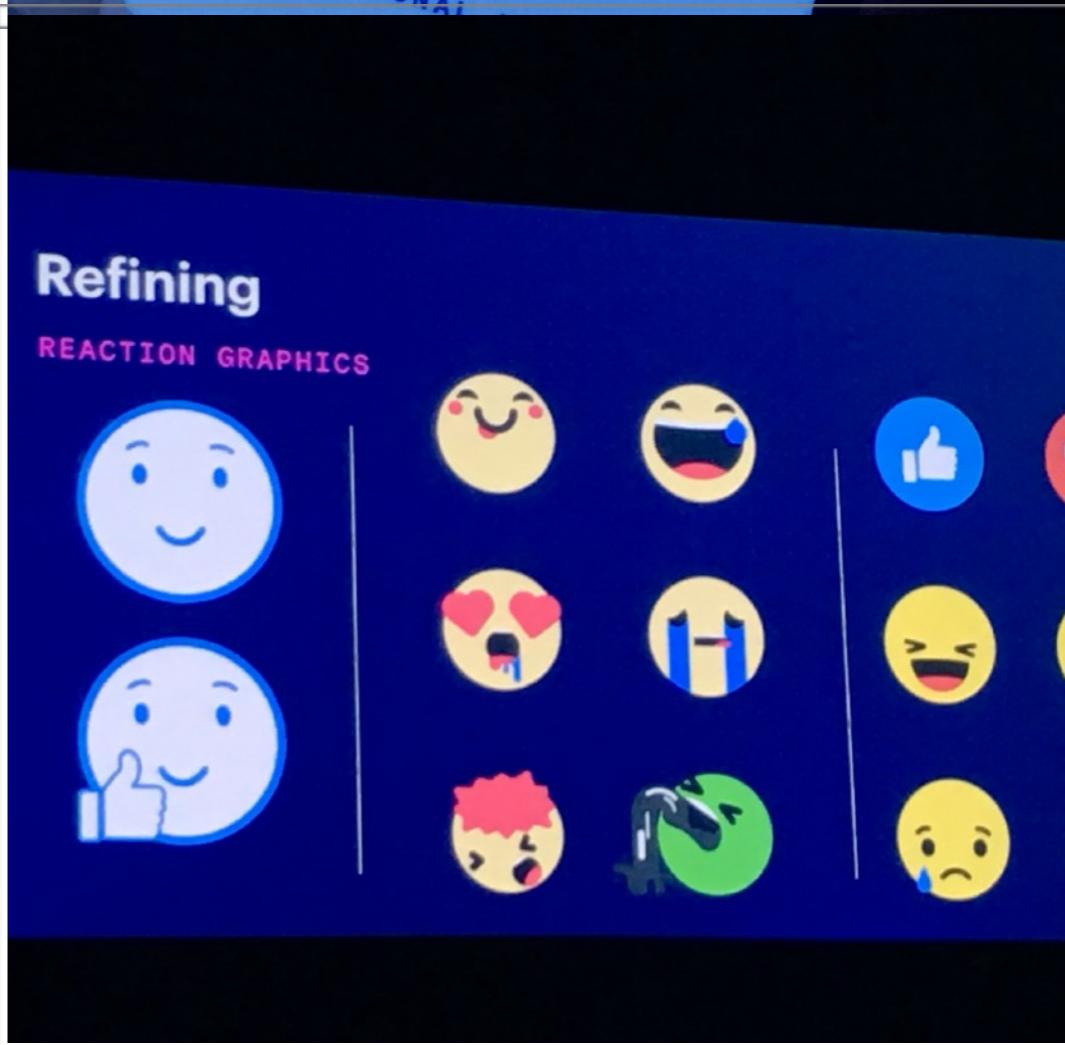
### Research Interest:

- UX/UI
- Full-body interaction
- Human-agent interaction

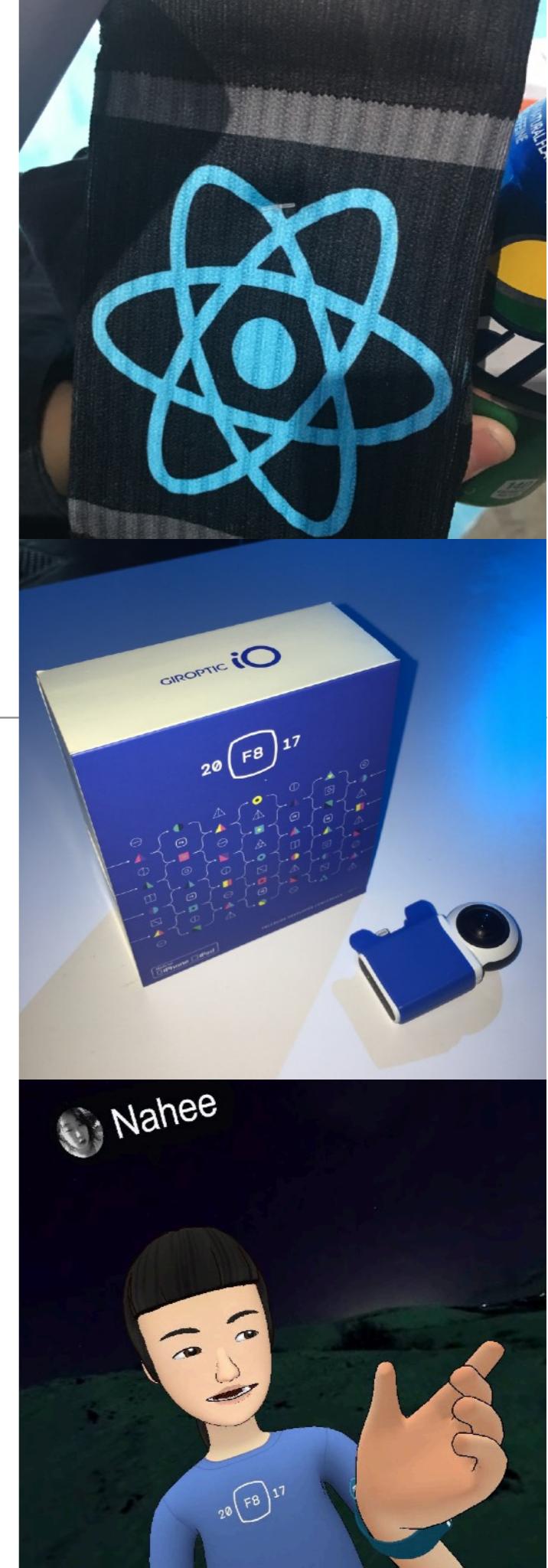
f8(Facebook developer's conference) 방문기

이전 작업

관심있는 연구 주제



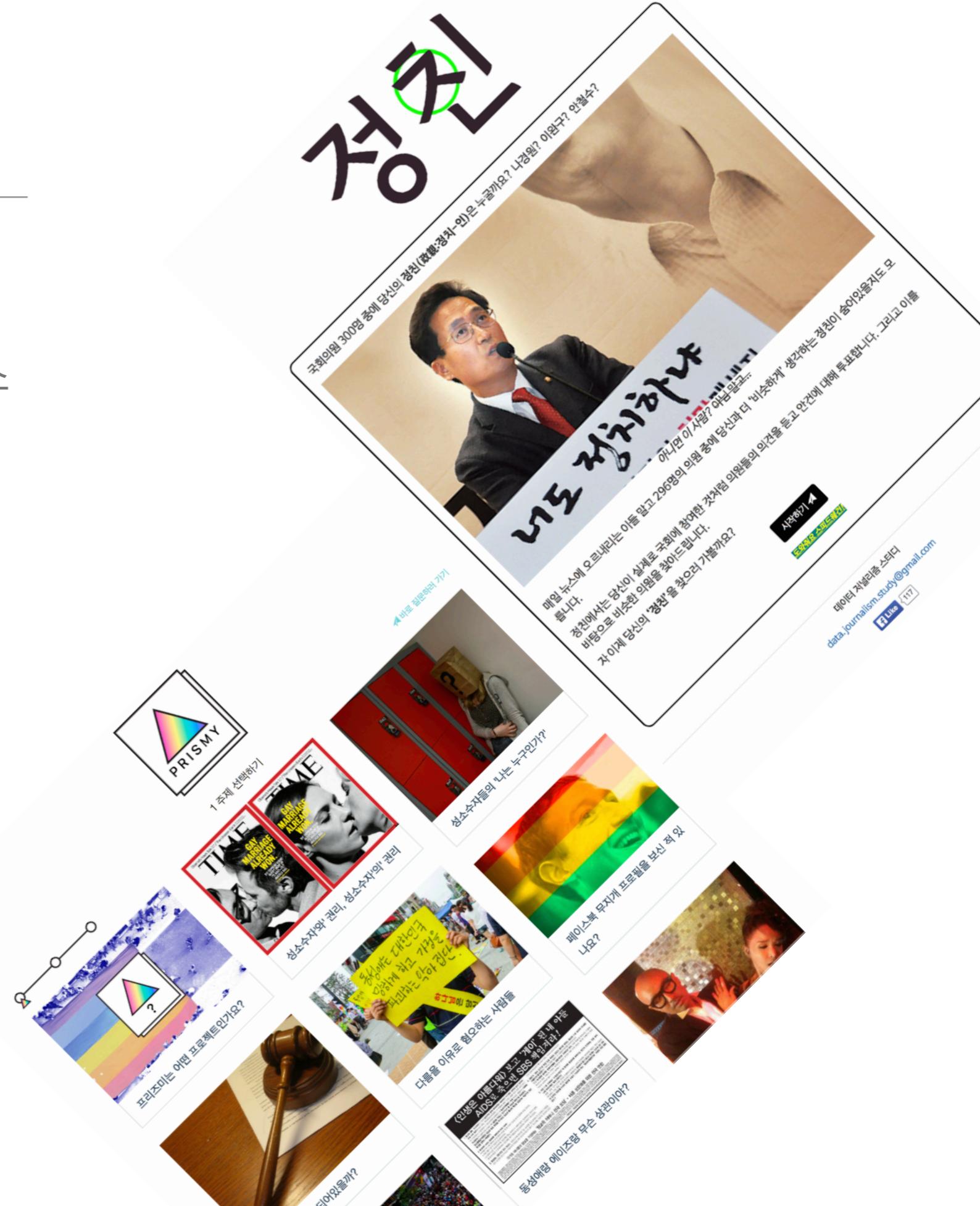
- 꽤 핫한 Chatbot
    - Facebook messenger
  - 브라우저에 AR/VR을 심으려는 페이스북
    - AR Studio, React VR
  - 인터페이스에 대한 신경과학적인 접근을 시도 중
- 
- 스타트업 창업/취업에 관심이 있다면
  - React.js 양말이 탐난다면
  - 매해 4월 후반 ~ 5월 초
  - 3월 쯤 f8 홈페이지를 기웃거리면 complimentary attendance scholarship을 받을 수도 있습니다.



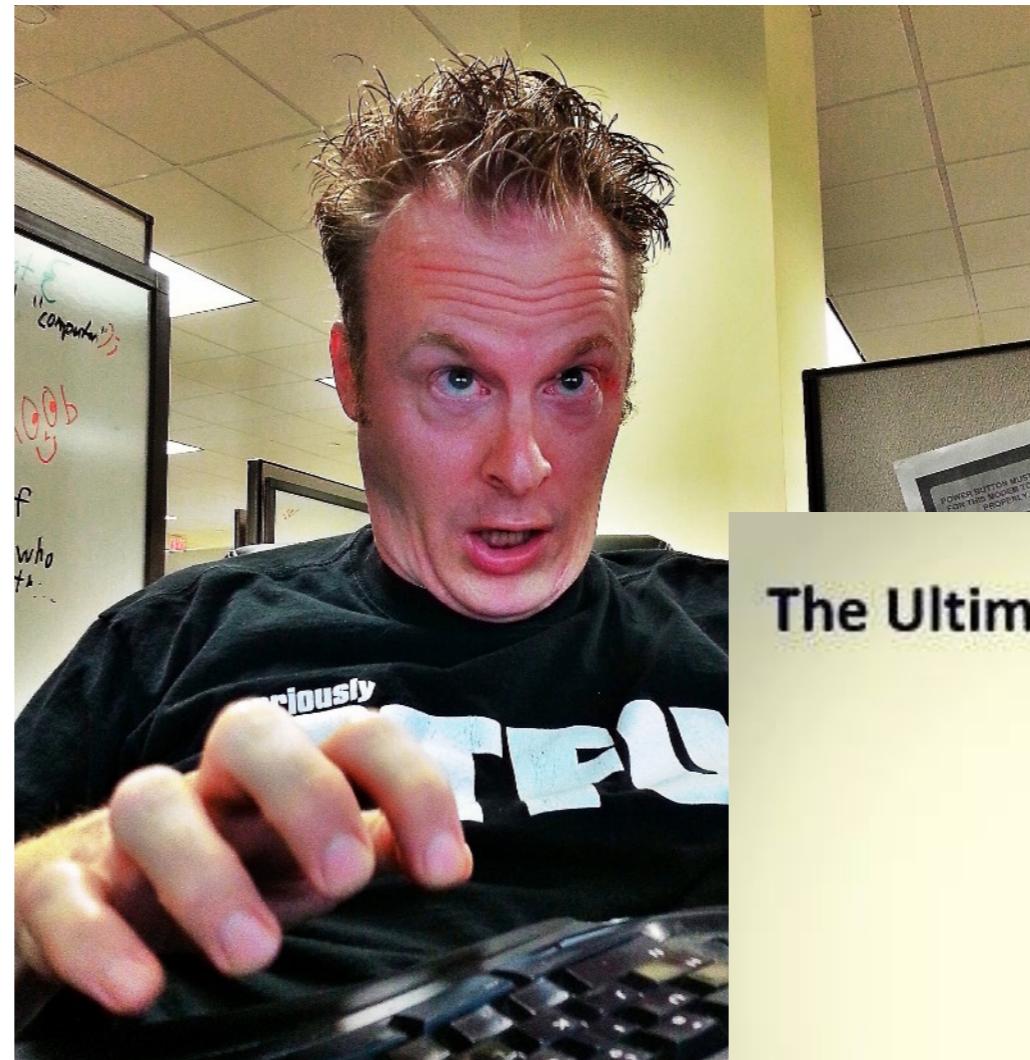
# 학부 때...

- 인터랙티브 저널리즘 프로젝트 : 정친(의안 기반 정치인 추천 서비스),  
프리즈미(대화형 인터페이스의 성소수자 인터뷰 컨텐츠)
- 웹프로그래밍 시작!
- 코딩 재밌다!!!! 근데

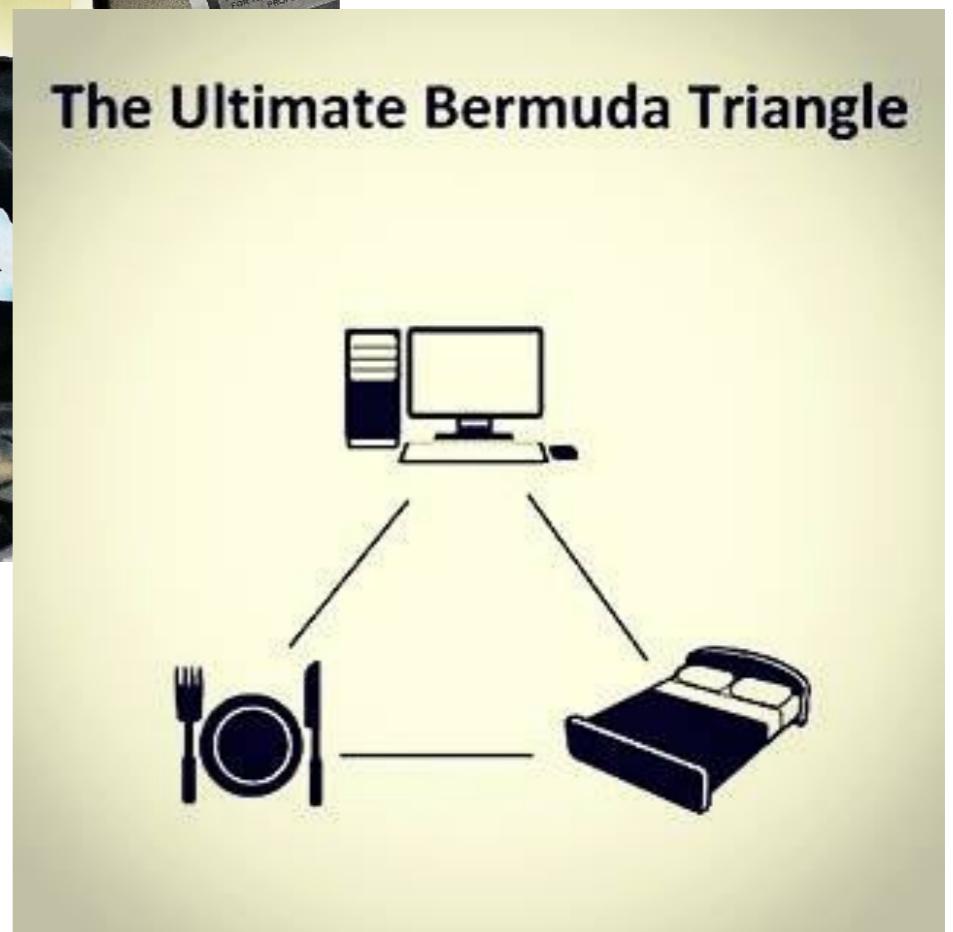
D a t a  
Journalism\*  
S t u d y



## TYPICAL Sitting Position



The Ultimate Bermuda Triangle



하루종일 모니터만 보고 앉아서...

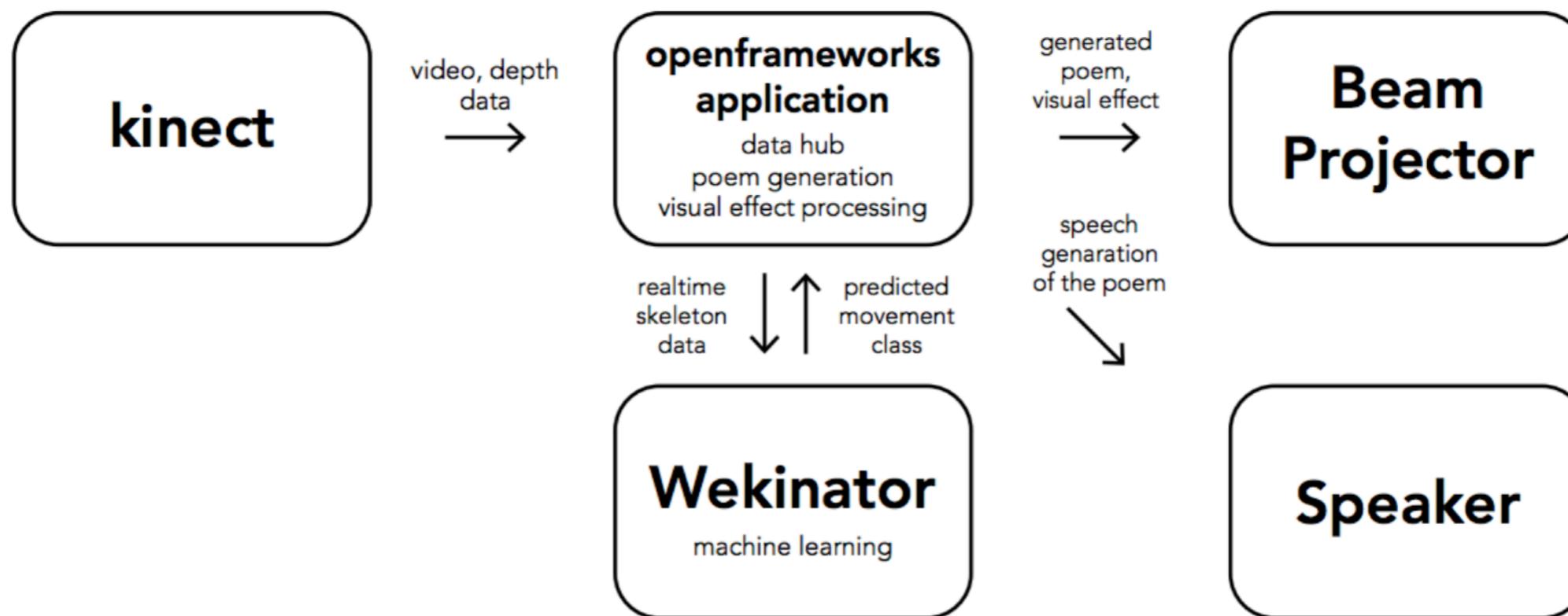
움직임에 대한 프로젝트를 시작해보자



동(작)시

움직임에 대한 프로젝트를 시작해보자

# Structure



codes on <http://github.com/nahbee10/movementPoem>

동(작)시

움직임에 대한 프로젝트를 시작해보자

HCI Korea 2017 Creative Award 출품작

# 동:시 (動:詩)

서울대학교 미디어 아트 그룹 cre8s

동(작)시

움직임에 대한 프로젝트를 시작해보자

# 전시하면서 관찰한 것

- 동작을 어떻게 classification 하는지 궁금해 함
  - 사실 별 다른 규칙이 없었음.  
: 임의로 그런 감정을 느끼는 것 같다고 생각되는 시어와 동작을 매치함
- 재밌어 함. 어떤 단어가 나올지 궁금해서 신체 부위 이것저것 활용해서 움직여 봄.
- 실용적인 쓰임 제안 :  
도박 중독자들을 감별하기 위한 수단...?

동(작)시

움직임에 대한 프로젝트를 시작해보자

?

- 사람들은 다른 사람의 동작에서 감정을  
읽어낼 수 있는가?
- 움직임에서 느껴지는 감정을 객관적으로  
분석해 볼 수 있는 방법은?
- 움직임+감정을 조합해서 사람들에게  
어떤 효용을 줄 수 있을까?

?

- 사람들은 다른 사람의 동작에서 감정을  
읽어낼 수 있는가?

Recent studies show that adults as well as children show great skill in their ability to **decode emotions from full body movements** (Boone and Cunningham, 1998, Dittrich et al., 1996; Lagerlof and Djerf, 2002a,b, Van Meel et al., 1993 . )

Various psychological studies indicate that humans are not only capable of **recognizing** the intended action, but also gender, identity, and **affective state from body movements**. (Karg, Michelle, et al. "Body movements for affective expression: A survey of automatic recognition and generation." IEEE Transactions on Affective Computing 4.4 (2013): 341-359.)

?

- 움직임에서 느껴지는 감정을 객관적으로 분석해 볼 수 있는 방법은? Automatic recognition of emotions from movement

## Toward a Minimal Representation of Affective Gestures

Donald Glowinski, *Member, IEEE*, Nele Dael, Antonio Camurri, Gualtiero \\\  
Marcello Mortillaro, and Klaus Scherer

Recognising Human Emotions from Body Movement and Gesture Dynamics

Ginevra Castellano<sup>1</sup>, Santiago D. Villalba<sup>2</sup>, and Antonio Camurri<sup>1</sup>

2013 Humaine Association Conference on Affective Computing and Intelligent Interaction

Laban descriptors for gesture recognition and emotional analysis

Arthur Truong · Hugo Boujut · Titus Zaharia

## Laban Effort and Shape analysis of affective hand and arm movements

1-1-2001

Synthesis and Acquisition of Laban Movement Analysis Qualitative Parameters for Communicative Gestures

Body Movements for Affective Expression: A Survey of Automatic Recognition and Generation

Michelle Karg, Ali-Akbar Samadani, Rob Gorbet, Kolja Kühnlenz, Jesse Hoey, and Dana Kulic

?

- 움직임+감정을 조합해서 사람들에게 어떤 효용을 줄 수 있을까?

## Advantages of body movement modality

- 1) for **perception from a distance**, because bodily expressions are more easily visible from a distance than subtle changes in the face
- 2) to analyze types of expressions which are **less susceptible to social editing**, because people are often less aware of their bodily than their facial expressions

어떤 활동에 대해 사람들의 engagement를 높여주는 수단

body movement as a means for biasing emotional experience and encouraging bonding in social interaction (Bianchi-Berthouze and Isbister, 2016)

self-report 이외의 상황에서 심리상태를 진단해 볼 수 있는 modality

upper body expressions and gestures, head movements and facial dynamics to classify between depressed and controls (Joshi et al., 2013)

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# **The Use of Laban Movement Analysis in the Study of Personality, Emotional State and Movement Style: An Exploratory Investigation of the Veridicality of “Body Language”**

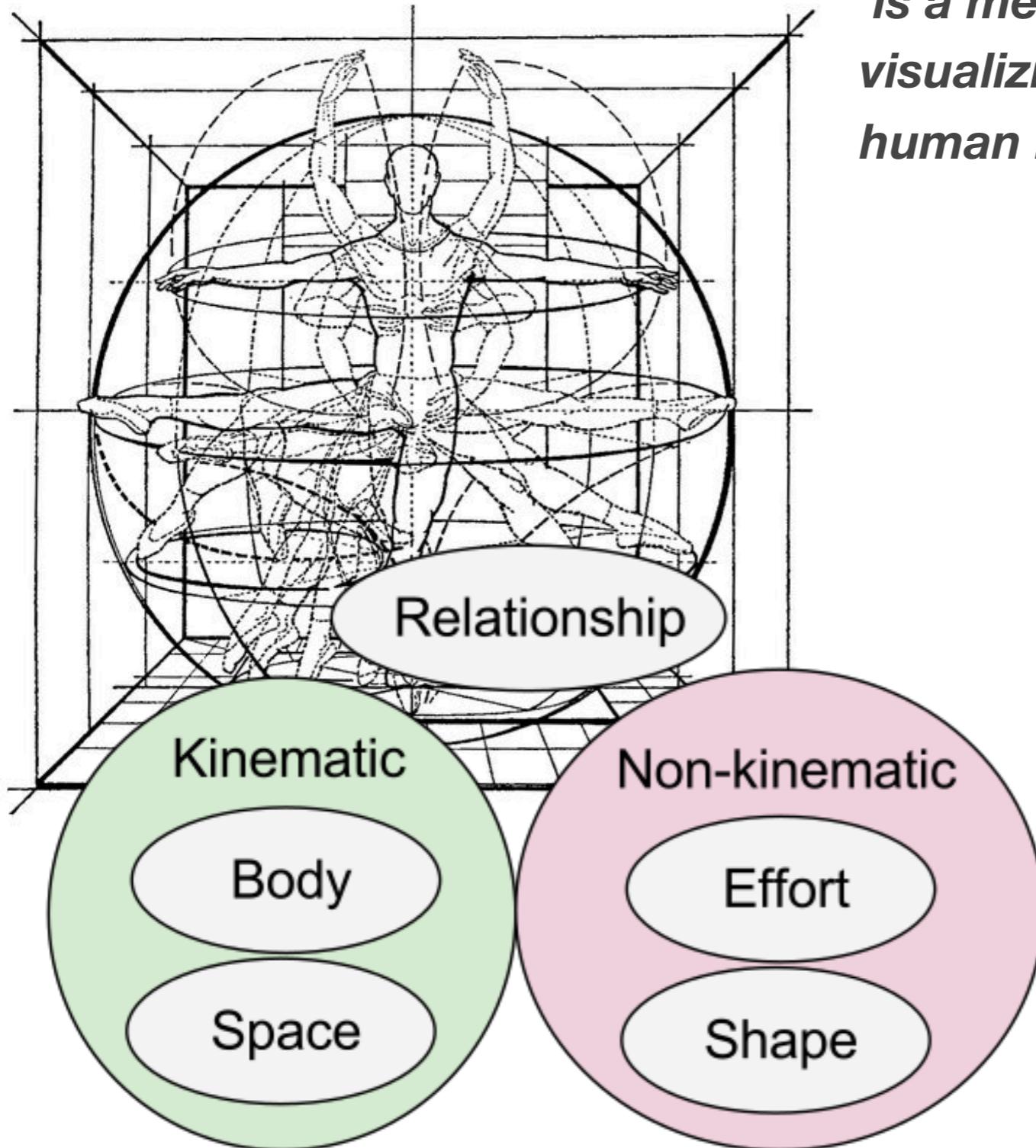
Jacqlyn A. Levy

Marshall P. Duke\*

*Emory University*

- Laban Movement Analysis(LMA) 사용
- 많은 심리학자/안무가들이 움직임-감정 사이의 상관관계를 밝혀보려고 시도하지만 과학적인 틀 안에서 이뤄지지 못한 점에 문제의식을 가지고 시작

# *Laban Movement Analysis?*



*is a method and language for describing, visualizing, interpreting and documenting human movement*

FLOW	Feeling, Progression, "How" Feeling for how movement progresses <ul style="list-style-type: none"><li>• Free: external releasing of energy, going with the flow</li><li>• Bound: contained and inward, resisting the flow</li></ul>
WEIGHT	Sensing, Intention, "What" How you sense and adjust to pulls of gravity <ul style="list-style-type: none"><li>• Light: delicate, sensitive, buoyant, easy intention</li><li>• Strong: bold, forceful, powerful, determined intention</li><li>• Weight Sensing: <u>sensing</u> the weight of your body, as opposed to being pulled by it<ul style="list-style-type: none"><li>• Limp: weak, wilting, flaccid</li><li>• Heavy: collapse, giving up</li></ul></li></ul>
SPACE	Thinking, Attention, "Where" Thinking, or attention to spatial orientation <ul style="list-style-type: none"><li>• Indirect: flexibility of the joints, three-dimensional awareness</li><li>• Direct: linear actions, focused and specific, attending to possibility</li></ul>
TIME	Intuition, Decision, "When" Intuitive decisions concerning <u>when</u> <ul style="list-style-type: none"><li>• Sustained: continuous, lingering, indulging in time, leisurely</li><li>• Sudden: unexpected, isolated, surprising, urgent</li></ul>

# ***Hypothesis***

H1 : Depression is related to a person's characteristic movement style

H2 : Anxiety is related to a person's characteristic movement style

H3 : Other measures of personality, such as achievement, affiliation, dominance, and exhibition, were also related to participants' characteristic movement style

# ***Method***

- 36 students participated in a movement improvisation
- Certified Movement Analysts analyzed video-taped movements - using Movement Improvisation Scoring Sheet (based on 13 movement variables)
- Students completed the questionnaire packet (Beck Depression Inventory 2 / State-Trait Anxiety Scale / Adjective Check List)

# Result

**Table 1**  
*Correlations Among Movement and Selected Personality Variables for Males*

Factor	Flow	Weight	Space	Time	Echan <sup>a</sup>	Teff <sup>b</sup>	Encl <sup>c</sup>	Sprd <sup>d</sup>	Tsha <sup>e</sup>	Horiz <sup>f</sup>	Vert <sup>g</sup>	Sagit <sup>h</sup>	Tspa <sup>i</sup>
Dep <sup>a</sup>	.437	-.082	.467	.366	-.021	-.080	.235	-.056	.243	.110	-.103	-.599*	-.757**
Anx <sup>b</sup>	.264	-.224	.267	.435	-.322	-.316	.519	-.321	.163	.017	-.298	-.563*	-.461
Ach <sup>c</sup>	-.137	-.155	-.387	.073	-.325	-.293	-.609*	-.068	-.154	-.192	.223	.144	-.224
Aff <sup>d</sup>	-.710**	.197	-.765**	-.338	.280	.063	-.347	.132	-.011	-.053	-.040	.506	.537
Dom <sup>e</sup>	-.300	-.039	-.393	-.120	-.208	-.126	-.594*	.050	.004	-.324	.294	.370	-.147
Exh <sup>f</sup>	-.128	-.006	-.256	-.138	.037	-.040	-.679*	.228	-.152	-.225	.285	.292	-.178

<sup>a</sup>Depression. <sup>b</sup>Anxiety. <sup>c</sup>Achievement. <sup>d</sup>Achievement. <sup>e</sup>Affiliation. <sup>f</sup>Dominance. <sup>g</sup>Exhibition. <sup>h</sup>Tendency to change back and forth between efforts. <sup>i</sup>Tendency to emphasize effort. <sup>j</sup>Enclosing. <sup>k</sup>Spreading. <sup>l</sup>Tendency to emphasize shape. <sup>m</sup>Horizontal. <sup>n</sup>Vertical. <sup>o</sup>Sagittal. <sup>p</sup>Tendency to emphasize space. \* p < .05. \*\* p < .01.

Depression scores on the BDI correlated significantly with affinity for indirect space( $r=.47$ ,  $p=.07$ ), use of sagittal movement( $r=-.60$ ,  $p<.01$ ). ... It seems most likely then, that males scoring higher on the BDI were less likely to locomote, and that their movements were mainly stationary

**Weight Effort:** Inspired by [13], the maximum of the sum of the kinetic energy of the moving body parts is used to estimate Weight Effort. The higher the maximum of the kinetic energy, the Stronger the Weight. The sum of the kinetic energy for the hand and arm at time  $t_i$  is:

$$E(t_i) = E^{\text{Hand}}(t_i) + E^{\text{Arm}}(t_i), \text{ where}$$

$$E^{\text{Hand}}(t_i) = \sum_{j=\text{Fingers}} E^j(t_i) \quad (1)$$

$$E^{\text{Arm}}(t_i) = E^{\text{UpperArm}}(t_i) + E^{\text{Forearm}}(t_i).$$

For instance, the kinetic energy of the forearm at time  $t_i$  is computed as:

$$E^{\text{Forearm}}(t_i) = \alpha_{\text{Forearm}} v^{\text{Forearm}}(t_i)^2, \quad (2)$$

where  $\alpha_{\text{Forearm}}$  is the mass coefficient for the forearm and  $v^{\text{Forearm}}(t_i)^2$  is the speed of the forearm at time  $t_i$ . The proposed Weight Effort for a movement of length  $T$  is then determined as:

$$\text{Weight}_{Q1} = \max(E(t_i)) \quad \forall i \in [0, T]. \quad (3)$$

The space quality is described with the help of 9 features.

The first feature is the total length of the head trajectory. Then, we compute several values related to the forward–backward global motion, i.e. the motion in the direction perpendicular to vertical plane (Fig. 4). For this purpose, we retain

- the number of zero crossings of the first derivative of the head’s component in this direction (which measures the number of head’s retreats/advances)

$$\left( n_{\text{ZC}} \left( x_{\text{Head}, t}^{\text{'trans}} \right)_{t=0}^{N-1} \right), \quad (1)$$

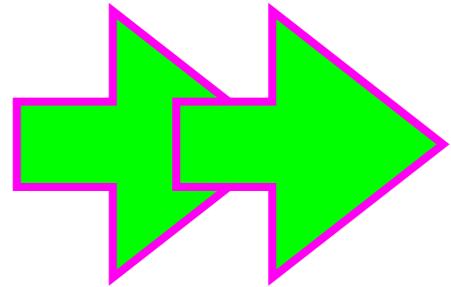
**Flow Effort** for a body part  $k$  is computed as the aggregated jerk over time as proposed in [14] (Equation 8). Jerk is the third order derivative of the position.

$$\text{Flow}_{Q2}^k = \sum_{i=2}^T \frac{|\mathbf{a}^k(t_i) - \mathbf{a}^k(t_{i-1})|}{t_i - t_{i-1}}, \quad (8)$$

- 동작+감정 분석방법에 대한 리서치를 하면서 봤던 LMA 요소들에 대한 computational quantification method
- 자동화된 방법으로 LMA 분석을 실시하고, 특정 심리 상태에 유의한 동작 요소를 추출해서 동작을 통한 심리 상태 진단/파악에 활용해 볼 수 있을까?

## 하지만, Feasibility?

- 1) 5명의 참가자를 대상으로
- 2) 자유움직임을 5분간 실시하도록
- 3) Kinect, LMA 움직임 요소 추출 소프트웨어를 활용해서 움직임 분석
- 4) 자유 움직임 이후 BDI(Beck 우울 척도) 검사 실시
- 5) 3)과 4)의 결과 사이의 상관관계 분석



## 하지만, Feasibility?

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## MoDe

MoDe is a cross-platform C++ library for real-time feature extraction suited for Kinect devices. It has been developed for creative applications for [openFrameworks](#).

It uses nearly optimal features proposed by [Skogstad et al.](#). for motion capture. Although it has been mainly used with Kinect devices, its API allows to process other depth cameras.

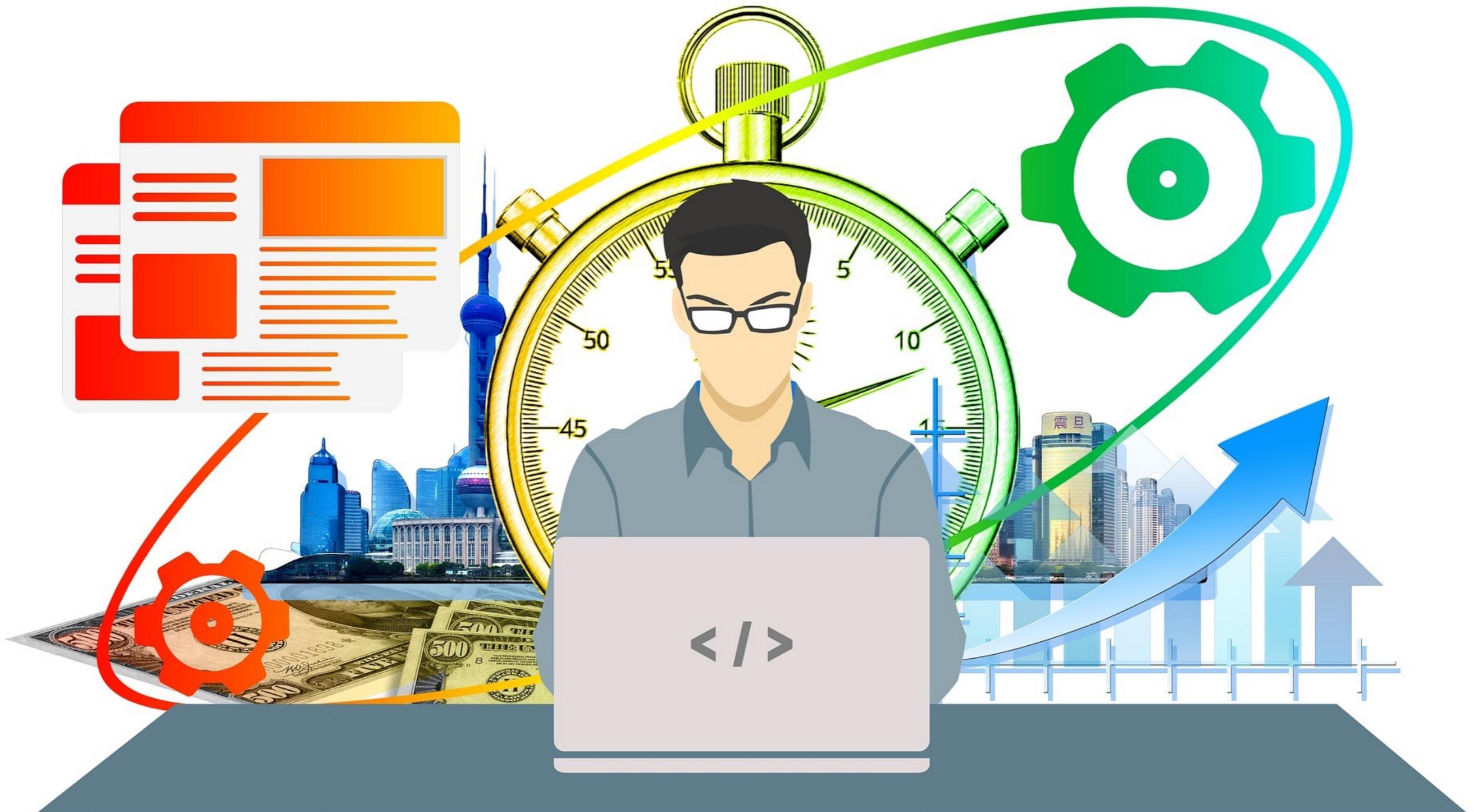
Examples and projects for Kinect V1 and Kinect V2 devices are available on the [GitHub](#).

## Joint descriptors

Joint descriptor are computed from a single joint. The

- Position / filtered position (3D)
- Velocity (3D)
- Acceleration (3D)
- Jerk (3D)
- Acceleration along the trajectory of velocity (1D)

## Motion descriptor



*Thank you!*