

MANAGING COMPLEXITY  
BETWEEN  
REAL TIME **SOUND**  
AND  
MUSIC COMPOSITION  
RELATING  
**BODY** BEHAVIOR  
IN A  
SYNESTHETIC  
**DANCE** PERFORMANCE  
THROUGH  
**WEARABLE** COMPUTING  
TECHNOLOGIES

**MANAGING  
COMPLEXITY  
IN  
PERFORMING  
ARTS**

# Collaborative project

- 3 people:
  - Javier F Gorostiza
  - Sandra Berrio
  - Javier Aparicio

# Motivation:

reviewing relation between dance  
and music

# Background

## 1. Correspondence: Dance to music

- Subordination (synchronicity, incidental music)
- Independence (“two worlds”)

# Background

## 2. Daily life

- DANCE exist when there are sound, music
- MUSIC is created for musicians and musical instruments

# Using technology to

- Create a device to integrate elements of dance and musical practice at the same time
- Synesthetic experience

# Development process

- 3 fields
  - construction of the device
  - Sound design and musical composition
  - Control system



# Construccion Device

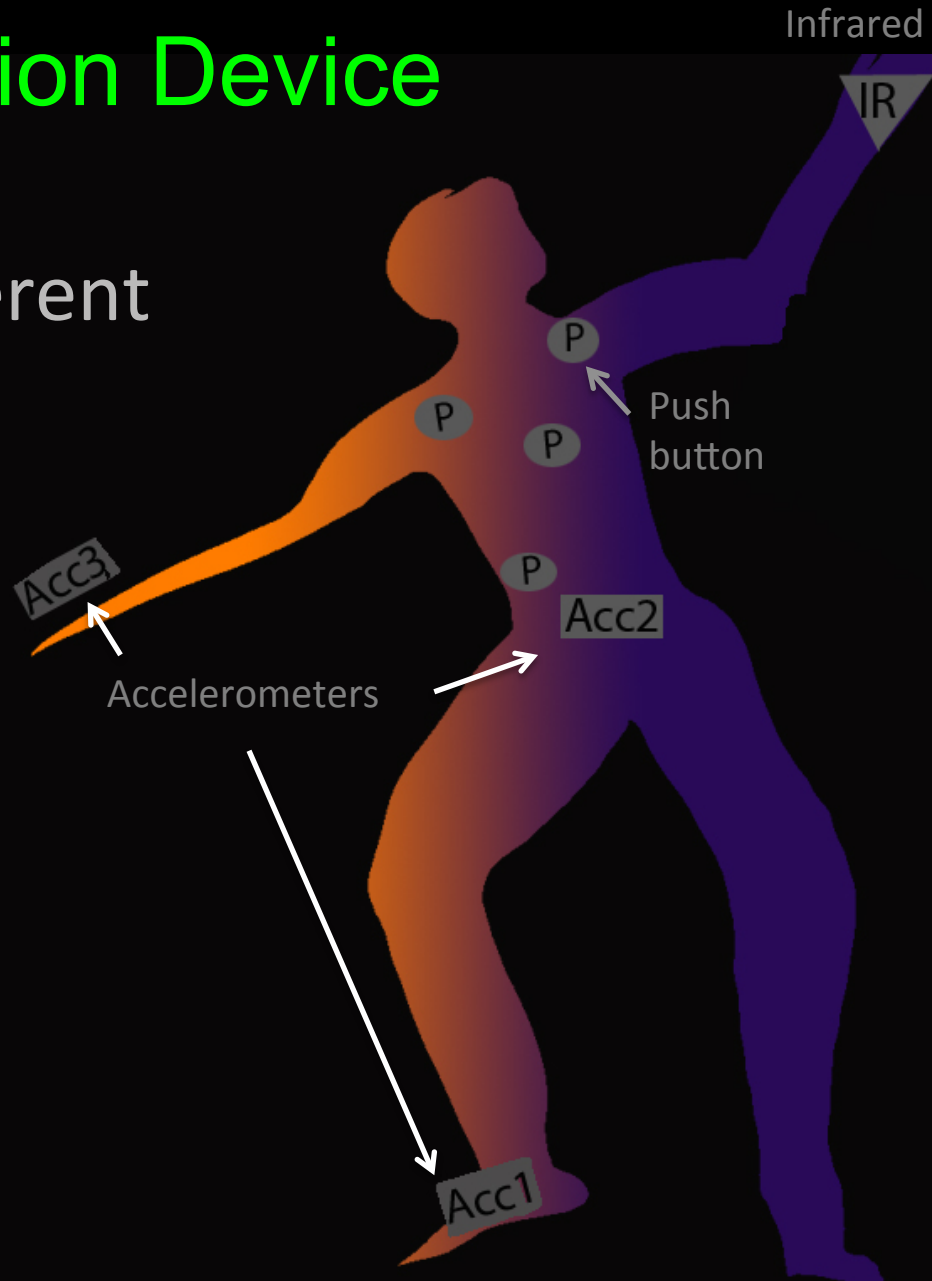


- Garment, different materials
- “Arduino” wireless
- Battery
- Cables
- Sensors to place at different parts of the body
  - Accelerometers (3)
  - Push buttons (2)
  - Infra Red (1)

# Construccion Device

Sensors to place at different parts of the body

- Accelerometers (3)
- Push buttons (2)
- Infra Red (1)



## Sound design and musical composition

- Proofing in links between dance and music

Are there connections between?

**Musical expression**

- Atmospheres,
- Structures
- chords,
- sounds
- melodies...



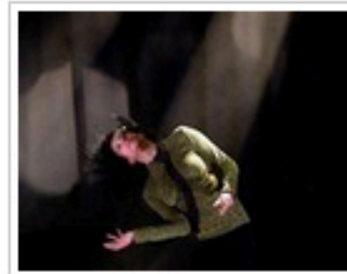
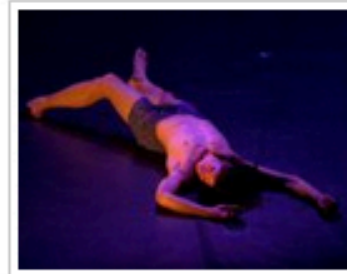
**body behavior**

- Movements,
- actions,
- gestures,
- poses,
- Contacts...





# Analyze last musical compositions

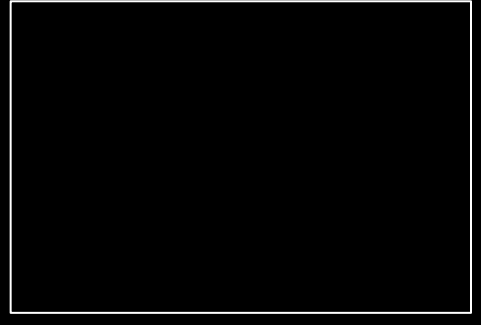
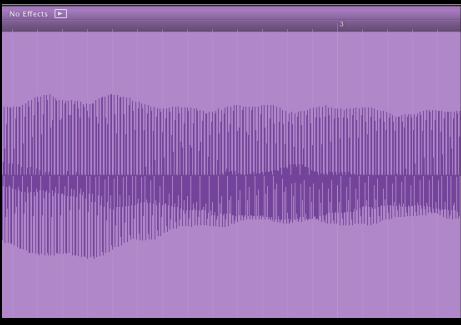




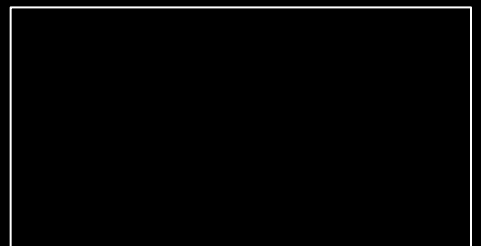
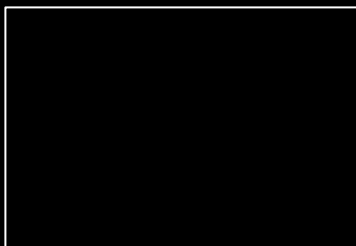
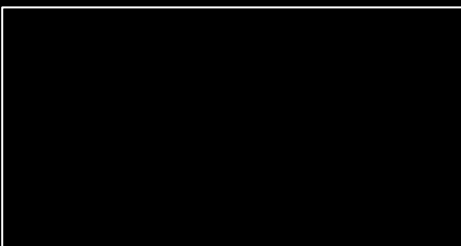
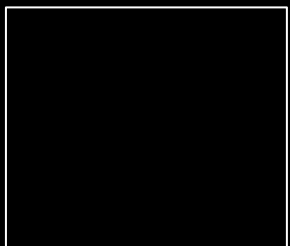
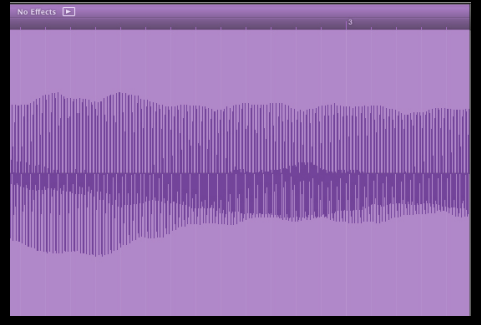
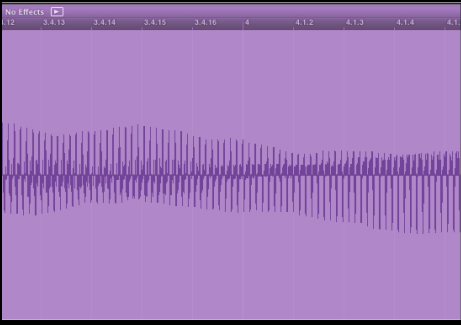




*a tempo*  
C<sup>7</sup>/E  
mf



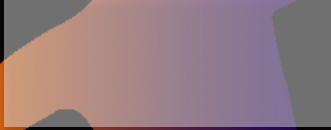
Gm<sup>6</sup>







High level hand touch,  
sound noisy synth



Medium level 3, heart, touch, modify other sounds



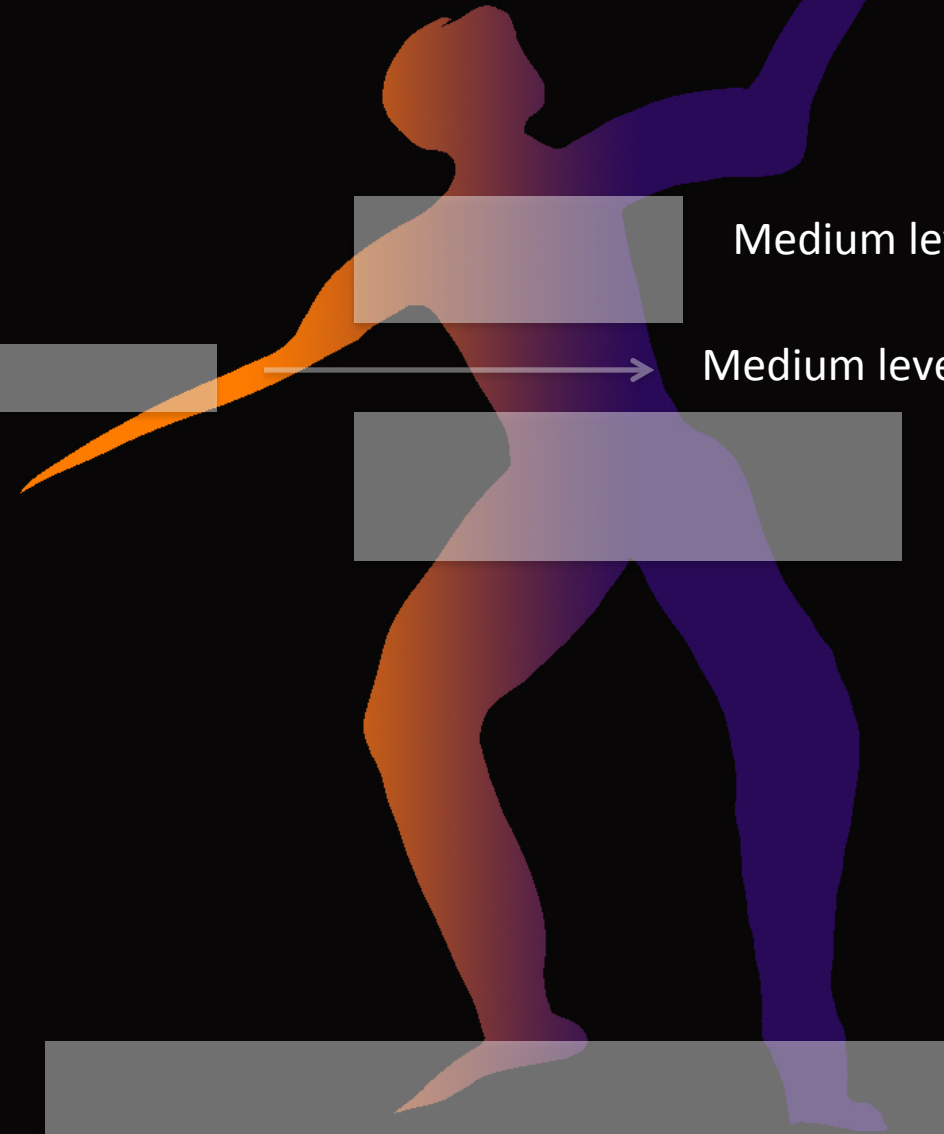
Medium level 2, hand, touch, "mallets" sound



Medium level 1, belly, breath, winds sounds



Low level, (Ground) Feet, walk  
constant atmosphere, "pad" sound





# Control System

garment

sensors

music

programming

Body – Space – Time

# Control System

garment

sensors

music

programming

Body – Space – Time

SYNESTHESIC ENVIRONMENT

# Control System

garment

sensors

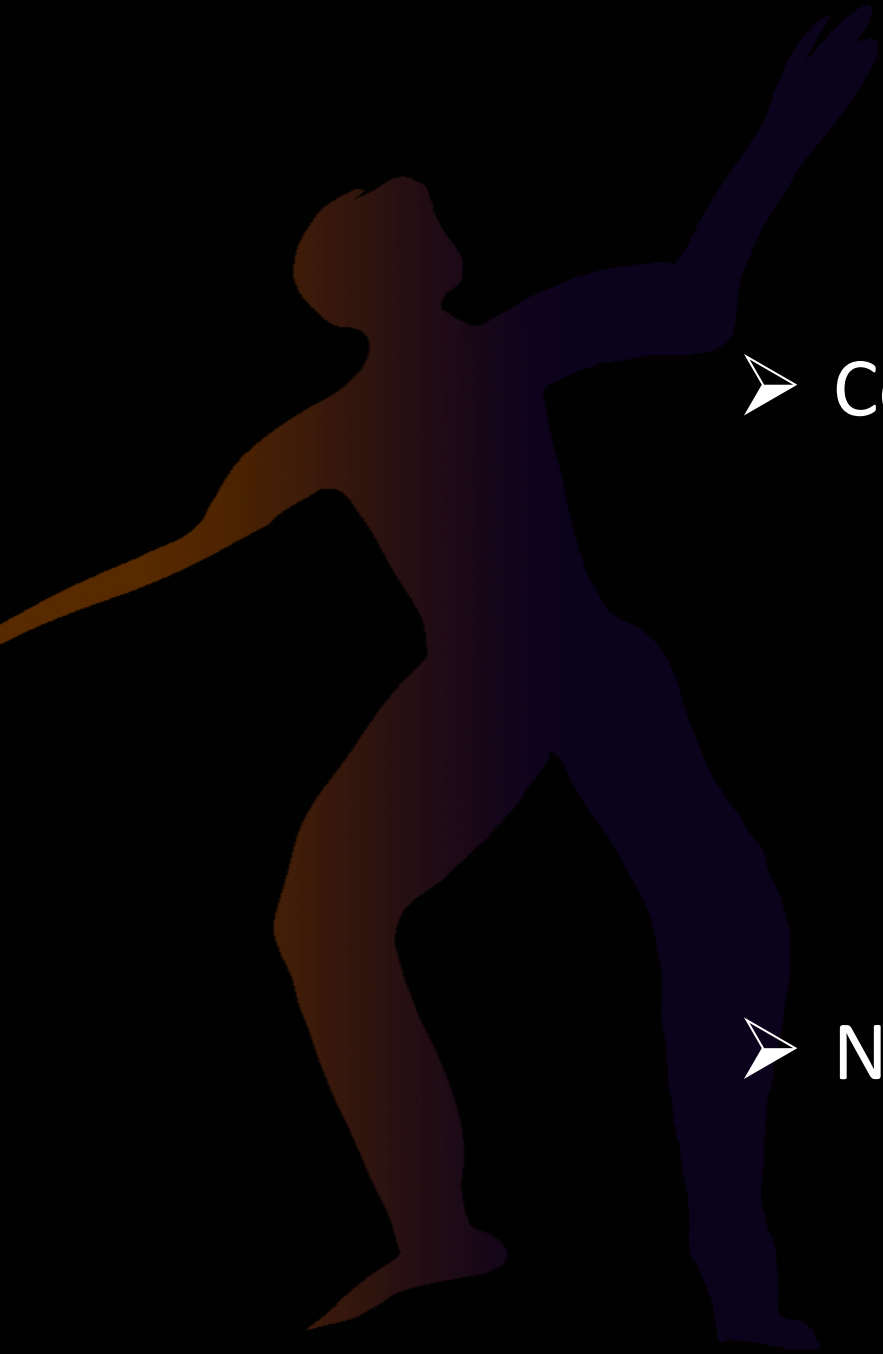
music

programming

Body – Space – Time

SYNESTHESIC ENVIRONMENT

**COMPLEXITY**



➤ Conditional, logic system

➤ Non linear - sequential system

- Conditional, logic system (first level of complexity)

SISTEMA DE CONTROL						
PISTA	SENSOR	CLIP AUDIO	RANGO DE VALORES		ACCIONES PREVISTAS CUERPO	RESPUESTAS SONORAS
			filtro	variables		
1 Audio	Acelerómetro 1	Acc2I	AutoFilter	F=(26 hz ~ 2.25Khz) Q=(1,99~3)	girar la mano 180º	sonido constante que experimenta un cambio de frecuencia en función del giro de la mano
			Resonator	sin cambios		
	Pulsador 1		AutoFilter	Amount=30.0 ~ 0	Pulsar o que alguien pulse el botón	Cambio repentino de frecuencia
2 Audio	Acelerómetro 2	Acc3I	sample	(0dB ~19dB)	Tocar, percutir el aire, con alguna parte del cuerpo, acceder a otro plano o espacio invisible	Comienza a sonar cuando se realiza la acción y deja de sonar cuando no se realiza ninguna acción
3 Audio	Infrarrojos	IRI	Auto Pan	Amount (0%~100%)	Acercar o que alguien acerque la mano al sensor	Se produce progresivamente una interferencia sobre el sonido

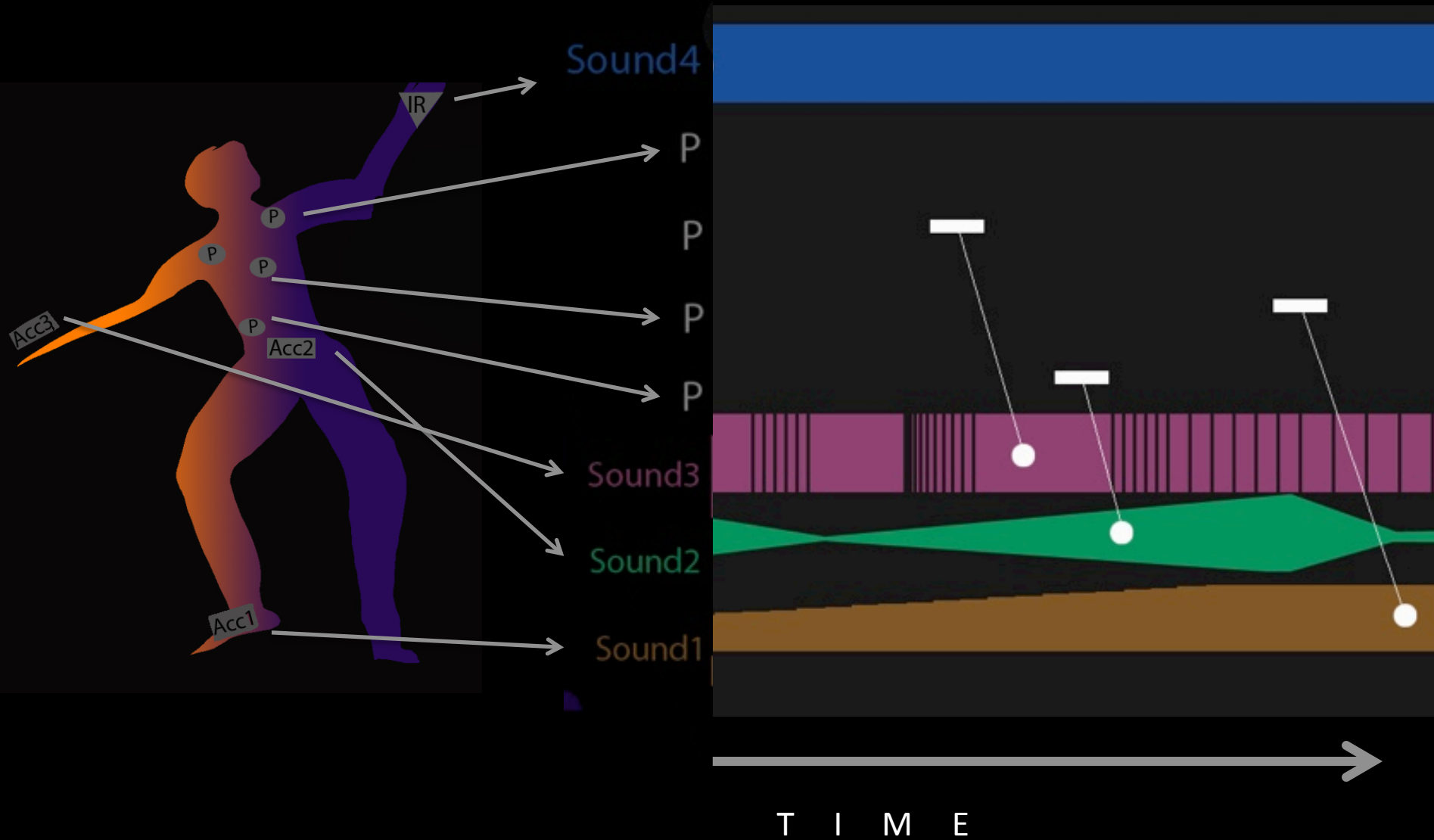
# Conditional logic system

Body action → Sensor → Control → Sound





# Conditional logic system (Score)



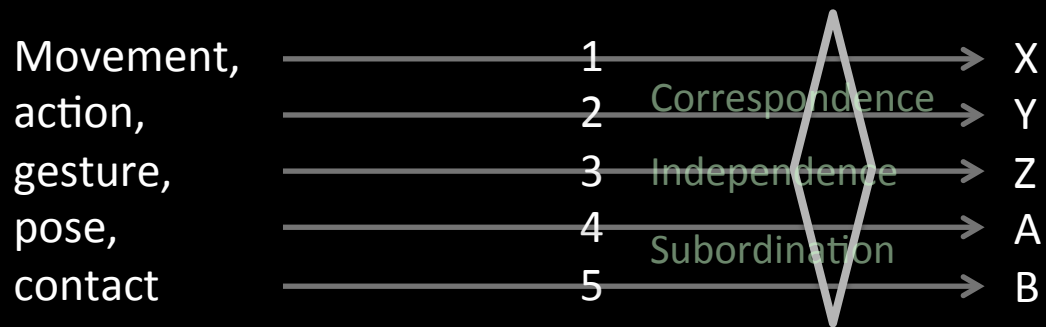
Conditional logic system =  
= (traditional instrument)

Body action → Sensor → Sound

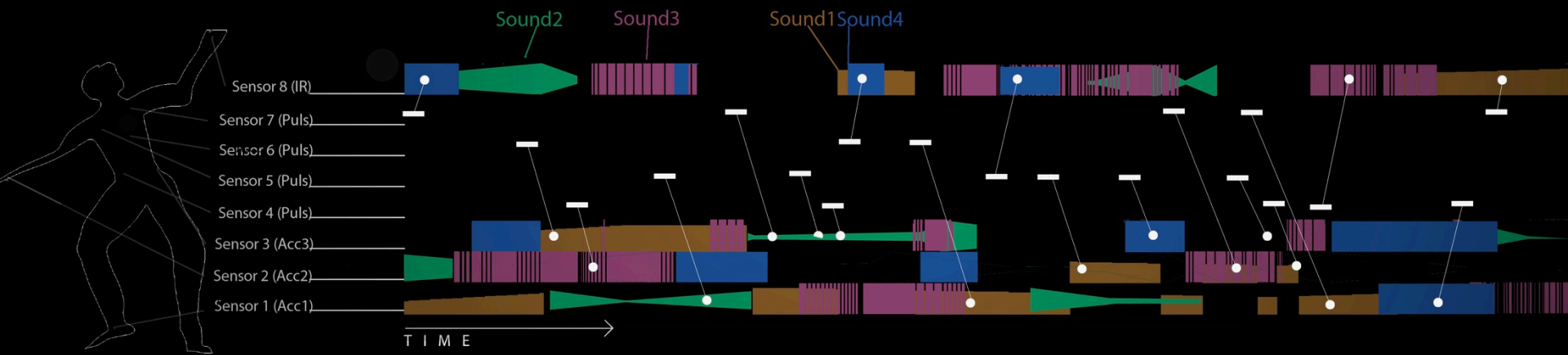


# Non linear-sequential system

Body action → Sensor → Control → Sound



# Non linear-sequential system score



# Non linear-sequential system score

