BRANDON BIGGS

# EDUCATION:

Inclusive Design Masters from OCAD University, Toronto ON - 2019 (Designing Accessible Maps)

Music BA and Marketing Minor from CSU East Bay, Hayward CA - 2016 (3.830 GPA with honors institute)

General music AA Honors degree from Foothill College, Los Altos CA - 2012

# PUBLICATIONS:

Paper: Biggs, B. & Coughlan, J. (2021). Getting in Touch With Tactile Maps Automated Production. Proceedings of the Wireless Rehabilitation Engineering Research Center Forum 2021.

Paper: Coughlan, J. M., Biggs, B., Rivière, M. A., & Shen, H. (2020). An Audio-Based 3D Spatial Guidance AR System for Blind Users. In International Conference on Computers Helping People with Special Needs (pp. 475-484). Springer, Cham.

Paper: Coughlan, J., Shen, H., & Biggs, B. (2020). Towards accessible audio labeling of 3D objects. *Journal on Technology and Persons with Disabilities*, *8*.

Paper: Biggs, B., Coughlan, J., Coppin, P. (2019). [Design And Evaluation Of An Audio Game-Inspired Auditory Map Interface.](https://icad2019.icad.org/wp-content/uploads/2019/06/ICAD_2019_paper_51.pdf) Published in the International Conference on Auditory Display, 2019.

Abstract: Biggs, B., Yusim, L., Coppin, P. (2018). [The Audio Game Laboratory](https://uc1056b52e94dc1447c49a791219.dl.dropboxusercontent.com/cd/0/inline2/AZ-DPqXJXNpizgBJMp2KmgQxqc9aNWTCcoW8HTibPoxH44TwKhWLgK3MyxlvhHuAbP2A9xittTVaixZOVa-AXgecTu7c1O4tsFblEfuBYaPBg2cFJ7mfkvxWoW_K_ECjmylVDhWVUNut88hjXI8BLBZtIdfrHuO0Ldr7zMTGsNKxAqKhI0BpPDfESUD8cuNvpCJDx_WIMHB6YWaWGzmim9JkYPS2ZZTpt-3ewacNR0vqbEctcPLjtcTUhA6t_nzksvgklspykxEVgZZOVBQMegkKwBuVaZp-5DKuFSOaaywfQ2MWXV33YsN2psMadI1rjB6RlQbJ-nNcXM67opuwBPAaxfIJo9lfJ1W6-OJXVLxSM81-gUA3nK-DhSbOC-LfzFyz0yl2bV-J--ljBHRI_ixLfe4jsVBsVIw67-WXJFwIHcPbmh7GNnBInUVSfdhsQuQ/file). Published in the International Conference of Cognitive Semiotics (IACS) 2018.

Abstract: Biggs, B., Yusim, L., Coppin, P. (2018). [The Audio Game Laboratory: Building maps from games](http://icad2018.icad.org/wp-content/uploads/2018/06/ICAD2018_paper_51.pdf). Published in the International Conference on Auditory Display, 2018.

# Professional Presentations:

State of the Science, Rehabilitation Engineering Research Center on Low Vision and Blindness 2020, (3 sessions), Challenges During COVID, Participation in High Tech (lead panelist), and Problems faced by Blind and Visually Impaired Researchers, remote

W3C/OGC Maps for the Web 2020, (3 presentations), introduction to Nonvisual Maps, Nonvisual Map Q&A panel, and building nonvisual maps using Audiom, remote

Jewish High Tech Community Center 2020, The Future of Accessibility, remote

CSUN 2020, (three presentations), CamIO, Audiom, and creation of an XR Navigation Experience, Anaheim CA

FWD 50 2019, Meet the Innovative Design for Accessibility Winners, Ottawa ON

California Association of Orientation and Mobility Specialists 2019, Future of Nonvisual Mapping, Monterey CA

International Conference on Auditory Display 2019, Poster session, Design and Evaluation of an Audio Game Inspired Interface, Newcastle Northumberland

International Conference of Cognitive Semiotics 2018, The Audio Game Laboratory, Toronto ON

International Conference on Auditory Display 2018, The Audio Game Laboratory: Building maps from games, Houghton MI

International Conference on Auditory Display Student Think Tank 2018, presenter, Houghton MI

# Publicity

Blind Bargains 2020, [Expanding VR And AR Into XR With The Smith-Kettlewell | Eye Research Institute](https://www.blindbargains.com/bargains.php?m=21603), A T Guys

Interview in WorldBound Magazine 2019, [Mapping the Way](https://international.unicatt.it/ucscinternational-Magazine_Worldbound_ISSUE_3_WEB.pdf), Università Cattolica Milano

# AWARDS:

Recipient, Dr. Arthur I. Karshmer Award for Assistive Technology Research for the 2020 CSUN Assistive Technology conference

First place, Technological/communication barriers, Innovative Designs for Accessibility 2019

Student Think Tank Recipient 2018, International Conference on Auditory Display

[Create Data Analytics and Visualization trainee](https://www.createdav.com/program/) from fall 2017- Spring 2019

Recipient, 2016 Kathryn Harvey Award National Association of Teachers of Singing, Annually awarded to the university aged winner of the Northern California NATS competition

Recipient, 2012 NFB Scholarship, 1 of 12 selected nationally each year

Dale M. Schoettler Scholarship for Visually Impaired Students, Recipient 2011, 2012, 2013, 2014, and 2015

# Grants:

Audiom, September 2020, COVID Supplement, National Eye Institute of the National Institutes of Health grant no. R01EY029033, Key Personnel, $406,525

Audiom, September 2020, National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR) grant no. 90IFDV0020-01-00, Key Personnel, $695,856

# Patents:

Provisional 2020, Systems and Methods for Digital Auditory Mapping, No. 59080-701.102

# Research Positions:

Coughlan Lab, Smith-Kettlewell Eye Research Institute, 2019-present, James Coughlan

Perceptual Artefacts Lab, Ontario College of Art and Design University, 2017-2019, Peter Coppin

# Research Interests:

Nonvisual and cross-sensory digital representations

Inclusive Design

X Reality, Virtual Reality, Augmented Reality, and Mixed Reality for nonvisual users

# BUSINESS WORK EXPERIENCE:

Engineer I, Smith-Kettlewell Eye Research Institute, Fall 2019 - Present. Lead the Magic Map project, building an accessible, cross-sensory XR map for the Magical Bridge playground in Palo Alto. Lead the Audiom project to provide a cross-sensory digital map component, managed developers, created the design, and developed the auditory map experience. Designed CamIO application and performed studies on the interface. Performed studies evaluating the TMAPs project.

CEO and founder, XR Navigation, May 2020, present. Oversaw development of an XR cross-sensory navigational experience at the Magical Bridge Playground in Palo Alto utilizing CamIO, Audiom, and an indoor wayfinding application.

Chief Financial Officer, co-founder, board treasurer, Sonja Biggs Educational Services, Inc. from fall 2015-present. Grew revenue 1400% in five years from $130,000-1,800,000, grew company size 2500% in five years, led incorporation, built finance, HR, and management teams, wrote employee handbook, created pay schedule, developed interview and onboarding process, maintain financials, manage finance team, developed marketing mix, led development of a training program for four employee categories, created tech rental program, developed logging system, and created standards for system acquisition. Researched and implemented accessible systems for timekeeping, finance, logging, payroll, and document management. Taught students and teachers assistive technology (AT), and managed company IT and AT.

# PRODUCT DEVELOPMENT:

Designed and tested CamIO (Camera Input Output), a computer vision application to annotate 3D objects. Designed and tested the IOS app, and performed studies evaluating the user experience.

Lead development on Audiom (audiom.xrnavigation.io), a cross-sensory web component tool using JavaScript, Node and React. Developed the Auditory experience using Web Audio API, event handling, collision detection, Web Speech API, Aria, and state management. Managed developers to meet deadlines, and performed user testing. Along with the team, developed on the full application stack (front-end and back-end) using Node, Express, and React.

Lead a team in building a trimodal cross-sensory map for the Magical Bridge Foundation that I used in a co-design and study. The map will be placed in every MB playground. The map consisted of a miniature 3D tactile representation of the playground combined with a 3D auditory landscape that users heard as they moved a stylus around the map. When they touched the stylus to an object, it spoke the label of that object using CamIO.

Created a MUD map of and for the inclusive design exhibition at the International Conference of Cognitive semiotics 2018 using Evennia and AWS EC2.

Created an auditory data visualization of Charles Minard's infographic of Napoleon's March of 1812 using React, Web Audio API, Web Speech API, and Aria that was based off a co-design session I coordinated with 5 blind users.

Built an auditory globe using React, web Audio API, web speech API, and aria incorporating collision detection in multipolygons from geojson data, and implemented latitude and longitude in a non-Euclidean plane.

Created the software for a multisensory art exhibit at the Art Gallery of Ontario. Created a dynamic soundscape with 3D panning and event handler running on pyaudiogame on a raspberry pi and Arduino.

Created and manage the EmpowermentZone GitHub organization page, run their email list, and manage their GitHub projects.

Created Pyaudiogame, an audiogame library based off pygame that is on PyPi, developed the event system, created algorithms for 3D audio, Cartesian plane navigation with polygon placement and collision detection, keymap, ability to use both console and pygame input and output, allows TTS output and managed the GitHub repository.

Built a system for service logs in Google Apps Scripting that is currently used by all SBES employees and handles over 6000 logs a year. The system uses GSheets as the database and viewer. Created text parsing from submissions to fill other fields and error check, automated the creation of new sheets when customers were added, created a batch log entry system, and created invoice totals with multiple price books.

Developed an engine for console adventure games in python, did system input, made the event system and main loop.

Made an inclusively designed flashcard game using the Ivona Web Speech API, Pygame and accessible\_output2.

Manage and created my own website, brandonkeithbiggs.com.

Led a group in the design thinking process as a part of the product and pricing class at CSU East Bay.

Manage the development of a full visually impaired program service and product bundle at SBESInc that has increased sales over 1400% in five years.

# TECHNICAL SKILLS:

Languages: JavaScript, Python, SQL, Google Apps Script, Arduino, HTML

Server Frameworks: Express, Feathers, NoteJS

Web Frontend Frameworks: React, JQuery

Knowledge of Aria and Web Content Accessibility Guidelines (WCAG 2.1)

Application Engines: Panda3D, Pygame, Pyglet

Content Management Systems: WordPress

Knowledge of Git, [GitHub](https://github.com/frastlin/), AWS, Heroku, and Google Cloud

# ASSISTIVE TECHNOLOGY:

Do frequent user experience and web accessibility reviews for QuickBooks Online from Intuit, 2016-present. Describe how to fix elements with Aria and HTML, present inclusive design techniques at internal conferences, and suggest component design.

Open issues and pull requests on opensource projects including Vaadin Components, Mozilla Hubs, IBM-Carbon-React, AccDC -React, tenon-ui, storybook, Cupper, and freeCodeCamp.

Frequently open bugs and suggest solutions on projects such as OpenCV, GSuite products, Chrome, Firefox, Edge, IOS, Windows, and NVDA.

Taught assistive technology privately at CSU East Bay (January 2016 to June 2016).

Use screen reading technology such as NVDA, Voiceover and Jaws, used accessible PDAs, Braille displays and other tech daily from 2005 to present.

Private contracted with Vista Center for the Blind as a technology teacher, teaching Jaws and basic computer skills in the summer of 2012.

# ACTIVITIES AND SKILLS:

Public Speaking: Spoke on numerous youth panels and led workshops at conferences with CTEBVI, CAOMS, ACB, NFB, Vista Center and Lions Club.

Went to Italy on a yearlong study abroad program to learn Italian and business in 2014

Languages: Speaks English fluently and Italian conversationally

Is a professional Opera singer

Theater & Film: Performed in nineteen musicals and films including Beauty & the Beast, La Boheme, Les Miserables, Oliver, Fiddler, and Camelot

Expert at working remotely: completed two years of master's degree and worked five years at SBES remotely from Malta, Netherlands, Italy, and San Francisco