

**An evaluation of the interstitial beat across  
varied modalities for characterization of a  
meaningful haptic enviro-sensing metronome**

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*For*



## **Abstract**

The interstice is an intervening space. When applied to a rhythmic context, the interstitial beat can be represented by two distinct states; whether energy exists within this small moment in time or if it does not.

Does filling the space provide an added awareness or preparation for the upcoming onset? Can the gestural motion of the conductor be justified scientifically?

The underlying question when applied to either the daily practice of a trained musician or the innate entrainment, external rhythmic synchronization, of the average human being, is whether the space between the beat matters.

The objective of this work is to display whether a continuous wave, one which leads up to the maximum amplitude of the beat and trails off into a smooth decay, exhibits differentiation from its instantaneous counterpart in communicating regular or irregular pulses. To quantify this differentiation, an expansive set of analog and discrete tap synchronization test cases spanning the modalities of sight, sound, and touch will be conducted across groups of musicians, amateurs, and non-musicians.

Auxiliary to this work, a haptic wearable design is prototyped and evaluated for optimization of physical spacing with an overarching goal of communicating dynamic changes more effectively.

The work hypothesizes that although rhythmic accuracy is proven to be most effective through discrete audible means [source] there will be improvement shown when the interstitial beat is occupied with a continuous wave across the modality of touch at slower tempo, when space between successive beats is significantly spread apart, as well as throughout the occurrence of unpredictable or dynamically changing events.

Furthermore, the wearable haptic will provide an inconspicuous and silent gestural system key towards future entrainment studies in expressive performance.



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Tom,

Riccardo, support

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# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Motivation . . . . .	1
1.2	Organization . . . . .	1
<b>2</b>	<b>Previous Work</b>	<b>3</b>
2.1	Motivation . . . . .	3
2.2	Organization . . . . .	3
<b>3</b>	<b>Haptic Design</b>	<b>5</b>
3.1	Motivation . . . . .	5
3.2	Organization . . . . .	5
<b>4</b>	<b>Method</b>	<b>7</b>
4.1	Motivation . . . . .	7
4.2	Organization . . . . .	7
<b>5</b>	<b>Data Analysis</b>	<b>9</b>
5.1	Motivation . . . . .	9
5.2	Organization . . . . .	9
<b>6</b>	<b>Conclusion</b>	<b>11</b>
6.1	Motivation . . . . .	11
6.2	Organization . . . . .	11



# List of Figures



# List of Tables



# Chapter 1

## Introduction

### 1.1 Motivation

I was motivated to write a Phd thesis because I did not want to work directly after finishing my study

### 1.2 Organization

This thesis is organized as follows, ...





# **Chapter 2**

## **Previous Work**

### **2.1 Motivation**

I was motivated to write a Phd thesis because I did not want to work directly after finishing my study

### **2.2 Organization**

This thesis is organized as follows, ...



# Chapter 3

## Haptic Design

### 3.1 Motivation

I was motivated to write a Phd thesis because I did not want to work directly after finishing my study

### 3.2 Organization

This thesis is organized as follows, ...



# **Chapter 4**

## **Method**

### **4.1 Motivation**

I was motivated to write a Phd thesis because I did not want to work directly after finishing my study

### **4.2 Organization**

This thesis is organized as follows, ...



# **Chapter 5**

## **Data Analysis**

### **5.1 Motivation**

I was motivated to write a Phd thesis because I did not want to work directly after finishing my study

### **5.2 Organization**

This thesis is organized as follows, ...





# **Chapter 6**

## **Conclusion**

### **6.1 Motivation**

I was motivated to write a Phd thesis because I did not want to work directly after finishing my study

### **6.2 Organization**

This thesis is organized as follows, ...

