

# Infrastructure Development for a Mind Attention Interface

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*This thesis is dedicated to my wife who is the inspiration in my life.*



# Declaration

The work in this thesis is my own except where otherwise stated.

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# Abstract

The “Mind Attention Interface” (MAI) enables sensor measurements of a person’s mind states, and attention states, to be used in a virtual environment. As well as serving as a platform for Human Computer Interface and Brain-Computer Interface research, the MAI aspires to build artistic installations, particularly in computer-generated music.

This thesis describes the development of the MAI System: the enabling software infrastructure of the Mind Attention Interface. It discusses the investigation and purchase of hardware and the design of the MAI System architecture. The requirements, design, and implementation of the MAI System, accompanied by a set of profiling tests, demonstrate the effectiveness of the design architecture and the overall usefulness of the system.



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# List of Terminology

## Terminology

6DOF	Six Degree of Freedom
API	Application Programming Interface
ASCII	American Standard Code for Information Interchange
BCI	Brain-Computer Interface
BDF	BioSemi Data Format
CPU	Central Processing Unit
DAQ	Data Acquisition
EDF	European Data Format
EEG	Electroencephalogram
fMRI	functional magnetic resonance imaging
GUI	Graphic User Interface
HCI	Human Computer Interface
MAI	Mind Attention Interface
MASE	Mind Attention Spectral Engine
MSS	Maximum Segment Size

NTP	Network Time Protocol
SDK	Software Development Kit
SECK	Spectral Engine Connection Kit
SMR	Sensorimotor Rhythm
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
UTC	Universal Time Coordinated
VE	Virtual Environment
VR	Virtual Reality