

## Ebb & Flow Exhibition Statement

Our lives are awash in rhythms and cycles and the cadences that control our lives. Ebb & Flow considers the similarities between intimate and internal systems of the body and the very large macro systems found in environmental processes. On the very large scale there are cycles of plate tectonics or the tidal movements caused by the moon. On the internal and more intimate scale there are sequences that govern our bodies as found in our circulatory system or the circadian rhythms that govern our daily cycles. As our technology has developed humans have either deliberately or inadvertently intervened and controlled these oscillations. Globally, there has been an ongoing dialogue around the human disturbance of natural processes. Ebb & Flow engages issues such as; regional and coastal flooding, glacial ice loss, consumption of natural resources and ultimately climate change. Projects in this exhibition seek to mimic various natural processes and act as a catalyst toward a dialogue around our anthropomorphic foot print. The use of robotics allows these artworks to act as surrogate performers that create durational compositions and explore these processes of transition and change. Below are descriptions of projects included in this exhibition.

### Floodwaters:

We are witnessing the environmental effects of climate change in unprecedented ways. *Floodwaters* focuses on the rising waters that have become a way of life in many communities worldwide. This artwork explores the failure of the engineered landscape. The central feature of this project is a riverbed that is manipulated by various robotic processes to mimic different flooding scenarios. Instead of a flood event taking days, these events will happen over the course of a few hours. Initially a large table filled with a bed of sand and gravel uses servo motors to tilt to approximately 35 degrees. At the top, a linear stepper actuator moves a water hose to one of 30 random positions and then a trickle of water is pumped from a reservoir below. Slowly rivulets are cut into the sand bed feeding into larger tributaries. Every 10 minutes the water hose is moved by the mechanism creating new places for erosion. After anywhere from 3 hours to 1 day, depending on the gallery schedule, the entire stream table tilts back to a level and flat position. Finally, over the course of 20 minutes a rake manipulated by 2 large linear stepper drives and a servo motor take four passes to rake the landscape flat. Now the table is reset and the entire process will continue to repeat itself for the duration of the exhibition.

### Malignancy:

Moulin's are the blue melt spots as large as a lake or as small as a blue hole that are created when melt water accumulates and cuts its way down through glacial ice. The dark blue color of these holes absorbs light and warms the pooling water to cause a feedback scenario where the moulin expands and more melting occurs, drilling ever deeper into the frozen glacier. Parallels can be found between this runaway growth and infections of the body. I want explore the deceptive beauty of these blue lakes in a physical way and provoke dialogue around climate change. Malignancy is an artwork where animations of moulin's are projected onto a frozen plate of ice. The video animation of a small river will enlarge as viewers approach the cooling plate to become a moulin lake. The inner workings of a reclaimed mini refrigerator are both functionally and visually incorporated into the sculptural form, integrating the work into a whole system. Here, as in nature the physical elements of light and ice converge, influenced by human presence.

### Ouroboros:

The Ouroboros is an ancient symbol of a serpent or dragon eating its own tail. Here something is constantly re-creating itself. This symbol has a variety of interpretations and is found represented in number of ancient cultures, the two oldest being China and Egypt. Ouroboros the robotic artwork is an embodiment of this idea. Using various DIY mechanisms and components this robot extrudes a plastic coil like "tail" that winds across the floor. The "tail" ultimately is returned to the robot's "mouth" as a vacuum and rollers in the machine intake the plastic "tail" grind it back up, melt it down and re-extrude the tail as a new coil. Instead of using a ready made filament or plastic pellet the Ouroboros robot only consumes shredded plastic milk jugs made from HDPE. It will thus only recycle and renew as long as it has its tail or extra shredded recycled plastic to consume. The Ouroboros will be "fed" new plastic material to extrude at the opening and other select times during the exhibition.

While the Ouroboros directly references the serpent or snake form, its mythology is also very

much human. The recycling system that takes place within the body of the Ouroboros both looks at ideas of mechanical manufacturing and material processing and the biological analogues to these processes.

#### Gradual Slip:

In Gradual Slip, a peristaltic pump moves water up to a hypodermic needle; from this a drip of water emerges and falls onto an angled aluminum plate. As the drop of water encounters the plate it freezes solid before it can roll off the plate. Thermal electric coolers (TEC) located under the aluminum plate lower the temperature to freeze the water droplets solid. Gradually the frozen drips accumulate into a small “glacier”. After 3 hours or more of ice accumulation the TEC cold plate shuts off. Very quickly the plate warms up and the mini ice glacier slides off into a tray filled with dirt and grass seed. As the exhibition progresses grass will sprout and grow where the ice melts. In this robotic installation there are three drip mechanisms that are constantly in different states of ice growth and melt.

The natural environment has evolved into system in equilibrium. Through our ignorance humans have disrupted this homeostasis. In all systems there is a threshold, a limit where the system can no longer function when pushed beyond this boundary. In nature too, these same thresholds exist however we are not necessarily in tune with the limits. We try to exert control over systems we do not fully understand. There is a tipping point, a point of no return. As the normal balance is disrupted we slip further toward this point. This is not a sudden shift and so society is slow to respond. This is a gradual slip.

#### Victuals:

Victuals looks at various forms of sustenance, both natural and artificial. In this work a central apparatus that dispenses electricity, air and water sustains various “specimens”. In one flask a peristaltic pump dispenses a very small amount of water every 3 hours to a seed mixture in a dirt mixture, while a LED light illuminates the dish. In another flask a glowing 3D printed entity “breathes” with air supplied from the central apparatus. In third flask floating in mineral oil an artificial life form glows with light and emits chirping sounds while sustained by an electrical umbilical cord.

#### Failure To Launch:

A large folded wing made from cast recycled milk jugs is mounted to the wall of an installation space. As viewers walk into the space the wing unfolds and rises into the air. A rush of air is pushed toward the visitor as the wing lowers back toward the ground as if to take flight. Using an RC controller interface visitors can interact with the mechanism; in this way the wing becomes an extension of the viewer. This wing serves as a metaphor for the human condition, connecting to the story Icarus and his wings made from wax, however in this case the wing is made from thermos-plastic. HDPE is a ubiquitous material that can be found in a multitude of products. My young boys, ages 4 and 5, consume a great deal of milk, the HDPE was recycled from 7 month’s worth of empty milk jugs. The plastic has been melted at lower temperature and then compressed into molds to make the boney appendages of this wing. The feathers are made from laminating the HDPE onto stainless steel rods. All of this repurposing of the plastic is done with a simple domestic electric oven. The structure will be put in motion with pneumatic actuators and controlled with an Arduino micro-controller.

#### Bat-Bots:

We are surrounded by the encoded communication of nature, from the echolocation of whales to chemical pheromone communication between ants. Bat echolocations allow bats to locate prey with pinpoint accuracy in the dark of night. In an earlier project, echolocations were recorded by using modified off-the-shelf heterodyne sensors. Now the Bat-Bots will express these recordings through this interactive sound sculpture. Bat-Bots disrupts our limited sonic awareness, making the silent hunters audible and turning the tables on the typical human interaction with bats. Bat-Bots forms a responsive system, creating a generative sound space. The robotic bats in this installation use distance sensors to detect participants walking through a space. As the Bat-Bots detect the presence of a person they emit recorded tracks of echolocations that vary as a visitor walks closer. These Bat-Bots not only look like bats but they also interact with the world in a similar manner. The bots use ultra-sonic distance sensors, which are essentially a machine version of echolocation, mimicking the biological sensors of the bats.

Built from plasma cut steel and 3D printed plastic, each Bat-Bot consists of a distance sensor connected to a custom-built microcontroller that controls the audio playback from a micro SD card. Each Bat-Bot has an amplifier and speakers to emit its selection of tracks based on the distance to a person in the space. Together these bat bots will create an immersive and generative sound composition.