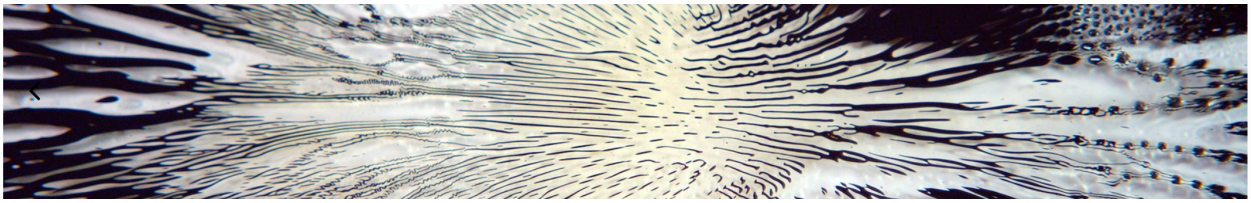
Arch 7101 – Fall 2022 – Sensor Data for Healthier Indoor Enviornments
Ellinger



Perry Hal. Digital photograph of oil and acrylic paints. From Turbulence Drawing System, 2014. (Series)

1-Page Studio Description

The studio is sponsored by Gresham Smith Architecture Firm and seeks to explore questions of how sensor data can inform design decisions and, more importantly, help to design healthier indoor environments for building occupants. Research has shown that there is a direct correlation between CO2 levels and the presence of other harmful gases in indoor environments, including virus transmission in indoor spaces[1]. Monitoring CO2 levels in rooms can give a course understanding of the indoor air quality in a given space. However, the question being asked in this studio is can the distribution and concentrations throughout the room itself be modelled to help designers better understand how pollutants move through a space and how to better design the airflow within the space to mitigate exposures.

The students will design, build and deploy air quality sensors with CO2, temperature and humidity throughout a series of case study rooms and environments. It will important to understand occupancy and the relationship to air quality. These sensor arrays will be spatially positioned three dimensionally within rooms to build a spatial model air quality model. They will build real-time data visualizations of the CO2, temperature and humidity levels as they change and build a database to compare changes.

The students will use the data to speculatively make changes to room design; shape, air supply and return locations, position of people in rooms, overall building and simulate how these changes would improve Indoor Air Quality. Where possible the students will make the modifications and use the sensors array to measure the results.

The data collection will be used to speculate how adaptive reuse of a ‘big box’ store can be designed to better deal with indoor air quality.

1. Exhaled CO2 as a COVID-19 Infection Risk Proxy for Different Indoor Environments and Activities. Zhe Peng and Jose L. Jimenez. Environmental Science & Technology Letters 2021 8 (5), 392-397 DOI: 10.1021/acs.estlett.1c00183