



SensUs

Medal Submission Document

Trusense
Version (Version January

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January

1. Bronze

1.1 Register on SensUs Connect;

Registration

Total: 16

 <p>Nan Li Hangzhou, China</p>	 <p>Tingyu Xie China</p>
 <p>Xu Xin China</p>	 <p>顾 (Jianhui) 剑辉 (Gu) China</p>
 <p>Xiang Lou Hangzhou, China</p>	 <p>Beini Chen China</p>
 <p>Yusen Wang Student at Zhejiang University China</p>	 <p>Liu Ziyi Hangzhou, China</p>
 <p>Mengzhen Ye China</p>	 <p>Yibo Shao Hangzhou, China</p>
 <p>Tianyi Chen China</p>	 <p>Xiangjing Chen China</p>
 <p>Zhijian Yan China</p>	 <p>Liquan Huang External and internal chemical sensing for health Hangzhou, China</p>
 <p>Weijia Chen China</p>	 <p>Tianyu Li Hangzhou, China</p>

Post On SensUS Connect



Nan Li

24 minutes ago



Hi everyone! Trusense invited Prof. Baojun Wang (University of Edinburgh, synthetic biology) to the conference last week. Synthetic biology is a cutting-edge technology that encodes and regulates life at the cellular level. Their Projects are very cool, we really learned a lot for sensor development, so I wanna share with you!

The collage contains several key elements:

- Top Left:** A diagram showing the process of engineering a genetic circuit. It includes steps like 'Engineering an input', 'Amplifying intermediate input', and 'Engineering an output'. Below this are graphs showing 'Response time' and 'Amplification'.
- Top Middle:** A diagram of an 'Arsenic' sensor circuit. It shows a signal from an arsenic source passing through a series of amplifiers (labeled 'Amplifier cascade') to a 'Cell'.
- Top Right:** A comparison of 'Digital mode' and 'Analog mode'. The digital mode shows a square wave output, while the analog mode shows a sine wave output with the equation $y = k \cdot f(x)$.
- Middle:** A central image showing a smartphone displaying a green screen with the number '15', connected to a network of blue lines representing genetic circuits.
- Bottom Left:** A 3D model of a cell with various organelles and a number '54' in the corner.
- Bottom Middle:** A diagram of a 'Cell' showing a 'Half adder 1' and 'Half adder 2' circuit. It includes inputs for 'Carry in' and 'Sum out', and lists 'Orthogonal gate libraries' such as AND, XOR, NAND, and MAJ.
- Bottom Right:** A diagram titled 'y of orthogonal split inteins' showing a sequence of 'Intⁿ' and a '+1' operation, leading to a 'One pot' multi-peptide assembly.



Nan Li
20 days ago



[TruSense Technology Introduction](#)

Hi, Everyone! This is a video about our team and technology introduction!

♥ 12 Likes 2 comments

♥ Like Comment



Nan Li
23 days ago



[Virus detection market research](#)

Hi, Everyone! I want to share a market research to you. During the Chinese New Year holiday, we visited some hospitals and related enterprises to learn about the latest development and market performance of the virus detection. We also talked with the virus inspector and learned the real situation of their work since the new epidemic. We learned, "There are four main methods for influenza detection. For novel coronavirus, we used the most costly and accurate nucleic acid assay; For normal influenza, we use virus isolation, rapid testing, and serum testing." One of the most commonly used is a rapid test based on colloidal gold, which is faster and simpler than virus isolation and can buy patients valuable treatment time.

At the same time, the person in charge of Hunan Cisheng Pharmaceutical Co., Ltd told us that in addition to the gold standard method, "there are many auxiliary tests, such as the more commonly done on the market is blood

[Read more](#)

♥ 12 Likes 1 comment

♥ Like Comment



Nan Li
3 months ago



Wish you all health, much love, and happiness in the New Year!

♥ 19 Likes 1 comment

♥ Like Comment

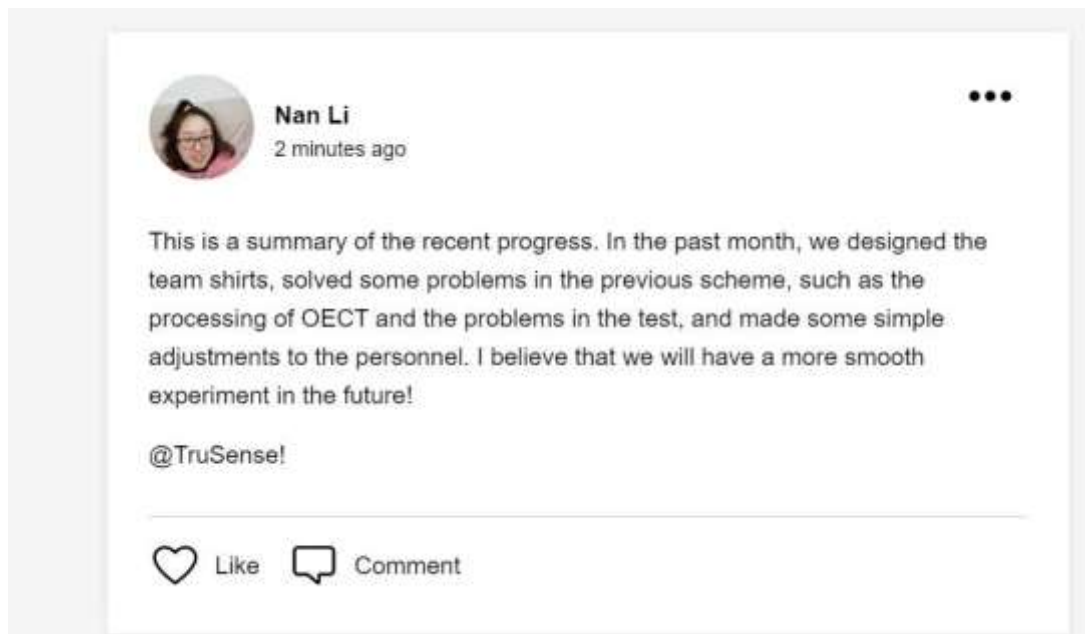
March

1. Bronze

1.1 Motivation;

As the only representative team from Asia, TruSense-Zhejiang University has always been an active participant in the SensUs competition. Through the years of competition experience, we have gained experience in sensor development, applied our technology and knowledge to design successful products, and made some profits during this period. In addition, what is more important is that we have met partners from different countries through this platform. Although we have different cultural backgrounds, we share the same dreams and goals. In the 2021 competition, we will use OECT and QCM to develop our influenza virus sensor. We hope that the final device can realize rapid and accurate detection, we also want to win the gold medal and public inspiration award in the competition. Finally, we also hope to meet and communicate with different teams and sensor companies, so please feel free to contact us anytime.

April



May

1. Silver


1.1 Meet with Alumni;

Attendees	Zhenwei Zhou(2018,2019), Zhe Chen(2020), Yuyao Feng(2020), Yiqiao Sun(2020), Nan Li(2021) and Yusen Wang(2020,2021)
Goal of the Meeting	As the experimental work of our team is progressing fast now, we seek to receive some suggestions from our team's previous members. At the same time, the business transformation team are presenting our work to the public via multiple business plan contests including the "Internet +" competition, we also would like to ask for usable tips about them. However, there are still some problems that occurred when we are fabricating our electrodes used in the sensor. We are in urgent need of technical support and some knowledge about AFM, so in the meeting we hope that former team members can provide some ways to seek help.
Date	2021-5-30
Preparation time	half a day
Duration	15 min
Summary	At the afternoon of May 30, we held an online meeting with the old team members. We introduced the current research and development progress of the sensor, as well as the problems encountered, and asked for their advice on some experimental problems. The former captain mentioned that a professor in Sichuan University School of Medicine may have the solution for some of our troubles. They also gave us the experience of last year, and put forward their opinions on the experiment and publicity, such as the analysis of experimental data, the improvement of experimental methods, and the preparation of the .Last year's TTP also taught us that we should promote Sensus and our biosensor widely on social platforms, and we should cross-promote with other teams, which will make the promotion more widespread. And promoting channels may include the online platforms in our university(CC98 forum), WeChat and offline channels like the billboard in our apartments. In addition, some video materials can be recorded in the usual experiment, which can be used to complete the final Vlog.We learned a lot from this meeting, and we will hold such meetings regularly in the future to ensure a good result in this year's competition.
Evaluation	Our alumni are good people and they are honest to our progresses and mistakes.
Picture	

June

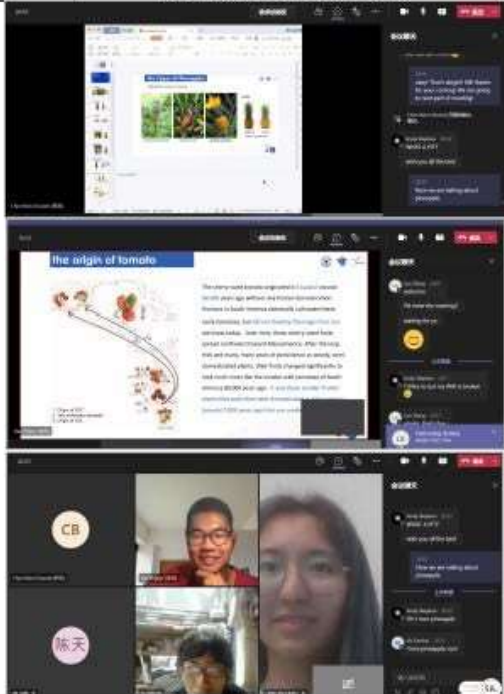
1. Silver

1.1 Interviews with medical professionals;

Professional Name	<Doctor.Qiao>
Short description about professional	<Xingtai City Ninth Hospital Clinical Laboratory Director>
Conducted by	<Yusen Wang, Ziyi Liu, Weijia Chen, Xin Xu, Zhijian Yan, Tingyu Xie, Tianyi Chen, Haoyu Wu, Yuyang Yuan>
Date	<February 7th,2021>
Preparation time	<Jan 11th-Jan27th,2021>
Duration Summary	<p><1 week></p> <p>During the Chinese New Year holiday, we visited some hospitals and related enterprises to learn about the latest development and market performance of the virus detection. We also talked with the virus inspector and learned the real situation of their work since the new epidemic. We learned, "There are four main methods for influenza detection. For novel coronavirus, we used the most costly and accurate nucleic acid assay; For normal influenza, we use virus isolation, rapid testing, and serum testing." One of the most commonly used is a rapid test based on colloidal gold, which is faster and simpler than virus isolation and can buy patients valuable treatment time.</p> <p>At the same time, the person in charge of Hunan Cisheng Pharmaceutical Co., Ltd told us that in addition to the gold standard method, "there are many auxiliary tests, such as the more commonly done on the market is blood cytometer, and now C-reactive protein, as well as interleukin-6 and procalcitonin, which can detect a marker of inflammation."</p>
	

2. Gold


2.1 Organize online Event;

Title of activity 1	Interesting Botany
Organized by	TruSense
Date	2021.07.24
Type of activity	workshop
Abstract	Zhijian Yan and Beini Chen, 2 members of TruSense, shares their knowledge in Botany and Molecular Botany
Objective of activity	connecting students by a interesting and relatively easy topic
Lessons learnt	knowledge in evolutionary biology and the classification of plants, etc.
Recommendations	Many of TruSense team members have Agricultural background and they are excited to share what they have learnt in their study and research. Hopefully these Macro-biology information may inspire us in biosensing. Let's listen to them.
Screenshot	

July


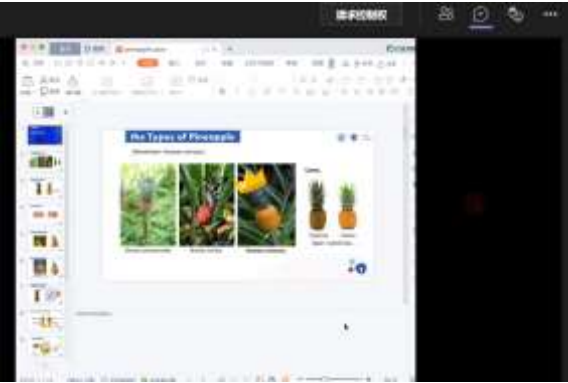
1. Silver

1.1 Meetings with a SensUs Partner;

Partner	Siemens Healthineers
Attendees	Nan Li, Xiang Lou and Xin Xu
Goal of the Meeting	As for we have developed a business plan for our product promotion, we are not sure about some details so we held this meeting to see if there's any advice. Also we are curious about how to improve our customer targeting session when preparing for our final translational potential pitch. Some of our team members never attended such a meeting before so this one would be a chance for them to contact foreign professionals and practice speaking. Technical issues presented in the power-point may be discussed as well.
Date	2021.07.23
Preparation time	1 week
Agenda	business plan presentation(10min); technology introduction(10min) team introduction(3min); question-asking and discussion(10min) ;
Duration	30min
Summary	We presented our work in the form of power-point and discussed with Ms. Judy. She emphasized the importance of finding appropriate consumer population.
Evaluation	It's a cordial and helpful meeting.
Minutes	30min
Social Media Post (Wechat public account)	 <p>Hi! Everyone we held an online meeting with Siemens (Germany) on July 23. Trusense team members Li Nan, Lou Xiang and Xu Xin attended the meeting. Ms. Judy from Siemens gave comments and suggestions on our business plan, with emphasis on how to target consumers.It was a cordial meeting! 😊</p>

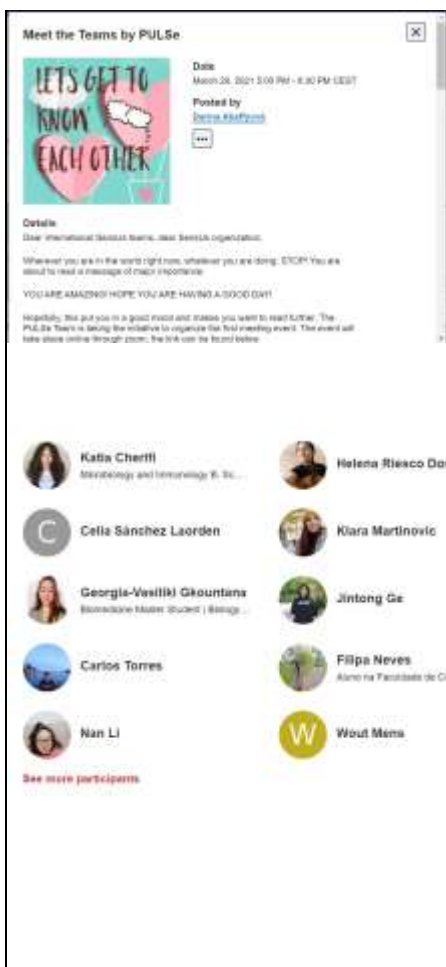
1.2 Be present at two online events;

Title of activity 1	Interesting Botany
Organized by	TruSense
Date	2021.07.24
Type of activity	workshop
Abstract	Zhijian Yan and Beini Chen, 2 members of TruSense, shares their knowledge in Botany and Molecular Botany, totally 7members of Trusense joined.
Objective of activity	connecting students by a interesting and relatively easy topic
Lessons learnt	knowledge in evolutionary biology and the classification of plants, etc.

Recommendations	Many of TruSense team members have Agricultural background and they are excited to share what they have learnt in their study and research. Hopefully these Macro-biology information may inspire us in biosensing. Let's listen to them.
Screenshot	 

Title of activity 1	IMeet the Teams by PULSe
Organized by	PULSe
Date	2021.03.29
Type of activity	workshop
Abstract	WHAT? Quiz & get-to-know-each-other time.
Objective of activity	connecting students by a interesting and relatively easy topic
Lessons learnt	Please, react to this event if you're interested in joining us so we know how many people to expect.
Recommendations	Wherever you are in the world right now, whatever you are doing: STOP! You are about to read a message of major importance:Hopefully, this put you in a good mood and makes you want to read further. The PULSe Team is taking the initiative to organize the first meeting event. The event will take place online through zoom, the link can be found below.


Screenshot



2. Gold

2.1 Present at a professional Event;

Title of event	Annual Academic Convention 2020, International Campus Zhejiang University
Date	2020.12.26
Preparation time	1 month
Type of event	conference
Abstract	The Annual Academic Convention of the International Campus, Zhejiang University provides a platform in which faculty and students can present their academic accomplishments. The purpose of the Convention is to provide opportunities for faculty and students to meet and to discuss current research on a broad range of subjects.
Objective of event	To provide opportunities to discuss current research
Partners	Researchers and students from ZJU College of Life Science and ZJU-UoE Joint Institute
Contact person	Prof. Liqun Huang(huangliquan@zju.edu.cn)
Evaluation method	To evaluate the visibility of team's lecture
Evaluation (fill in after the activity)	
Number of participants	~300

Lessons learnt	At this conference, we presented trusense's work over the past two years and our competition plan for 2021. We adjusted the plan to improve the specificity of the sensor in response to questions from the present faculty about the characteristics of the virus and the characteristics of OECT
Recommendations	We are Trusense from Zhejiang University. We have participated in the Sensor Competition twice and achieved excellent results. This year's theme was biosensors for influenza viruses. We designed an OECT based product with a target detection limit of 10^{-9} M and flexibility to modify different antibodies to respond to different antigens
Picture	 A wide-angle photograph of a large, brightly lit conference hall. Numerous people, mostly men in business suits, are seated at long, light-colored tables arranged in rows. The room has high ceilings, large windows on the left, and a red carpeted aisle running down the center. The atmosphere appears to be a formal professional gathering.

August

1. Bronze

1.1 Tips for subsequent SensUs Teams

- Tip 1: [It is necessary to determine the general direction of research and development in advance, and contact the laboratory in advance to ensure that sufficient experimental resources and equipment are available]
- Tip 2: [You need to have a proper system of rewards and penalties in place when you're managing your team]
- Tip 3: [When the schedule is delayed, it is necessary to hold meetings in a timely manner and assign tasks accurately to each person]

Valuable tips in the document:

- [When recruiting a team, you need to advertise ahead of time]

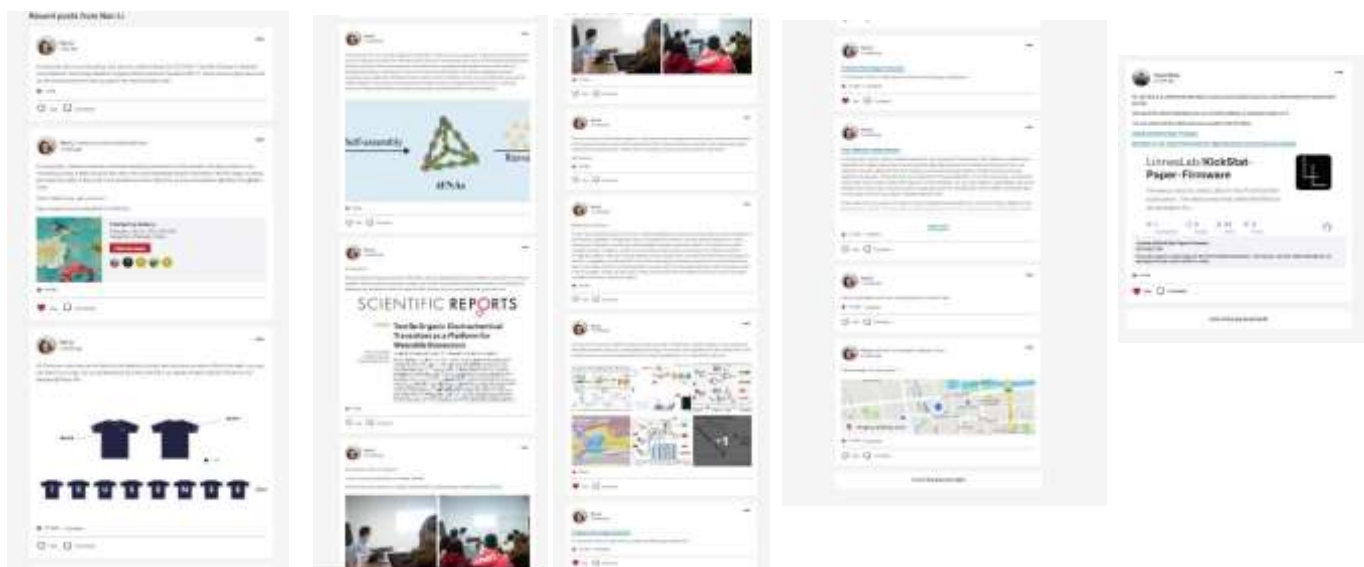
2. Silver

2.1 Reposts on social media;



]

2.2 Post on Contact



3.2 World-value;

As long as the SensUs competition's slogan is "Compete for quality of life", we are focusing on our biosensor's ability to inspire the scientific community, to benefit the public health system, to reduce pollution to the natural environment and to help cure the patients. Firstly let's talk about the inspiration to the scientific community. Our biosensor uses screen-printed organic electrochemical transistor to amplify the minimal signal generated by binding reaction[1]. The technology is firstly combined with the DNA tetrahedron[2] to achieve better performance. We consulted our coach, who is experienced in the field of OECT application and made some test to ensure the reliability of our results.

In the winter holidays our team went to multiple local primary hospitals, which bear the burnt of the wave of pandemic. Interview result show that these medical institutions are often troubled by time-consuming traditional diagnosis methods like gold immunochromatography and hematology analysis. It comes worse that many patients can't even bear the slight discomfort caused by those methods, especially for the vulnerable population of influenza—children and elderly people. But by reducing the measuring time to 5 min by our biosensor, the welfare of patients may be enhanced.

As news reported, China's first wave of COVID-19 pandemic largely results from lack of fast-testing instruments[3]. Many people died while they were still in the waiting list of COVID-19 screening. Although we still need 5 min to get the result, the efficiency of diagnosing is improved 24 times. This revolutionary change will greatly benefit public health system, preventing the possible collapse.

TruSense team cares about the reusability of biosensor. We chose aptamer as the molecular recognition part as it can be regenerated by certain physiochemical factor treatment and to be regenerated for next usage[4]. This technology will limit the pollute created in the procedure of experimentation and also cut the cost, improving economical efficiency. Our aptamer technology is approved by Prof. Dr. Baojun Wang, who is one of our consultants.

To verify our technology, including the DNA tetrahedron and aptamer, TruSense performs several physical and electrochemical tests. AFM (Atomic Force Microscope) photography showed that DNA tetrahedron tightly bound on the surface of gate electrode. EIS (Electrochemical Impedance Spectrum) showed that our device can be reused after simple treatment. Our device's transference characteristic curve showed its reproducibility. Those results, in the technical aspect, proved the biosensor's ability to fulfill all of our vision mentioned at the beginning.

Our References:

- [1] Contat-Rodrig, L., Pérez-Fuster, C., Lidón-Roger, J. V., Bonfiglio, A. & García-Breijo, E. Characterization of screen-printed organic electrochemical transistors to detect cations of different sizes. *Sensors (Switzerland)* 16, (2016).
- [2] Bao, J. et al. Carbon Nanomaze for Biomolecular Detection with Zeptomolar Sensitivity. *Adv. Funct. Mater.* 2006521, 1–13 (2020).
- [3] <https://baijiahao.baidu.com/s?id=1658233894985765437&wfr=spider&for=pc> (Why is the situation of COVID-19 pandemic still grim after 28 days past outbreak?)
- [4] Phan, D. T., Jin, L., Wustoni, S. & Chen, C. H. Buffer-free integrative nanofluidic device for real-time continuous flow bioassays by ion concentration polarization. *Lab Chip* 18, 574–584 (2018).