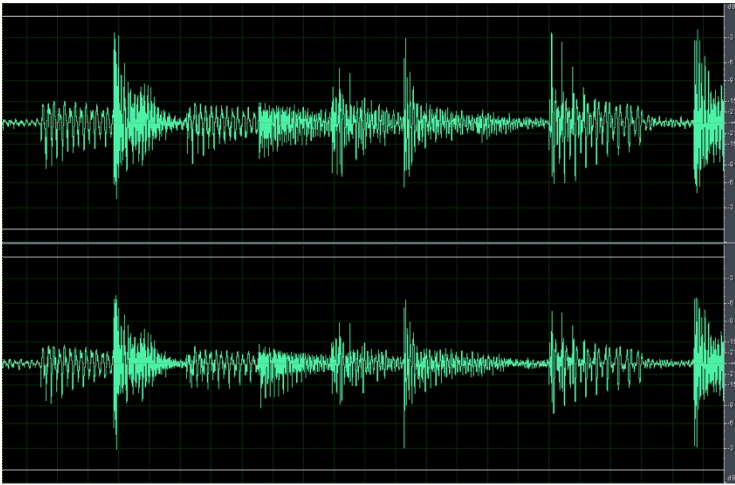# SONIFICATION OF SLEEP DATA

Working with doctors at the Mayo Clinic Center for Sleep Medicine, this UARTS Faculty Engineering/Arts Student Team (FEAST) will explore the possibilities of creating techno tracks from up to, at least, four data points from raw polysomnogram data (EEG/Pulse/Oxygenation). The goal is to convert sleep data into interesting music to enable sleep diagnostics that would be accurate and fun– for the world. Sonification data has already been shown to increase the speed and accuracy of interpretation of medical data and we aim to expand that principle to the world of sleep diagnostics.

Introductory experiments, working with CoE alumnus Greg Syrjala (from ORMEC in Rochester, NY) have been conducted, in collaboration with Dr. Kara DuPuy-McCauley at the Mayo Clinic. Kara is an alumnus of the School of Music, Theater & Dance, and had an established career in Punk band before returning to Michigan to complete her studies in Medicine. It is her life's vision to create an "audio approach" for sleep study data and using MAX/MSP, our team has already concatenated EEG, EKG, EMG and RespNatal data using EDF formatted files introduced into MAX/MSP and Ableton live. The results sounded like "glitch" meets "Brian Eno/ambient music." The goal is to create interested music with data that is inherently rather dull and does not change much, but highlight anomalies, such as snoring (or worse), in order to diagnose sleep patients more accurately and efficiently. Sonification of data has been utilized for decades in the medical field but although we can hear the representation of patient data rather ubiquitously in the operating room or intensive care unit (think beeps from EKG and ventilators), sonification as a field of medical research is relatively unexplored in most other specialties.

MEETING TIME AND LOCATION
Tuesdays, 4pm

STUDENTS SOUGHT

SONIFICATION AND MUSIC SYNTHESIS (2)
- Student skills: MAX/MSP and Ableton Live expertise required, willingness to learn about techno/ambient music (Eno and Detroit)
- Likely majors: COMP, PAT, EECS, BME

DATA ANALYSIS (2)
- Student skills: ability to review large files and cull for exceptions/bugs/anomalies, app development skills, knowledge of Ableton Live, may involve building software synths/modules
- Likely majors: CS, SI, STATS

SOFTWARE APP DEVELOPMENT (2)
- Student skills: UX/UI characterization, application development, knowledge of Ableton Live
- Likely majors: CS, SI

FACULTY PROJECT LEAD

Stephen Rush has had premieres on five continents and has released many publications of his musical compositions. He has written six operas, over 50 works for dance, chamber and electronic works, concertos, and three symphonies, performed by the Detroit Symphony and the Warsaw National Symphony. He has authored two books, including *Free Jazz, Harmolodics and Ornette Coleman*. Rush has recordings on Nessa, Pi, Innova, ESP-Disk', Equilibrium, Deep Listening, Centaur, MMC, RogueArts (Paris), Eroica, Summit, and CALA Records (with the New York Philharmonic Chamber Musicians).

Rush is a professor of music at the University of Michigan, where he founded the Digital Music Ensemble (DME) which he has directed for 25 years. DME has worked with Pauline Oliveros, Elliott Sharp, Alvin Lucier, and Robert Ashley, and premiered works by John Cage, Philip Glass, and La Monte Young.

He collaborates with virtually every ensemble at SMTD, having written scores for the University Symphony, University Choir, Trombone Ensemble, as well over 100 scores for dance.

Rush has also taken over 130 students to India every summer since 2005, where they study music, dance, and yoga for one month. There they study, one-on-one, with gurus who are deeply committed to the cultural traditions of India.

Rush has over 30 CDs released and has performed or recorded with Roscoe Mitchell, Henry Grimes, Elliott Sharp, Steve Swell, Eugene Chadbourne, Peter Kowald, and Art Ensemble of Chicago. He also tours and records with his electronic psychedelic improvisation band, Crystal Mooncone.

Rush is deeply invested in "Installation Art", with current works in collaboration with Michael Gould and Nobel Prize-winning physicist Henry Pollack, *World Without Ice*, as well as *Jeweled Net of the Vast Invisible* in collaboration with scientists at the Fermi Lab.