**Memory Seed In Feather**

In the culture of North Paiute Western Shoshone, feathers are an important symbol, representing courage and freedom. No matter a single feather or a crown composed of many feathers, it is an important cultural representation of Indian culture. When thinking about how to build a sustainable power generation device on Fly Ranch that allows visitors to both understand the local culture and interact with it, we carefully looked into the unique structure of feathers and were pleasantly surprised to discover that the four characteristics of feathers make it a very perfect device prototype: One-way air permeability, Waterproofnes, Cascaded Slide-Lock System, and Hexagon structure.

* **One-way air permeability**

When the creature inspires the blade to blow from the back wind, the damper opens (the circle indicates the airflow position); However, when air is blown into the web, the damper plate remains closed. The unidirectional air permeability of feathers makes the device that mimics the structure of feathers the ability to become a shelter.

* **Waterproofnes**

When the creature inspires the blade to blow from the back wind, the damper opens (the circle indicates the airflow position); However, when air is blown into the web, the damper plate remains closed. The waterproofness of feathers is even more powerful for the function of the shelter, although the data shows that the fly ranch is not a rainy area.

* **Cascaded Slide-Lock System**

The hooked hooks on the bow hooks and the hooks on the dorsal spine have fully curved triangular shapes, which enable the stability to the device.

* **Hexagon structure**

The main structural section of feather is hexagon hole

What’s more, there is an article ***Rotational wind power triboelectric nanogenerator using aerodynamic changes of friction area and the adsorption effect of hematoxylin onto feather based on a diversely evolved hyper-branched structure*** published by ***Nano Energy***, which make featherlike device have a perfect ability to produce energy. This article describes the possibility of using fibrous materials to imitate bird feathers to collect wind energy and convert it into electrical energy under precise experiments. We compared the wind energy conditions of this experiment and found that our fly ranch was fully consistent. This makes our dream of trying to make a power generation device with bionic materials come true. At the same time, we also hope to increase people's participation, attract more people to come here, and let fly ranch prosper again.

Therefore, in the end, our devices will be scattered along the newly designed route of natural walking, and mainly divided into two parts:

Larger feathers which bear the responsibility of the main branches of the device. The feather structure uses the principle of bionics and to reproduce the characteristics of one-way ventilation and waterproofness of natural feathers. The larger feather uses bionic fibers to fully simulate the triboelectric power function of bird feathers, and at the same time is coated with a layer of photosensitive paint, which converts solar energy into electrical energy when wind energy or human kinetic energy cannot provide sufficient electrical energy through friction power generation. Each huge device is composed by 12 huge feathers.

The small feathers will be distributed to everyone at the starting point of natural walking, both as a souvenir and a recorder of journey memories. We integrate the functions of recording and playback into this small feather, and hope that participants can carefully choose which large feather to insert. They will be play the role of a dynamic switch for the entire installation. The branches of the big feathers have the same hexagonal hole structure as the real feathers, and the small feathers can provide piezoelectric effect by inserting these holes. The more small feathers accumulate on a large feather, the more likely it is to complete a change in form-from a closed hemispherical shed to blooming flowers. People can gather in these shelters for the night, which will provide basic service facilities such as charging and heating. When they leave, they will leave their little feathers, which carry their own memories. When each installation is completed, it also means that the number of visitors has reached its peak. People who come here again can pull off these feathers and listen to these memories. The device will slowly close from a blooming flower.

This is an environmental protection device that can be recycled. It's like a process of planting flowers and then harvesting again, except that what is planted is the seed of memory.

**Technologies**: Solar power generation and friction power generation are the main generation technologies and power sources of our device. Piezoelectric technology is the main technology to complete the interactive function of the device. The feather recording end is inserted into the large device to generate electrical signals through piezoelectric technology and becomes the switch of the shape change of the large device. Meanwhile, the feather recording end obtains power supplement from the large device through wireless charging technology. The shape change of the large device is carried out through the mechanical gear transmission device, and the designed transmission device can enable the large device to complete the realization of each functional period.

**Activities:**

* Planting the memory: This is a very personal activity. People record their memories with a recording pen and leave them on the big device to become the seed of the big device.
* Listening to memories: Listen to the memories left by others to realize the interaction of staggered space and time;；
* Communication in shelter: When the device becomes a shelter, people communicate internally;
* Enjoy the blooming of image memory: when the device is fully open, the center projects a piece of image of Black Rock City into the sky. It was a way to remind people of the Black Rock City which disappeared after burning man.

**Materials and Dimensions**

Landmark: Windward Area≈9m2

Shelter form: Windward Area≈17m2

The weight of six-core optical fiber per kilometer m1≈50kg/km

Total length of optical fiber L≈2552m

Total weight of optical fiber m2≈127kg

The density of structured plastic ρ≈ 2.1t/m3

Total weight of structured plastic m3≈2045kg

**System inputs:**

* **Lighting:** Electric consumption per meter: 5 W

Total energy consumed by lighting per hour in kWh: 0.3

Daily lighting hours: 6

Energy consumption every month in kWh: 54

* **Morphological change:** Force of rolling friction: f≈1022.5N

Gear efficiency η≈ η1 η2 η3 η4 η5 ≈0.69

Total energy consumption of electric machinery E≈80kWh

**System outputs**

The wind blows the feathery structure. The barbules made of nanometer electricity-generating materials rubbed against each other to convert the wind energy into electricity. Output performance of FTR-TENG varies depending on the varied degree of evolution of the shape of feather and the density of barbs.

Landmark form: Windward Area≈9m2

Total energy produced by feathers per month in kWh=220

Shelter form: Windward Area≈17m2

Total energy produced by feathers per month in kWh= 470

For Native American Tribes, the Feather embodies trust, honor, strength, wisdom, power, freedom； Our design tries to follow this same intention of giving to the Feather a leading role by presenting them as the main aspect of our structure. The visitor will treasure the Feather all its journey to finally place it in one of the many installations located all along the site, and shaped in one of its different stages, either as a landmark, a shelter or an exhibition piece.

Hence the Feathers will be shown to all and will dress the structure, resembling the meaningful moment of the placement of the feather on the headdress of a Native American, representing not only a symbol of bravery, but also a gift of wished peace, prosperity and happiness.