

**Podcast Name: Scentinel**

**Podcast Description:** Scentinel combines the words *scent* and *sentinel*, symbolizing the main theme of the project: helping visually impaired women manage their menstrual periods using terpene scents. The team uses synthetic biology to produce terpenes through yeast fermentation, which are then applied in hygiene products to help women identify the start of their period and the need for a change of sanitary products by scent rather than sight.

The project aims to amplify the voices of women and visually impaired individuals, and to encourage underrepresented groups, particularly those traditionally considered disadvantaged, to participate in STEM research.

**Episode Titles:** To be decided, possibly a quote from the content.

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**Key Outline:**

1. **Introduction:** The hosts and team members introduce themselves and the iGEM competition. They explain the concept of synthetic biology and provide an overview of their project.
2. **How They Chose the Topic:** The team describes the brainstorming process and how they ultimately focused on the challenges faced by visually impaired women during their menstrual cycles. They mention the initial inspiration from social media and public feedback.
3. **Inclusivity Segment: Blind Women in Science:**
  - They discuss how visually impaired women navigate menstrual challenges and how there is a lack of existing market solutions.
  - Statistics are shared about the employment challenges faced by visually impaired individuals, especially women, and how their educational and employment outcomes lag behind their non-disabled peers.
  - The project team reflects on how people with disabilities, especially women, struggle with access to higher education and representation in fields like science and business.
4. **Interviews and Dialogue with the Target Group:**
  - The podcast highlights their interviews with visually impaired women to better understand their challenges and needs, such as concerns about the scent's visibility to others.
  - They mention engaging in activities with blind individuals, including visits to laboratories and museums, to involve them in science and raise awareness.
5. **Documentation and Accessibility:** The team emphasizes the importance of documenting their work so that future teams and organizations can build upon it. Their research and human practices are made accessible through a wiki, show notes, and mind maps.

**EP01 Podcast Transcript****Host (H): Tian Jiameng**

**Guest (G): Zhang Liyu**

**H (Tian Jiameng):**

Hello, everyone! Welcome to Scintinel. I'm your host, Tian Jiameng, and today we have Zhang Liyu from our team. Liyu, say hello to everyone.

**G (Zhang Liyu):**

Hi, everyone! I'm Zhang Liyu.

**H:**

Could you briefly introduce yourself and tell us how you joined our team?

**G:**

I'm Zhang Liyu, from Shenzhen International Exchange Academy. I'm currently a first-year high school student. Joining iGEM was quite by chance—I only found out and signed up three days before the deadline. This topic aligned so well with my interests, and I was really passionate about it, so I just joined directly.

**H:**

You mentioned that you were very interested in this topic. At that time, we had been participating in the Brains competition for a couple of months. We first narrowed it down to terpenoids, then to something scent-related. We brainstormed many ideas, like addressing the early greening of plants, using *Helicobacter pylori* treatments, and creating scent labels. Eventually, we landed on addressing the challenges faced by visually impaired women during menstruation, which was inspired by some social media trends. You said you've always been interested in this issue. How did you first get involved, and what activities have you participated in?

**G:**

I've been aware of this issue about women for a long time, but I initially had a rather vague understanding. It wasn't until I delved deeper, reading many articles, that I realized this is a problem that's easily overlooked, especially when it comes to menstruation. Since it happens monthly, we may not consider it a big deal. However, data shows that menstrual periods are closely linked to both physical and mental health. I also joined a women's menstrual organization, which helped me deeply understand that menstruation-related challenges are important and need solutions. We often hold awareness-raising events, as one of the fundamental ways to address any issue is to raise awareness and let more people understand the problem.

We also organize **art exhibitions** using inclusive methods. Through a visually accessible approach, we present these challenges in a way that many people can understand without making the topic too heavy. For example, we often extract key points from interviews and turn them into artwork for exhibition. This allows people to recognize the challenges faced by visually impaired women in a more artistic way, which is part of what we have been doing.

**H:**

Yes, I think that's really cool. You've taken a topic that people may not talk about often and presented it in an artistic form. It creates a sort of

defamiliarization, encouraging people to rethink the issue. This approach may make more people willing to embrace and understand it. Have you done other activities?

**G:**

Our other activities are more practical. For example, we place sanitary pads in every restroom at school to ensure that those who forget to bring one or don't have one aren't left in an embarrassing situation. We want to make these necessities more accessible and eliminate the burden associated with menstruation. Additionally, we focus on marginalized women, like those working as dancers in bars or single mothers. We don't often know what their daily lives are like, or how their lives differ from ours. By interviewing them, we hope to make their experiences more visible to the public and to help them realize they are an integral part of society.

**H:**

It's great that you're able to interview marginalized women because their struggles may be even more unique and might not be seen from the general public's perspective. The challenges faced by visually impaired women are similar—they receive attention on social media, but often by chance, like when certain posts go viral. However, in reality, there are over 20 million visually impaired women worldwide, with varying degrees of blindness. This means that every day, around 3 million women with visual impairments need to rely on other senses, such as smell, touch, or even taste, to determine if their period has started, how heavy it is, or if they need to change their pad. For example, every month during my period, I feel anxious and check regularly. For women with visual impairments, this must be even more difficult. I've looked into the market, since I'm interested in business, to see if there are products that specifically target this issue, but I couldn't find any viable solutions. I believe there are technical challenges, such as with the conditional release of scents. Although we haven't created the final prototype yet, we've combined theory and practice to propose this product concept. But given how many sanitary product companies exist, I think there might be other reasons. What do you think? Is the lack of attention part of the problem, and how can we raise awareness for this issue?

**G:**

I think the problem stems from two main factors. First, the voices of disadvantaged groups aren't heard. Both their identity as women and their visual impairments make it more challenging for them to pursue higher education or find jobs. Many women are already struggling to make ends meet, so they're less likely to think about improving their quality of life or helping others.

Second, as we mentioned, developing a product for such a specific group is incredibly challenging. High-quality sanitary pads are typically made by large companies, which are often profit-driven and may not take the time to understand the needs of smaller, specific groups or design products

specifically for them.

In terms of raising awareness, it's crucial to challenge stereotypes. Both sighted and blind women, and even men, have certain misconceptions about menstruation. Many people view menstruation negatively, perpetuating what's known as *menstrual shame*. To raise awareness, the first step is to help people abandon this sense of shame and treat menstruation as a normal biological process. That's the most fundamental change we need.

**H:**

You're absolutely right. We need to make menstruation something people aren't afraid to discuss, something they understand. That's why we've created many public awareness posts introducing menstruation to everyone. We also conducted a survey to gather people's understanding of menstruation. Did you participate in that survey?

**G:**

Yes, we created a survey on menstruation knowledge. Some of the responses were quite shocking. For example, some people believe menstruation can be controlled, like urination. That surprised me, showing that people's understanding of menstruation isn't as deep as we thought. Male participants, in particular, often misunderstand menstruation, which can unintentionally cause women discomfort or make them feel disrespected. This is normal, though, because no matter how much a man learns about menstruation, he will never experience it firsthand or be treated as a woman. These misunderstandings contribute to the lack of solutions for menstrual challenges, simply because people don't understand it.

**H:**

Exactly, they face two barriers: one is a lack of understanding of menstruation, and the other is that women in STEM and business fields are underrepresented, so their voices aren't heard. I have some data here showing that in prestigious professions, visually impaired people are underrepresented. In the U.S. in 2017, the employment rate for fully blind or severely visually impaired people was around 44%, compared to 79.4% for people without disabilities—almost half. Employment rates by education level were even more shocking. You'd think higher education would narrow the gap, but it doesn't. Even with a bachelor's or even a doctoral degree, the income gap widens, with an average difference of \$13,000 per year. For bachelor's degree holders, the gap was even larger at \$14,700.

This makes me think that the challenges visually impaired individuals face don't stop with getting an education. There's another barrier—the *glass ceiling* in the workplace. Their jobs often don't match their qualifications, and they may be relegated to roles that don't reflect their education. I wonder if this is due to their disadvantage in non-verbal communication in the workplace. For example, sighted people use both verbal communication and body language. They may engage in activities that require vision, like team-building exercises, which can exclude visually impaired individuals from the workplace culture.

Additionally, employers may hold certain biases, assuming that visually impaired people are only suited for specific jobs. A survey showed that nearly half of respondents felt their company had few positions suitable for visually impaired people. Many believe they're best suited for roles like customer service at disability-friendly cafes.

These barriers prevent them from entering positions of power. Have you thought of ways we could help them?

**G:**

There are many well-known solutions, like providing assistive technologies or scripts for visually impaired people. For example, we're doing an interview now, and visually impaired individuals can access it through audio. Another solution is preparing Braille versions of documents. These are effective ways to increase their contributions to the team and improve communication. But for employers, these accommodations may seem like extra costs or burdens, which is why visually impaired people still face many challenges, especially in the workplace.

**H:**

We've done a global perspective series on our public account, and one example from Hong Kong is the installation of audible traffic signals to help visually impaired people cross the street. This is something that could be widely implemented because it's not expensive and doesn't require structural changes to societal views. I also researched how transportation barriers prevent many visually impaired people from accepting or retaining jobs. So, addressing practical issues like transportation might be an easier first step than tackling workplace discrimination.

**G:**

Yes, there are many ways we can help, like offering training programs for visually impaired individuals. Many visually impaired people may not be able to do certain jobs, like text-based work or attending meetings, but there are still many opportunities out there. However, due to information gaps or other reasons, they may not be aware of these opportunities. Providing training is an effective way to help, similar to how we see visually impaired people working as masseuses, which is another viable career path, but not everyone knows how to enter that industry.

**H:**

I've also been reflecting on the fact that when people think of visually impaired individuals, they often think of a limited range of jobs, like masseurs, baristas at visually impaired-friendly cafes, or musicians. While these are important, we rarely hear about visually impaired individuals in STEM or business. These fields are crucial because they have a broader social impact. It's essential for them to be represented and have their voices heard in these areas because the platforms are larger and more influential.

**G:**

Exactly. There are many practical reasons why this is difficult. It's not just

about getting visually impaired people into STEM fields. It's about creating communication bridges between STEM experts and visually impaired individuals or other groups in need. Ensuring that everyone is on the same page and working together is already a significant step forward.

**H:**

When you were in Shanghai, you interviewed some visually impaired individuals, right? Could you share your experiences with those interviews? Who did you talk to, and what responses left a lasting impression on you or helped push our project forward?

**G:**

Yes, let's go through them one by one. The first person I interviewed worked at a Braille printing company, proofreading Braille text. I was surprised because I didn't know that this kind of work could be a job or that it was a way for visually impaired people to earn a living. Her job really opened my mind. Initially, our project targeted all age groups, and most of the people we interviewed were adults. However, through her, we learned that many adults, whether through muscle memory or experience, find menstruation less challenging. But for younger individuals, especially those between 12 and 18, they are just starting to experience menstruation and are not yet familiar with it. This is also when they begin to feel self-conscious, making the experience even more stressful. Her input shifted our focus from adults to a younger demographic, and most of the women we interviewed later were younger. The second person I interviewed worked at a special institution I didn't even know existed. They provide corporate training for Fortune 500 companies, focusing on leadership skills, coordination, strengths, and weaknesses in the dark, simulating vision loss. It's a fascinating and meaningful job. Aside from often wearing sunglasses because she couldn't open her eyes, she was no different from a sighted person. She had excellent communication skills and was very articulate. She also loved listening to audiobooks, which helped us find a lot of common ground. It made me realize that people like her, whom we may think of as distant from us, are actually right beside us and aren't as different as we might imagine. She also gave us practical feedback. For example, she preferred cotton sanitary pads for their breathability and was concerned about whether the scent we were designing would be detectable by others. She found the idea of others smelling it a bit awkward. This feedback prompted us to adjust our project, ensuring that our product is as thin, breathable, and absorbent as the best-selling pads on the market. We also worked to limit the scent to a small area so that only the user could notice it.

There were many other interviews, like with a visually impaired singer and a women's organization for the blind. These interviews made us realize that many people around us are visually impaired, but they blend in so well with sighted people that we often don't even notice or realize the challenges they face. Interviews are a great way for us to understand them better through one-

on-one conversations rather than relying on online posts.

**H:**

Yes, when writing the interview notes for visually impaired individuals, I came across a line from the Convention on the Rights of Persons with Disabilities that left a deep impression on me: *“Nothing about us without us.”* This is also one of iGEM’s inclusivity criteria—having direct dialogue with the target group and integrating their feedback into our product. During the interviews, we verified some assumptions, discarded misinformation, and heard new, practical suggestions. Initially, our perceptions were based on stereotypes or first impressions from online information. But through the interviews, we heard their real concerns. For example, regarding the scent issue, we developed a diffusion model to see how the scent would affect their own sense of smell and the perception of others, measuring the duration and intensity of the scent. We also consulted a professor in materials science about the composition of the layers in top sanitary pads. I asked about common materials, such as cotton, and how breathable and absorbent the layers are. This research deepened our understanding of how to integrate our scent-capsule technology into the most practical layer of the pad, ensuring optimal effectiveness. These interviews have been incredibly valuable. They’ve helped us understand the visually impaired community and improved the practicality of our product. We also want to give back to the community we aim to help. That’s why we’re creating this podcast—to reach more visually impaired people, share our project, and create small groups to have one-on-one or group conversations with them about menstruation. We also want to introduce them to synthetic biology. You must have mentioned this in the interviews, right?

I’m not sure if you were there, but we organized an event where we took visually impaired friends to a museum. One of them was a young man who used to compete in chemistry competitions. He lost his vision due to an accident, and in high school, he had to stop pursuing his love for chemistry competitions. We took him to our lab for a tour, and I think that was a cool way to help him rekindle his dreams and learn what high school students are doing in biology and chemistry now.

**G:**

Yes, we realized that access to STEM is essential for them. We’ve also worked with schools like Vanke Bilingual School’s junior high department and Jiaotong University’s summer camp to provide science outreach programs. From the perspective of visually impaired individuals, the work we’re doing may be very helpful to them, but it can also seem distant. For example, working with lab equipment and chemicals can feel inaccessible even for someone like me, a high school student. Making STEM more accessible is crucial, and summer camps, podcasts, and public outreach posts are all ways to achieve this. Surveys are also a good way to understand their needs.

**H:**

Yes, my reflection is that our public outreach posts have mainly been aimed at raising awareness of the challenges faced by people with disabilities, to help us communicate with them. I'm also in contact with a school for blind children in Shanghai, hoping to create biology or menstruation-related science outreach programs for them. Hopefully, this will inspire a spark in young children, helping them realize that visually impaired individuals can also pursue these fields and do amazing things to change the world.

**G:**

Exactly.