

UNIVERSITY OF CALIFORNIA SAN DIEGO

This is a tribute

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy

in

Department
(Sub-track)

by

A. Student

Committee in charge:

Professor Chair, Chair

Professor A

Professor B

Professor C

Professor D

Professor E

2019

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The dissertation of A. Student is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

Chair

University of California San Diego

2019

EPIGRAPH

This is the quote I want to print.

Author, "Source"

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First and foremost, I would like to thank my advisor for their guidance, support, and inspiration. I would also like to thank my family. The chapters of this dissertation consist of published and submitted journal articles. The dissertation author was either the primary or secondary investigator and author of each of these papers.

- Chapter 2, in full, is a reprint of the material as it appears in [1] The dissertation author was the primary investigator and author of this paper.
- Chapter 3, in part, is a reprint of materials as they appear in [2] papers. First is Alasfour et al., JNE 2019. Second is Chen et al., JTEHM 2018. The dissertation author was the secondary investigator and author of both of these papers.
- Chapter 4, in full, is a reprint of the material as it appears in [3] The dissertation author was the primary investigator and author of this paper.
- Chapter 5, in part, is currently being prepared for submission for publication of the material. The dissertation author was the primary investigator and author of this material.

VITA

2013	Bachelor of Science in Engineering Physics, Stanford University, Stanford
2013 – 2019	Graduate Student Researcher, University of California, San Diego
2015	Master of Science in Electrical Engineering (Medical Devices & Systems), University of California, San Diego
2019	Doctor of Philosophy in Electrical Engineering (Medical Devices & Systems), University of California, San Diego

PUBLICATIONS

This is a paper I published

This is another one

ABSTRACT OF THE DISSERTATION

This is a tribute

by

A. Student

Doctor of Philosophy in Electrical Engineering
(Medical Devices& Systems)

University of California San Diego, 2019

Professor Chair, Chair

This is the text that represents the abstract of my thesis. It will describe everything from the conceptual model motivating why we study motor behaviors and the brain as a control unit. It will also describe how task-based studies do this and compare it against my approach. It will discuss, broadly, how my approaches address specific needs in this problem. It will specify the results / demonstrations / methods being reported in the thesis.

Chapter 1

Introduction

This topic is important and here is why...

1.1 Background

Background information. Example citations include this paper [1] and these papers speech [2–4].

1.2 Challenges

1.3 Proposed method

References

- [1] Kai J Miller, Christopher J Honey, Dora Hermes, Rajesh PN Rao, Jeffrey G Ojemann, et al. Broadband changes in the cortical surface potential track activation of functionally diverse neuronal populations. *Neuroimage*, 85:711–720, 2014.
- [2] Scott B Wilson, Christine A Turner, Ronald G Emerson, and Mark L Scheuer. Spike detection ii: automatic, perception-based detection and clustering. *Clinical neurophysiology*, 110(3):404–411, 1999.
- [3] Mark L Scheuer and Scott B Wilson. Data analysis for continuous eeg monitoring in the icu: seeing the forest and the trees. *Journal of clinical neurophysiology*, 21(5):353–378, 2004.
- [4] F Fürbass, P Ossenblok, M Hartmann, H Perko, AM Skupch, G Lindinger, L Elezi, E Patariaia, AJ Colon, C Baumgartner, et al. Prospective multi-center study of an automatic online seizure detection system for epilepsy monitoring units. *Clinical Neurophysiology*, 126(6):1124–1131, 2015.

Chapter 2

Title of chapter 2

Abstract

This chapter considers SOMETHING. We show that...

2.1 Introduction

In this chapter, we focus on SOMETHING

2.1.1 Network Model

In addition, [1] demonstrates that from such data, behavior-specific contexts can be discriminated from freely recorded neural activity.

Here is a figure:

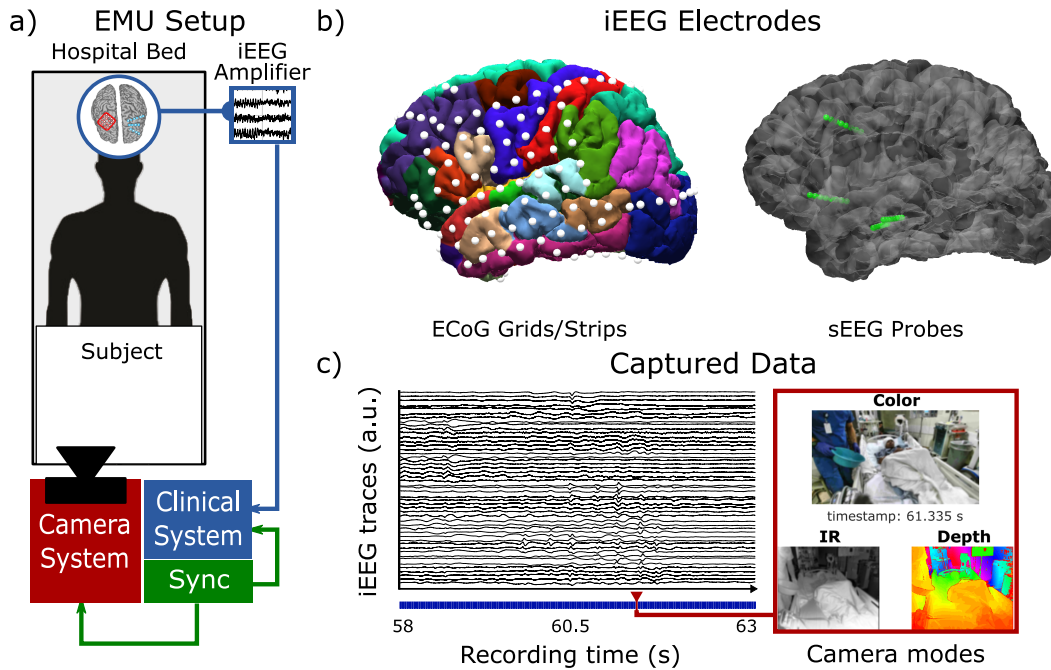


Figure 2.1: **Diagram of experimental setup for recording behavioral video simultaneously with intracortical activity (ECoG, sEEG) from subjects in the epilepsy monitoring unit.** **a)** The experimental setup places the video recording system at the foot of the hospital bed facing the subject to capture the subject and their immediate surroundings. **b)** A typical subject has over 100 electrodes placed according to clinical need, as shown in the reconstructed coverage of ECoG and sEEG for Subject 1. A combination of subdural grid and strip electrodes (ECoG) covers many regions of the cortical surface, depicted by the Desikan-Killiany parcellation [2], while stereotactic depth probes (sEEG) sample deep and superficial brain structures. **c)** During the study, videos (blue) of the subject moving in an uninstructed and unstructured manner are captured using a Kinect for Windows (v2) sensor. An example of the sensor modalities is framed in red. A subset of 50 neural traces recorded in parallel shown underneath, aligned $\leq 5ms$ of each video frame. Data collected in this manner captures an external and intracortical representation of each subject's movement. A preliminary demonstration using neural features in relation to movement segments marked using only the color video stream is detailed in this work.

2.1.2 Related Work

Text

2.1.3 Our Contributions

Text

2.2 Open Questions

References

- [1] Abdulwahab Alasfour, Paolo Gutierrez Gabriel, Xi Jiang, Isaac Shamie, Lucia Melloni, Thomas Theisen, Patricia Dugan, Daniel Friedman, Werner Doyle, Orrin Devinsky, et al. Coarse behavioral context decoding. *Journal of Neural Engineering*, 2018.
- [2] Rahul S Desikan, Florent Ségonne, Bruce Fischl, Brian T Quinn, Bradford C Dickerson, Deborah Blacker, Randy L Buckner, Anders M Dale, R Paul Maguire, Bradley T Hyman, et al. An automated labeling system for subdividing the human cerebral cortex on mri scans into gyral based regions of interest. *Neuroimage*, 31(3):968–980, 2006.

Chapter 3

Title of chapter 3

Abstract

This chapter considers SOMETHING. We show that...

Table 3.1: This is the long table caption.

Subject No.	Patient ID	Recording dur. (hrs.)	Implant type	Coverage	Handedness	Age (y.o.)/Sex
1	NY531	2.25	ECoG/sEEG	LHem.	R	48/M
2	RCH1	9	sEEG	L FL/TL	R	18/F
3	RCH3	24	sEEG	L/R FL/TL	R	17/M

3.1 Introduction

In this chapter, we focus on SOMETHING

3.1.1 Network Model

Here's a new citation that no previous chapter includes [1]

This is a table: Note that you are responsible for adjusting table format to fit thesis format.

3.1.2 Related Work

Text

3.1.3 Our Contributions

Text

3.2 Open Questions

References

- [1] Hirotugu Akaike. Akaike's information criterion. In *International encyclopedia of statistical science*, pages 25–25. Springer, 2011.