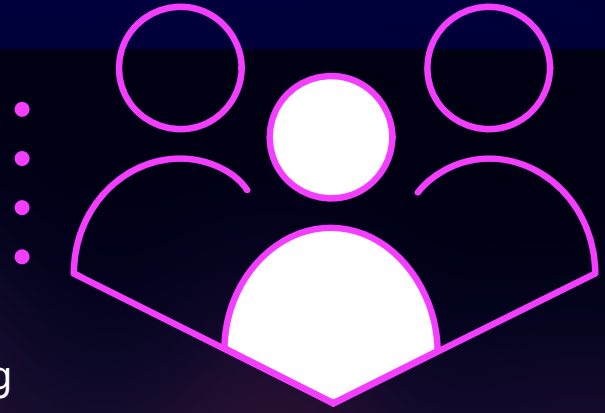


# BIOT BUSINESS PLAN

## OVERVIEW

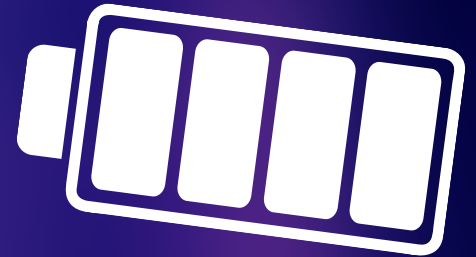
Our project aimed to develop new non-polluting biomaterials that use wet energy to generate electricity, and new power generation and energy supply methods to solve the power supply problem of the existing IoT terminal small machinery.



## USERS' PAIN POINT

For many small wireless devices in the Internet of Things, disposable chemical batteries are often the most common power source. Although disposable chemical batteries have a long life, they need to be recycled after use. Otherwise, the environment will be polluted; the environment's temperature and the frequency of use will also affect the battery's life or accelerate battery passivation. The labor cost and the complicated process of replacing the battery have also brought trouble to the enterprise.

Batteries that rely on cleaner environmental energy harvesting technologies (such as photovoltaic cells) have higher requirements for the environment in which the equipment is located, which dramatically limits the scope of applying this technology and has prevented it from becoming the mainstream of power supply. This is a significant pain point in the current IoT industry for small wireless devices' power supply.



## INDUSTRY ANALYSIS

At present, the Internet of Things module requires up to 30mA of instantaneous current while doing wireless communication, which means that the current Internet of Things module still needs a battery with high capacity (AA battery) to function (makes human implantation in the future possible). The market trend reduces the battery's size and increases the continuity and stable current supply of electric power. The battery's size and cost have become a significant limitation for IoT, making IoT hard to enter the market. In this critical period of development, new technologies of battery and methods become the breakthrough-energy harvesting.



Solar power is currently the most widely used energy harvesting source, but the sunlight light's intensity is always changing and uncontrollable. Besides, it is hard to integrate the energy generated on the CMOS chip. This puts forward the high expectation in the optimization of the IoT module. Traditional IoT wireless transceiver systems often use conflict communication or active event-driven communication schemes (step-by-step communication refers to the Internet of Things regularly open to communicate with the center, and sleep at other times; event-driven communication means that the Internet of Things only communicates with the center when the sensor detects a specific event). In this mode, the IoT processor needs to establish a connection with the center actively. However, this process of establishing a connection is very energy-intensive. Thus, to reduce the battery size and develop efficient communication, an alternative circuit configuration is indispensable.

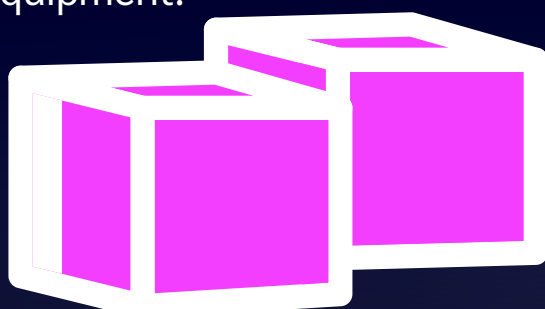


A combination of wireless arousal system and energy generation from humidity may be one of the best solutions. Wireless arousal systems, in which the system is dormant, are only ignited when the master node emits a specific signal. In other words, the energy-consuming process of connection creation is not performed by the IoT node, but by the central node, which is responsible for the call. In the ISSCC in 2016, the wireless arousal receiver supporting BLE network published by the start-up company PsiKick performed a wireless communication with only a power consumption of 400 nW. In 2017 ISSCC, the wireless arousal receiver published by the University of California, San Diego, lower the power consumption to 4.5 nW, which is 4-6 orders of magnitude smaller than the consumption of traditional receivers. In addition to wake-up wireless systems, advances in reflective modulation systems, ultra-low-power sensors, and ultra-low-power MCU have reduced IOT power consumption, laying a good foundation for the application of our products.

## ADVANTAGE OF THE PRODUCT

Our product mainly bases on the Nano filament sheet, which can produce electricity by itself. At present, a single module can have a voltage of 0.28V, two modules in series can have a voltage of 0.56V, and four modules in series can generate a stable voltage over 1.5V.

Our product's core function is to use the air's moisture to produce electric energy, which is used as a power supply module in the equipment.





# ANALYSIS OF COMPETITIVE PRODUCTS

The analysis of competitive products mainly highlights the advantages and differences of products, list the competitive products ABC, and analyzes their respective advantages, disadvantages, and differences, including direct competitors and indirect competitors.

**Note:** It is necessary to conclude deep thinking. Otherwise, investors will question the professional ability of the team

Solar Energy	<ul style="list-style-type: none"><li>• Over <u>40%</u> of energy conversion efficiency has been achieved</li><li>• Wide application scenarios</li></ul>	<ul style="list-style-type: none"><li>• Energy density strongly influenced by factors such as day and night and weather</li></ul>
Thermopower Energy	<ul style="list-style-type: none"><li>• Small volume</li><li>• It has certain practicability</li></ul>	<ul style="list-style-type: none"><li>• The preparation process of vertical conduction is complex</li><li>• High cost</li></ul>
Vibration Energy	<ul style="list-style-type: none"><li>• Piezoelectric energy collection<ul style="list-style-type: none"><li>○ A wide range of sources</li><li>○ Higher energy density</li><li>○ Small environmental restrictions</li></ul></li><li>• Electromagnetic energy collection<ul style="list-style-type: none"><li>○ High output power</li></ul></li><li>• Electrostatic energy collection<ul style="list-style-type: none"><li>○ Have strong process compatibility with IC, can be used to make MEMS variable capacitance</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Piezoelectric energy collection<ul style="list-style-type: none"><li>○ When the excitation frequency deviates from the first-order resonance frequency of the cantilever beam itself, the power of the energy acquisition system will decrease sharply</li><li>○ The output is time-varying and random</li></ul></li><li>• Electromagnetic energy collection<ul style="list-style-type: none"><li>○ Low output voltage</li><li>○ Miniaturization is difficult</li><li>○ Still need to improve power generation efficiency from a hardware perspective</li></ul></li><li>• The hardware of all collection methods is more complicated and needs further innovation</li></ul>
Electromagnetic Wave	<ul style="list-style-type: none"><li>• Controllable power when changing with distance</li><li>• Sustainable</li><li>• Parallel transmission of energy and information</li><li>• Suitable for remote sensor node power supply</li><li>• Parallel transmission of energy and information can be realized</li></ul>	<ul style="list-style-type: none"><li>• Low efficiency</li><li>• The antenna size will affect the effectiveness of energy delivery</li></ul>



## BUSINESS MODEL

### - KEY PARTNERS

One of our major partners is the Long Sing Technology company, which is now developing a combination of batteries and capacitance as their product. They offer lots of valuable advice and insight into how to build the circuit and design the hardware. They also provide their product for us to test our module. Simultaneously, labeling and packaging companies need to be on the list to focus on the technical issues.

## - KEY ACTIVITIES

The first step our team plans for product promotion is to introduce the basic methodology behind our product on social media, such as the internet, platforms, and questionnaires. Besides these online events, we have also planned for offline interactive events such as summits and presentations. After the preliminary form of the product comes out, we will invite the desired customers for trials to build up trustful relationships. Upon designing the final products, we aim to fulfill all certifications for future generalization of our product.

After that, we plan to contact more experts and factories for technical support and companies, organizations, or investors for financial aid, so that we will be able to explore a complete procedure of scale production. With a mature production model, we will further establish contracts with companies, introducing our product into the IoT market while protecting both sides' legal benefits.

## - KEY RESOURCES

As for human resources, we will consider experts in synthetic biology and electrical engineering for the future up-gradation of the nanowire film and hardware design, respectively. Meanwhile, experts with profound experience in marketing, selling, and administration are essential. We also plan to remain in contact with Bluepha Laboratory for technical support during the phase of optimization. Infrastructure resources, including the facilities needed in the lab-developing and scale-producing phases, will be carefully considered. Furthermore, financial resources like investors and bank loans are necessary for our future development.

Value proposition (effect of our product)

- Our BIOT device helps complement the shortages of the current power supply methods, offering a new choice for integrating producers and companies in the perception and application layers.

## - CUSTOMER RELATIONSHIPS

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## - CUSTOMER SEGMENTS

### SYSTEM INTEGRATION COMPANIES

- They develop systems with all the parts necessary in each IoT application scenarios, which means they inevitably need to consider the power supply of different devices.

### COMPANIES DEVELOPING A DUAL-ENERGY STRATEGY

- They develop systems with all the parts necessary in each IoT application scenarios, which means they inevitably need to consider the power supply of different devices.

(As a detachable module charging capacitance)

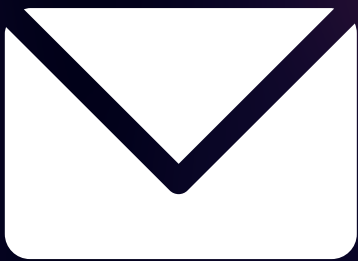
### COMPANIES DEVELOPING SMALL-SIZE WIRELESS SENSORS/REMOTE TERMINAL DEVICES

- ' usually choose to purchase batteries from the market to power their product instead of developing their own. The portability and durability are their utmost concerns on the batteries, for the product is often installed at sites that are inconvenient for maintenance.

(As an independent battery)

## CHANNELS

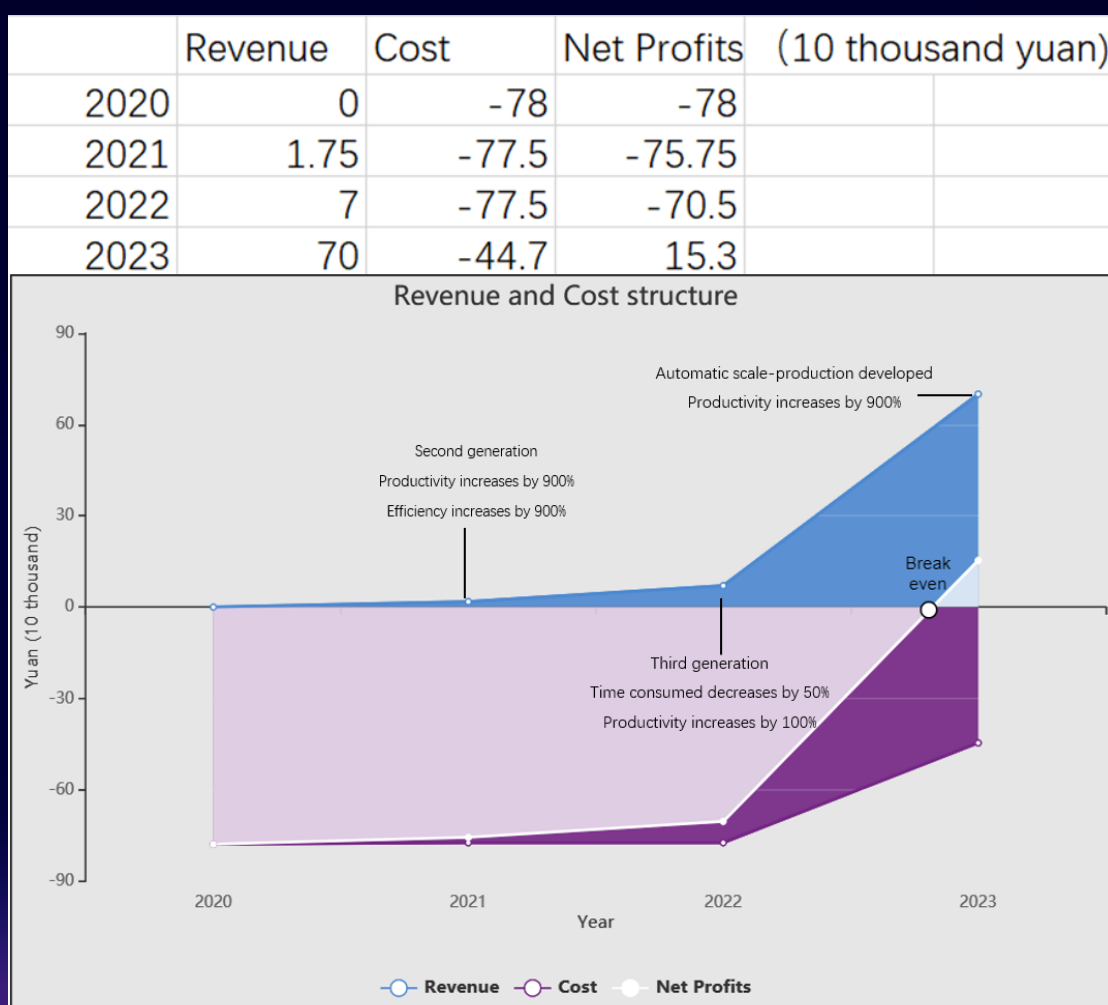
There exist two contact options with our partners and customers: they can contact us through our E-mails and WeChat platform, or we can contact them through summit, assemblies, communicating with them face-to-face. We ensure that the contact is direct and effective so that both sides can benefit from it.



## REVENUE STREAM & COST STRUCTURE

(As battery)

The cost of each protein nanowire film is 0.25 yuan. Before improving the electricity-generating efficiency, the cost of producing a 1.5V, 3V, and 3.6V battery is at least 1.5 yuan, 3 yuan, and 3.75 yuan, respectively. If the efficiency is increased to 10 times as high as the prototype, the cost will drop to 0.25, 0.5, and 0.5 yuan. According to the average prices of the Lithium battery we gained, our product's prices will be 0.5, 3.5, or 4.5 yuan per battery, depending on the output voltage of each. As we envision, by the end of 2022, we will reach the breakeven and start gaining profits.

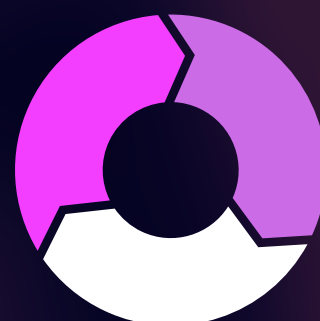


## OPERATION STATUS

The product is currently under development, and the development cycle is estimated to be six months.

After two months of development, a prototype has been produced.

The first technical iteration will take one month. The goal is to increase production by a factor of 10 while increasing power production efficiency by at least ten times.



## PLAN FOR FURTHER DEVELOPMENT

### - TRIAL PHASE

The current product is still in the trial phase, and the corresponding short-term plan is:

1. Send the hardware (trial products) to relevant companies interested in cooperating to get more feedback and gradually update the product.
2. Shoot short videos on major video and social networking sites to popularize a small amount of synthetic biology content and much information about our products to spread out the product to the public.
3. We will hold lectures and organize fun activities (such as prized knowledge contests) to attract more people offline.
4. Visit the corresponding local government departments or agencies in Shenzhen to learn about relevant laws, regulations, policies, and the official government's opinions and concerns toward this product.



## - MID-TERM

1. After reaching a particular power generation effect and qualified product performance, sign up contracts with individual companies for long-term testing usage to improve further and expand possible future product directions and new development trends.
2. Conduct product use tests with a few upstream and downstream cooperative companies to broaden consumers' scope and meet more consumer demand.
3. Produce small quantities of products and provide them to customers in need of product application and promotion.

## - LONG-TERM

1. Achieve mass production of products, shift from staged profitability to continuous profitability, and finally form a standard industrial chain to achieve the goal of long-term, large-scale profitability.
2. Cooperate with partner companies to jointly launch a series of products such as wet energy power generation systems for full application scenarios, multi-functional wireless environment monitors, portable health monitoring sports watches/instruments, and much more. to expand the BIOT product field in an all-round way and form a large-scale coverage brand product ecological chain to enhance brand awareness.
3. Continuously improve product performance, obtain phased results, and replace products in real-time to meet market trends.

## FINANCING PLAN



The first round of financing plans to raise 5 million yuan , which covers site, labor, laboratory prototype development costs, intellectual property rights, BD, and daily maintenance costs.

## PLAN FOR FURTHER DEVELOPMENT



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Wechat Public Account: iGEM2020 GreatBay SZ

