



SensUs

Medal
Submission Document

UT+
Version January

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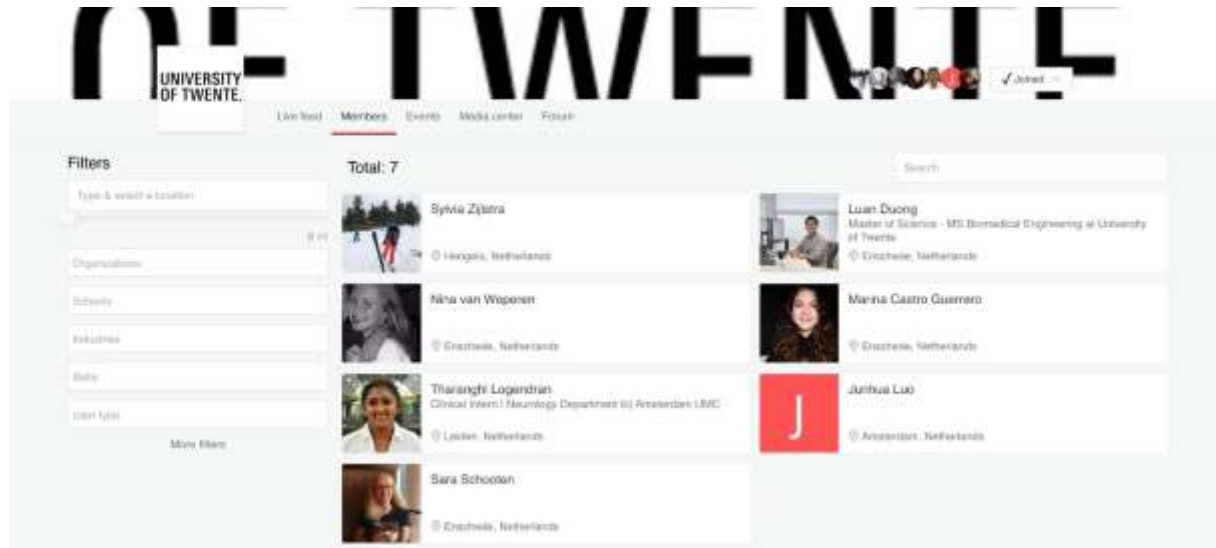
Table of Contents

| | | |
|--|-----------|--------------|
| January | 2 | 1. |
| Bronze | 2 | 1.1 |
| Register on SensUs Connect;..... | 2 | |
| March | 3 | 1. |
| Bronze | 3 | 1.1 |
| Motivation;..... | 3 | |
| May | 4 | 1. |
| Silver..... | 4 | 1.1 |
| Meet with Alumni;..... | 4 | |
| June | 5 | 1. |
| Silver..... | 5 | 1.1 |
| Interviews with medical professionals; | 5 | 2. Gold |
| | 5 | 2.1 Organize |
| online Event;..... | 5 | |
| July | 7 | 1. |
| Silver..... | 7 | 1.1 |
| Meetings with a SensUs Partner;..... | 7 | 1.2 Be |
| present at two online events; | 7 | |
| 2. Gold | 9 | 2.1 |
| Present at a professional Event; | 9 | |
| August | 11 | 1. |
| Bronze | 11 | 1.1 |
| Tips for subsequent SensUs Teams | 11 | 2. |
| Silver..... | 11 | 2.1 |
| Reposts on social media;..... | 11 | 3. Gold |
| | 11 | 3.1 Post |
| on SensUs Connect every month; | 11 | 3.2 |
| World-value;..... | 12 | |

January

1. Bronze

1.1 Register on SensUs Connect;



March

1. Bronze

1.1 Motivation;

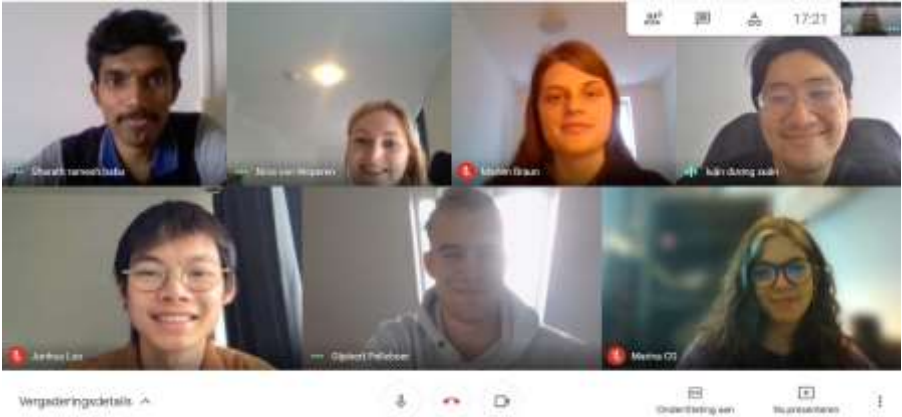
As seen in the past, influenza can cause a real pandemic, so this is a big social problem. This is one of the reasons why we wanted to participate in the SensUs competition: there is a need for a better and faster biosensor to detect influenza. Besides, we think joining this competition is a unique opportunity to expand our knowledge about designing a medical device, especially in (photonic) biosensing systems. Thereby, we increase our knowledge about writing a business plan. We also think we can learn a lot from communicating and eventually collaborating with companies. We have a multidisciplinary team so we can also learn a lot from each other due to our different study background. Last but not least, we have fun together as a team! We are really looking forward to the upcoming months to develop a good working biosensor to prevent another pandemic in the future!

May

1. Silver

1.1 Meet with Alumni;

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| <p>Attendees</p> | <p>Marlen Braun (2020) Gijsbert Pelleboer (2020) *One alumni didn't show up.</p> |
| <p>Goal of the Meeting</p> | <p>The goal of this meeting with the alumni is to learn from the pitfalls the previous team experienced. We are curious about their experiences and also how they managed with the situation of last year due to Covid-19. We also want to ask them for some tips about collaboration with companies and some general aspects. Besides, we want to discuss the progress of the student team for this competition. UT+ is a starting student team at the university of Twente, so we want to discuss how we can improve our team. It would be nice to share our knowledge with the upcoming teams.</p> |

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| Date | 25-05-202 |
| Preparation time | 1 hour |
| Duration | 1 hour |
| Summary | <p>During this meeting we first introduced ourselves. Then we talked about the problem of the contest this year. We also explained how our sensor worked, so they had a good idea of what our goals are. Then we talked about their experiences during the contest last year. Last year it was the first time that the university of Twente participated in the Sensus competition. It was also a different year because of Corona, but besides that, they could give us some good advice. We are a starting team, so we also discussed how we can improve this team. Together we made some plans about how we can help upcoming teams in advance. We want to share our Google drive and will create one shared Google drive. In this way every team has access to the plan of the previous teams. This will make the start of the competition quicker. Besides they had some good tips about the organisation of the project, for example that they used Tictic. Also they gave us the advice to not underestimate the process of testing the sensor. We have to make big steps in this process, so this was a good wake up call for us.</p> |
| Evaluation | We thought the meeting was very helpful. It was nice to hear about their experiences and we will keep in contact with them. |
| Picture |  <p>A screenshot of a Zoom meeting showing seven participants in a grid layout. The participants are: Charatharanwarthi, Nina van Heijst, Marlon Braun, Kiki (dancing solo), Jeroen Lee, Christel Peltboom, and Melissa OJ. The meeting title is 'Vergaderingsdetails' and the time is 17:21.</p> |

June

1. Silver

1.1 Interviews with medical professionals;

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| Professional Name | Floor Rodenberg-ten Berge |
| Short description about professional | Floor is a general practitioner in Kesteren. She and her colleagues are the only general practitioners in the village, the closest hospital is in Tiel. That means that they generally can do more examinations than general practitioners in the city. |
| Conducted by | Sylvia Zijlstra and Tharanghi Logendran |
| Date | 07-04-2021 |
| Preparation time | 30 minutes |
| Duration | 35 minutes |

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| <p>Summary</p> | <p>Currently flu patients know for themselves whether they are ill or not. The patients with respiratory symptoms are assessed on whether they are severe or not, which means: whether there are also pain symptoms and breathing difficulties. The doctors perform physical examinations and tests for CRP (C-reactive protein). When the CRP levels are low, nothing happens. If the levels are increased, the illness is treated as pneumonia.</p> <p>Background of the patient plays a large role in assessing the severity of illness, such as diabetes, high blood pressure and dehydration. If the situation is determined to be severe, the patient is sent to the emergency room. This is because the general practitioners cannot assure that the situation at home is safe enough for the patient. In the ER the patient is constantly watched and supported where needed.</p> <p>Disadvantages of the current detection method (CRP measurement) is very supplementary to other information and the symptoms the patient presents. When the patient shows clear signs of the flu and severe symptoms, but has low CRP levels, the patient is sent to the ER anyways. The general practitioner does not determine what the cause of the inflammation is, that happens in the ER. There they will determine whether the inflammation is viral or bacterial. Floor thinks that patients would like to know what causes their inflammation and symptoms and would be useful to distinguish from COVID, but it would not really make a difference for doctors. They care more about treating the symptoms, because Influenza is not very contagious. For COVID this is different, because the virus is very contagious.</p> <p>For future pandemics a biosensor could be very useful. A biosensor should at least give a quick result and should be minimally invasive. It should be as easy as possible to use and preferably also at home. It would also be helpful if it is not necessary to clean the whole device between patients and that it has disposable parts.</p> |
| <p>Evaluation</p> | <p>To know the current detection method for influenza and point out the disadvantages of CRP and PCR tests, it shows that there is a market for influenza biosensors (improve human influenza detection).</p> |

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| <p>Professional Name</p> | <p>Gerdien van Schaik</p> |
| <p>Short description about professional</p> | <p>Gerdien controls the epidemiology group of GD Animals, designing all kinds of projects and mainly focused on farm animals. She is also a professor in Emipedemiclogy at Utrecht University. She is also asked to join a committee to advise on zoonotic disease risks.</p> |
| <p>Conducted by</p> | <p>Tharanghi Logendran and Junhua Luo</p> |
| <p>Date</p> | <p>03-06-2021</p> |
| <p>Preparation time</p> | <p>30 minutes</p> |
| <p>Duration</p> | <p>60 minutes</p> |
| <p>Summary</p> | <p>Gerdien first introduces how to detect the influenza within animals and points out an example of detecting swines. It is cheaper to detect the animals influenza compared to humans with 40-50 euro max combining three roles and combining into one for pig. Around 2000 pools in the Netherlands would purchase the diagnostics. Slaughterhouse, 12 millions pigs. 100 millions chickens.</p> <p>They usually use an indirect way of testing - detecting the environment, and samples will be collected as a pool. When detecting animals, they are more curious about the group, not the individuals. They only care whether the virus circulates</p> |

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| | <p>within the animals. When animals are ill, vaccinating animals is an option instead of killing.</p> <p>She also mentions, from a technological point of view, it is similar that there are specific viruses in the animals, but they are more generally similar to humans, like influenza. There might be particular mRNA because of new variance and new strings. The way we detect influenza from humans is similar to coronavirus, taking samples from the deep nose and deep throat with PCR.</p> |
| Evaluation | <p>There is a huge market in animal influenza in the Netherlands. Get to know more about the how to detect the influenza within the animal as well as the ideal product of a biosensor for animal detection.</p> |

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| Professional Name | <p>prof. dr. A.L.W. (Anke) Huckriede</p> |
| Short description about professional | <p>Anke's expertise is in vaccinology, but she also is a virologist both at the UMCG. Before corona, her research was focused on influenza, now also on covid. She is researching influenza as an infectious disease that everyone repeatedly qualifies for. The research question that she then investigates is does this have any connection with new diseases and vaccinations and immune response. Some of her research takes place in vitro. Here they can see the difference between young and old.</p> |
| Conducted by | <p>Sylvia Zijlstra</p> |
| Date | <p>03-06-2021</p> |
| Preparation time | <p>30 minutes</p> |
| Duration | <p>20 minutes</p> |
| Summary | <p>Today, influenza is detected on the basis of disease criteria. Little flu activity this winter due to corona. Before corona, infection with severe cold symptoms (especially cough and fever) and rapid development of symptoms was suspected of influenza. Other viruses can also cause respiratory infections. Diagnosis is made for only a few people with influenza, because there is no real use for it and it costs too much time and money.</p> <p>When a test is done, PCR is often used when influenza is detected. Unfortunately, this has a relatively long duration to rash and duration. New diagnostics must be faster, and to make it more accessible, people must be able to do this themselves. This ensures that costs are kept down. It is important that the test remains reliable, try to pay close attention to specialty and sensitivity in this test instead of fast.</p> <p>Check what your target group is to test, this can be a broad group but sometimes specific is better. At the moment, the advantages of testing are recognizing and encapsulating sources of infection. Situation is different if there is good medication against it, that is not the case with anti-viral diseases at the moment. Think of a retirement home as a target, so that no lab is needed. Prophylactic antivirals can be given there because this is a small group.</p> <p>Main requirements for biosensor:</p> <ul style="list-style-type: none"> ● Easy to maintain ● Reliable ● No lab needed ● Sensitivity and specificity ● Unambiguously |

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| | <p>What makes them start using new equipment instead of current equipment? If they are easier to use, cheaper, without compromising sensitivity and specificity. Time is mainly hands-on time, these are the most important in addition to reaction.</p> <p>All viruses can be detected by PCR. Only the response to this has to be adjusted, so virus specific antibodies have to be adapted.</p> <p>Multiple viruses in 1 sensor is possible if there are different antibodies in a virus, but pay attention to specificity.</p> <p>Think detecting multiple viruses is very interesting. There are quite a lot of patients for whom you do not yet have a real diagnosis, so that you can test multiplexes for different viruses. Would be very nice.</p> <p>Antibodies h1n1, there are still 100 different strains within this variant. You have antibodies that are very specific on 1 strain. This is of little use to you if you develop this, think more broadly. Choose something that all of these or the majority can recognize.</p> <p>The degree of specialty is very important. Consider the possibility in third world countries as a target. Especially complexity and price is an issue here. Often new strains of a virus develop where there are few possibilities. If you want to effectively contain a virus, you have to do it in all layers of the world.</p> |
| Evaluation | Gain a deeper understanding of influenza and how we detect the influenza within humans. |

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| Professional Name | Erhard van der Vries |
| Short description about professional | Erhard is senior scientist at GD animal health with over 12 year of experience in influenza. He is interested in how to detect influenza in animals. |
| Conducted by | Marina Castro Guerrero, Sharath Rameshbabu, Nina van Weperen |
| Date | 18-06-2021 |
| Preparation time | 30 minutes |
| Duration | 50 minutes |
| Summary | <p>Erhard thinks Influenza is the most important virus in the world, but the pig market doesn't see it like that. They see this PRRSV virus as the most important virus. PRRSV is a respiratory virus and also a reproductive virus. It affects the macrophages in the lungs. From there it goes into the blood, you can detect it in serum. PRRSV is pretty similar to Influenza. The way industry deals with this problem is with vaccinations. However the vaccinations are an "attenuated" version of the virus, which also comes up in tests. This creates a big problem. If your setup could detect and differentiate both vaccine and wild virus, it would be a breakthrough.</p> <p>If you want to test influenza, you can start with the pig market and continue with humans. This is a big market, a big industry with a lot of money, so if you think of an entry market with a lot of money, it's the pig market. For them Influenza is the second target, and PRRSV the first target. This is because it costs billions to the industry. But there are more animals in the Netherlands than humans, so it could be an interesting entry market. The pig market in the Netherlands is huge.</p> <p>There are all kinds of regulations when it comes to exporting and importing livestock. The regulations regarding PRRSV is that if you want to export pigs to, let's</p> |

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| | <p>say Spain, then you need to ensure that the pigs that you are exporting are PRRSV free. This is a problem because: the big issue within the pig market is that you get the spread of the PRRSV vaccine and the PRRSV virus, and they want to distinguish the vaccine virus and the field virus, but that is not possible yet. If you could make an essay that could do that, then you have a high potential in the pig industry.</p> <p>Many people focus on humans, so maybe it's interesting to focus on animals, it's a different point of view. If you think of a platform that needs to make money as a business case, and you need an entry market, then you can consider the PRRSV virus and the pig market. It's also good to think of the sampling method. The traditional PCR is relying on conventional ways (long paths) of diagnostics. In this pandemic, it wasn't a good way to handle such huge volumes of data, it's a huge logistical problem. If you could go for an alternative logistic route, if you detect it on the spot, and the result goes via the internet to the doctor, that is a big progress. That's also an advantage of your chip.</p> |
| Evaluation | Deeper understanding of the animal market (pig market) within the Netherlands. |

2. Gold

2.1 Organize online Event;

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| Title of Event | UT+ Sensus Lecture from Dr. Annemieke van Dam Lecture title: Development of a biosensor - with a side-step to the forensic field |
| Date | Thursday, May 27 · 5:00 – 6:30pm GTM+1 |
| Preparation time | 5 hours |
| Type of event | Guest Lectures |
| Abstract | The lecture from Dr. Annemieke van Dam provides the basic guidelines in developing a biosensor, with all the aspects in building a successful product in sensing devices. The lecturer also provides the example of this guideline in her research of the forensic field, specifically building optical biosensors in fingermark analyzing. |
| Objective of activity | As the Sensus competition is focusing on building the novel biosensor for influenza, we believe it is an interesting topic to give the student the insights into how researchers build the set-up of biosensor in a real life laboratory context. Indeed, Dr. Annemieke van Dam's lecture focuses largely on this aspect, specifically on the guideline of building biosensors, as well as her hand-on experiences in this process. |
| Promotion | We posted the designed poster on our social media page (Instagram) as well as on Sensus Community website. Here is the access to our post on Instagram and our poster: https://www.instagram.com/p/CPEAqY9p8UY/?utm_source=ig_web_copy_link |

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| Partners | Speaker: Dr. Annemieke van Dam from University of Amsterdam Partners: KIVI Medical Technology Team Enschede, Prof. Ton van Leeuwen from University of Amsterdam |
| Contact person | Lecturer: Dr. Annemieke van Dam Email: annemiekevdam@amsterdamumc.nl |
| Evaluation method | We have 1 hour of lecture and 30 minutes for Q&A sections. The Q&A section is used to evaluate the usability of the lecture to students' projects. More questions toward our lecturer show the applicability of Dr. Annemieke van Dam guideline on developing biosensors to other's setup. Interaction is thus our main evaluation. |
| Evaluation (fill in after the event) | |
| Number of participants | Besides 3 members from our team, 11 people registered for the event 7 of these 11 people attended, so there are a total 10 people including our team. However, absent people who registered will receive the email with the recorded lecture after the event. |
| Lessons learnt | From our points of view, the lecture was interesting as Dr. Annemieke van Dam provided a really clear overview of all the steps in building a biosensor. This will be helpful in the next stage of experimenting we have in the competition. The side-step on her research of forensic biosensing is also a compelling topic. There are several questions from the students on her recommendation on their setup. We believe her answers give a clear insight from the inside researchers and might be very useful for |

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| | the students |
| Recommendations | Shifting time zones is one of the main technical problems if you want to organize online events for the international community. One of our attendees was late for the lecture due to the mistaken time zone. The time of the event should be chosen that is most suitable for more people in different areas. |
| Picture | |

July

1. Silver

1.1 Meetings with a SensUs Partner;

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| Partner | Bronkhorst |
| Attendees | Ergbert van der Wouden (Bronkhorst), Rik de Boer (Bronkhorst), Ferdinand Luimes (Bronkhorst), Marina Castro Guerrero, Nina van Weperen, Duong Xuan Luan, Sara Schooten, Sylvia Zijlstra |
| Goal of the Meeting | <Add a description in which you explain what the goal is of the meeting (+/- 100 words)> |
| Date | May 18, 2021 |
| Preparation time | 1 hour |
| Agenda | <p><u>Questions</u></p> <p>3.1 We see that you are a SensUs partner. What is the reason for Bronkhorst to support the competition?</p> |

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| | <p>3.2 Microfluidic handling is an area that we don't have extensive expertise in. What can you do to support us?</p> <p>3.3 We would like a system that can switch between two fluid channels (one for buffer, one for saliva), and run both at 10-50 $\mu\text{l}/\text{min}$. The liquid channels are not going to be very long (+- 10 cm), and we want to avoid bubbles in the channels. How would they handle it? (can they give an overall picture of parts, etc)</p> <p>3.4 How do you keep this system as compact as possible?</p> <p>3.5 From their own experience, are there flow rates typically used for biosensing?</p> <p>3.6 Positive vs Negative Pressure: What Are Their Experiences?</p> |
| Duration | 1 hour |
| Summary | The aim for this meeting with Bronkhorst is to know each other better and discuss the potential support from Bronkhorst side, especially in microfluidic handling. From Introduction, we shared more detailed information about our goal to detect Hemagglutinin H1 in saliva, a protein from Influenza. A discussion in an overview of the project (testing in the lab) and the role of Bronkhorst in this planning. |
| Evaluation | The meeting was evaluated taking into account the amount of valuable information and questions answered that we got from Bronkhorst. It was also evaluated the way the meeting was led by one of the team members and the way it flowed. |
| Minutes | <p>Part 1- Introduction:</p> <ol style="list-style-type: none"> 1. Marina: Introduction to the team (goal to detect Hemagglutinin H1 in saliva, a protein from Influenza, using photonic microring resonators combined with an antifouling layer). Slide deck was used to show more detail (slide 2 shows specs for detection). 2. Question - Egbert: Is the chip optimized specifically for this purpose? Or is it off-the-shelf? No for both questions, the chip is developed by Optical Sciences and it has been optimised for covid detection, which is quite similar. The chip has 16 rings but we don't use them all. Egbert: if the chip is not optimised for the application it might have consequences in the detection. The constraints in slide 2 are quite restrictive. 3. Question - Egbert: How far are you in the project? Have you started testing in the lab? Pretty much investigating everything but separately. We have tested surface functionalization and we have plans to combine this with the photonic chip. But we have not got the saliva yet due to delays in shipping, which we need to combine experiments and start testing. Question - Egbert: Do you have planning? A bit of delay in the experiment and milestones, but this week we are finishing the global planning. 4. Question - Egbert: The role of Bronkhorst in this planning? What is the ask for Bronkhorst? Advice in microfluidic handling. We need only 2 channels => Advice on microfluidics, how to control flow 5. Question - Egbert: Want to optimize the microfluidics? Loes (with whom I shared office many years at the UT) knows passive and active microfluidics. In passive microfluidics you don't measure the flow. If this is enough, then it is easier. We do not have much time to optimize. Assembling will take a bit of time. Micro-ring: steady reliable rings. We try to follow the leanest path. A constraint is that we need steady, reliable flow to measure refractive index change. 6. Question - Egbert: How changing flow affects the reflective index ? If you move sth through liquid, density might be varied. It is a quite sensitive optical sensor, vibration and temperature need to be controlled. 7. Question - Ferdinand: How sensitive is the sensor ? Really sensitive, even for the small change 8. Question - Rik: Is that really necessary to have stable flow, and how big is it ? 20 - 50 μL per minute => Important to have a fast but stable rate. Nico: Do we have the flow system ? Depending on the chip we made - parallel channels |

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| | <p>9. Question - Egbert: Is it easier if we make the channel smaller (Easier to control) ? Nico: Recycling maybe easier?</p> <p>Part 2:</p> <p>1. Is recycling ok ? In case you have a low number of proteins then this might be an option. It is possible, just need to change bit parameters. The flow rate is already pretty high and would become much higher. Also, the extra length of tubing increases the risks of contamination and nonspecific binding.</p> <p>2. So we should not recycle ? You can, but need to check if the internal area of the tube absorbs anything, but a small channel should be fine. Cleaning part is a bit hard, so you need to be careful.</p> <p>3. Nico's suggestion: Put the system after the cells? Good idea, no interference with anything</p> <p>4. Rik: You need a pressure controller. Egbert: But what happens with bubbles ? Nico: I thought it's gas pressure? Egbert: Pressure over all of the fluid => easy to get bubbles. Rik: Time is too small to get bubbles. Ferdi: Use some cell to remove the bubbles Egbert's suggestion: Need to look what pressure we use Rik: Repeatability, the result might be acceptable so it should be fine Egbert's suggestion: droplet of liquid, then absorb inside</p> <p>5. Ferdi: Heat might be the problems (small box), Cleaning procedure => introduce gas to the system and contamination Egbert's answer: The surface is big => Heat is not easier to change. 3 Solutions:</p> <ul style="list-style-type: none"> - Heat for the experiment set-up: change above of room temperature. - We can put in buffers that can stabilize the temperature such as liquids, aluminum. - Place the box around <p>6. Nico: Should we use multiple channels or we need to clean? There is no time for cleaning, so the chips will be used as a disposable cartridge. We can make multiple parallel channels, but cannot use them simultaneously.</p> <p>7. Ferdi: What is the next step?</p> <ul style="list-style-type: none"> - Marina: Discuss about what we talked today and then contact you next week |
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Social Media Post




The image shows a social media post from the account 'utplus_utwente' (University of Twente). The main content is a photograph of a meeting in a bright, modern office space with large windows. Several people are seated around a long table, some with laptops open. In the foreground, a man in a black t-shirt is sitting and talking to the group. The post includes interaction icons (heart, comment, share, bookmark) and a notification that it was liked by 'tharanghi and 18 others'. The caption reads: 'utplus_utwente Tuesday afternoon we had a really nice meeting with Bronkhorst talk about the possibilities to improve our sensor. It was one of the first physical activities for our team, next to the work in the lab off course.' The date is 'May 21'.

1.2 Be present at two online events;

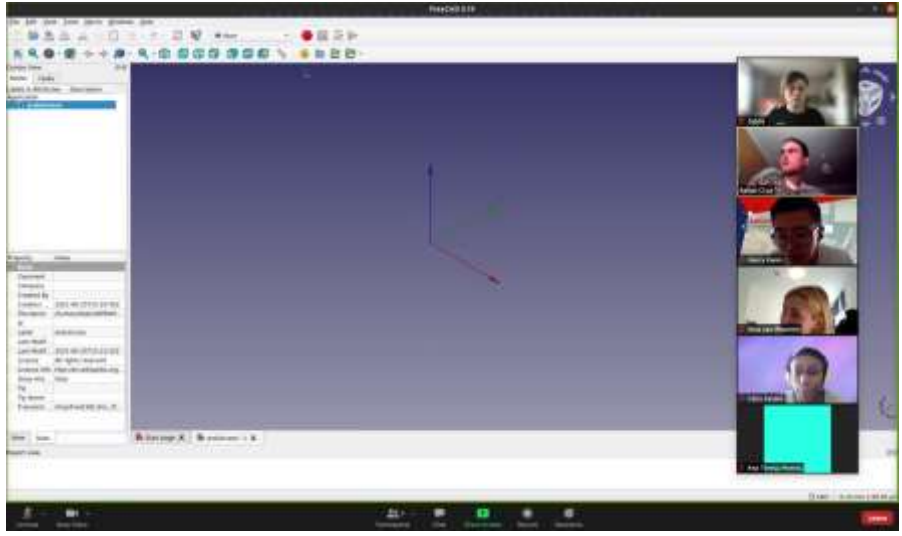
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| Title of activity 1 | UT+ Sensus Lecture from Dr. Annemieke van Dam Lecture title: Development of a biosensor - with a side-step to the forensic field |
| Organized by | UT+ |

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|-------------|--|
| Date | Thursday, May 27 · 5:00 – 6:30pm GMT+1 |
|-------------|--|

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|------------------------------|---|
| Type of activity | Guest Lectures |
| Abstract | The lecture from Dr. Annemieke van Dam provides the basic guidelines in developing a biosensor, with all the aspects in building a successful product in sensing devices. The lecturer also provides the example of this guideline in her research of the forensic field, specifically building optical biosensors in fingerprint analyzing |
| Objective of activity | As the Sensus competition is focusing on building the novel biosensor for influenza, we believe it is an interesting topic to give the student the insights into how researchers build the set-up of biosensor in a real life laboratory context. Indeed, Dr. Annemieke van Dam's lecture focuses largely on this aspect, specifically on the guideline of building biosensors, as well as her hand-on experiences in this process |
| Lessons learnt | From the perspective of the listeners (not organizers), we indeed have learnt a lot from Dr. Annemieke van Dam, especially in improving the quality of our experiment set-up. As indicated above, the lecture provides a really clear overview of all the steps in building a biosensor, which helps us to figure out a lot of what we are missing in building our experiment. We also have several questions to her for our topics; and we gained really valuable feedbacks |
| Recommendations | There are 3 persons in our team who joined this event, with one key co-speaker with our guest lecturer, and 2 attendees. We recognize that the role of co-speaker in these guest lecturer events is extremely important. Without the this position in the lecture, it will be confused for the listeners as there is no explanation in planning, and to stimulate the questions from listeners. |
| Screenshot |  <p>The screenshot shows a Zoom meeting interface. On the left, a presentation slide is displayed with the title "In the nearby future...". The slide content includes an image of a crime scene with "CRIME SCENE DO NOT CROSS" tape, a diagram of a biosensor setup, and a "Fingerprint profile" section with a list of items: 1. Identification, 2. Fingerprint, 3. Fingerprint, 4. Fingerprint, 5. Fingerprint. On the right side of the screenshot, a grid of video thumbnails shows several participants in the meeting, including Hans van Tricht, Marina Castro Quaresima, Mariana Costa Pereira, Catarina Moura, Rafael Cruz, and Sara Scholten.</p> |

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| Title of activity 2 | FreeCAD workshop 3D parametric modeling |
| Organized by | The LxUS team |
| Date | June 25 |
| Type of activity | Workshop |
| Abstract | It was a workshop to learn the basics of working with CAD software. The goal was to create a modular Arduino/RPi case that can be easily changed to different scenarios. |

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| Objective of activity | The SensUs community is a bit about learning from each other. Thus in this activity it was learning a new skill from another team, in this case working with CAD software. |
| Lessons learnt | Sadly both Nina and Sylvia did not have the correct computer to be able to work with the software, they have followed the workshop but where not able to really join and work with it. The lesson learnt was to better understand in advance what kind of software was needed so we could have prepared by using another laptop or something. |

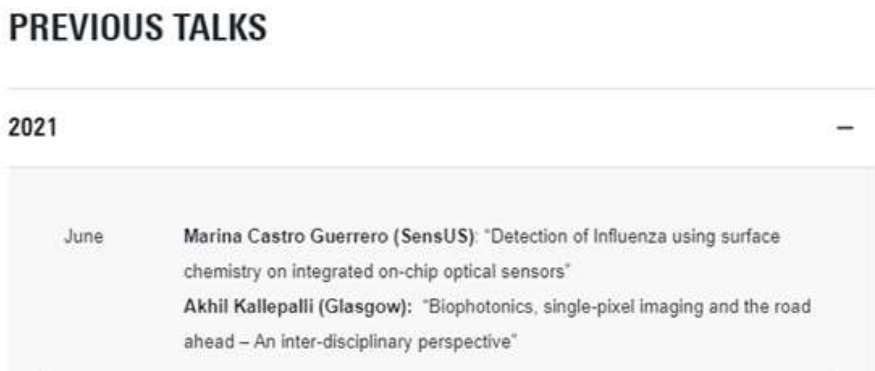
| | |
|------------------------|---|
| Recommendations | Our recommendations is to put a bit more info out before the event on how to download these sorts of software and what laptop you need for that. |
| Screenshot |  <p>The screenshot shows a Zoom meeting in progress. The main window displays a CAD software interface with a 3D model of a part. On the right side, there is a vertical grid of video feeds for several participants. The Zoom interface includes a toolbar at the bottom with icons for mute, video, chat, and other controls.</p> |

2. Gold

2.1 Present at a professional Event;

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| Title of event | ANP meeting |
| Date | 3rd June 2021 |
| Preparation time | 2h |
| Type of event | Networking event |
| Abstract | The event consists of a meeting between all the research groups from the University of Twente that work in the field of Applied Nanophotonics. |

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|--|--|
| Objective of event | The objective of this event is to share information and knowledge between the different research groups. In those meetings there is always at least one talk which also adds to the knowledge sharing and learning. |
| Partners | There were different research groups: Biomedical Photonic Imaging, Complex Photonic Systems, Laser physics and Non-Linear Optics, Optical Science, Industrial Focus Group XUV Optics, Mathematics of Computational Science, Medical Cell Biophysics, Nanobiophysics, Photocatalytic Synthesis, Laser Processing and Adaptive Quantum Optics. |
| Contact person | Yvan Klaver (y.klaver@utwente.nl) Reinier Van Der Meer (r.vandermeer-1@utwente.nl) Sonia García Blanco (s.m.garciablanca@utwente.nl) |
| Evaluation method | The evaluation came from the feedback the audience gave, the questions they asked and how satisfied or not they were with the answers. |
| Evaluation (fill in after the activity) | |
| Number of participants | 30-50 |
| Lessons learnt | Sharing your work with professionals from the sector can be very beneficial, as their feedback is very valuable. We also learnt a lot of communication skills and how to deal with stressful situations in a professional and calm way. |
| Recommendations | Do this presentation at an earlier stage of this competition so it's easier to implement the feedback the audience can give. It's also useful to try and predict some of the questions so you can prepare answers beforehand. |

| | |
|----------------|--|
| Picture |  <p>PREVIOUS TALKS</p> <p>2021</p> <p>June Marina Castro Guerrero (SensUS): "Detection of influenza using surface chemistry on integrated on-chip optical sensors"</p> <p>Akhil Kallepalli (Glasgow): "Biophotonics, single-pixel imaging and the road ahead – An inter-disciplinary perspective"</p> |
|----------------|--|

August

1. Bronze

1.1 Tips for subsequent SensUs Teams

- Tip 1: Plan a meeting with the team that participated in the previous competition, to talk about do's and don'ts for the competition.
- Tip 2: Order the different reagents (antibodies, chemicals, antigen, etc.) as soon as possible (before March if possible), as it can take up to 2 months until they are delivered.
- Tip 3: Plan fun activities too! Team bonding, especially in the beginning of the competition, is very important.

Valuable tips in the document:

- Talk in the beginning about each other's expectations for the competition and the teamwork. Also about the roles everyone should fulfill.
- Divide the task and plan a proper timeline from the beginning till the end and try to stick with it.

2. Silver

2.1 Reposts on social media;

14:52



Je verhaal 4s



Introducing: Dr. Bart van Meerbergen

Talk: Sampling Methodologies



I'm a biochemist by training but I have been fascinated all my life by the combination of technology and biology to improve patients' lives. After my Ph.D. I worked at Philips Research, Biocartis and VITO in which I gradually moved from scientist into business developer. I like working together with our industrial and academic partners to explore opportunities to develop novel products.

Sensors for Influenza

How to develop sensors for rapid detection of Influenza



Online |
Free participation
August 30th 2021
14:00-15:30 CET
Register at
www.sensus.org/workshop

@sensuscompetition



UT+_utwente

Gepubliceerd door Sylvia Zijlstra · Gisteren om 11:01

This years SensUs assignment is to develop an innovative biosensing system for detecting an acute respiratory viral infection by measuring Influenza A in saliva.

Being in the middle of the global Covid-19 pandemic, it is a very current issue because Influenza can be the cause for a next global pandemic. The competition has made an educational video about this year's theme.

<https://www.youtube.com/watch?v=InJOuPTtqg8>



YOUTUBE.COM

Theme video SensUs 2021: Influenza, the next pandemic?



UT+_utwente

Gepubliceerd door Sylvia Zijlstra · 2 min ·



ANNELIES RIEZEBOS-BRILMAN

Arts-microbioloog

SensUs Student Competition

3 juli om 23:15 ·

"The focus was always more on influenza viruses rather than coronaviruses, which is why we were surprised by the COVID-19 pandemic" says Annelies Riezebos-Bri... [Meer weergeven](#)

3.1 Post on SensUs Connect every month;



Sylvia Zijlstra

4 months ago



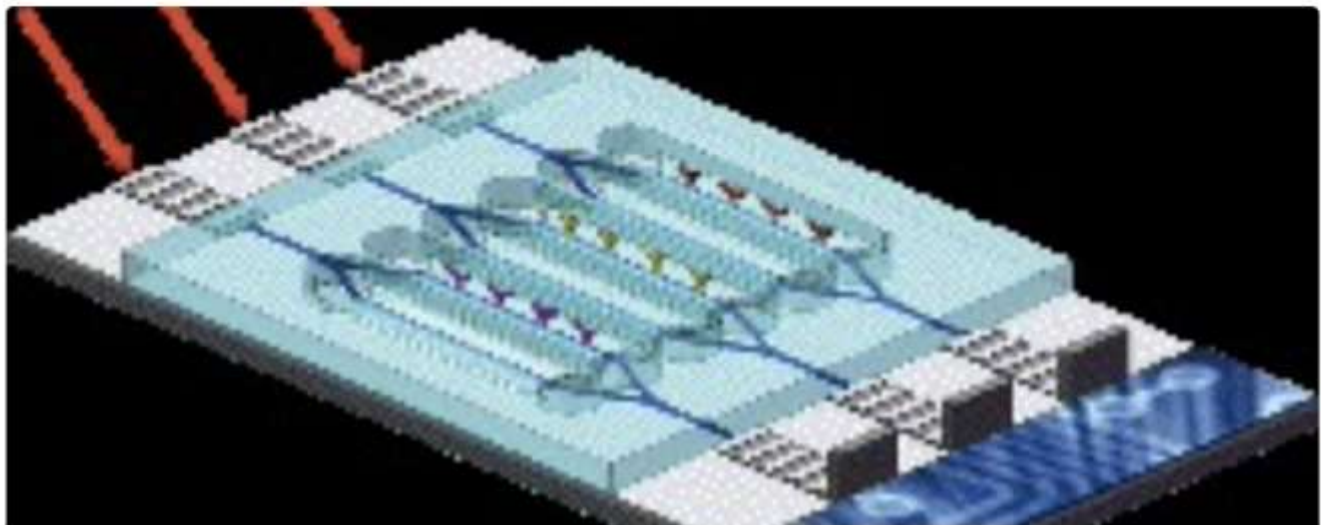
Hii everyone!

This is the UT+ team. We wanted to share this interesting article about optical devices for biosensing. I hope it will be interesting to read.

Our team is working hard on the sensor and hope to see you in Eindhoven.

<https://onlinelibrary.wiley.com/doi/10.1002/lpor.201100025>

Stay safe!



Integrated optical devices for lab-on-a-chip biosensing applications

ONLINELIBRARY.WILEY.COM

The application of portable, easy-to-use and highly sensitive lab-on-a-chip biosensing devices for real-time diagnosis could offer significant ...

❤️ 10 Likes



Like



Comment



Sylvia Zijlstra

3 months ago



Hey there!

Hope you all are doing well with your sensors!

An update from the UT+ team:

We are waiting for some materials for our sensors to arrive, this includes our antibodies and some coating components. So we are stuck for a moment, hopefully these materials will arrive soon.

In two weeks we will finally see the whole team in person for the first time. Till then only the people who go to the lab have seen each other in person. We are very excited for this :)

Stay safe and tot ziens!!

♥ 9 Likes



Like



Comment



Sylvia Zijlstra created an event **Development history of Biosensors by Dr. Annemieke van Dam**

2 months ago



We, the UT+ team, will provide a lecture about the development history of Biosensors, with a very interesting sidestep to the forensic field. We hope the majority of you can join!

If you want to join, please fill in the Google Forms so we can send you the link to this lecture.



Development history of Biosensors by Dr. Annemieke van...

Thursday, May 27, 2021 5:00 PM

[Find out more](#)



♥ 8 Likes · 1 comment



Like



Comment



Sylvia Zijlstra

2 months ago



One week ago, we had a really nice meeting with [Bronkhorst High-Tech BV](#) to talk about the possibilities to improve our sensor. It was one of the first physical activities for our team, next to the work in the lab off course.



♥ 9 Likes



Like



Comment



Sylvia Zijlstra

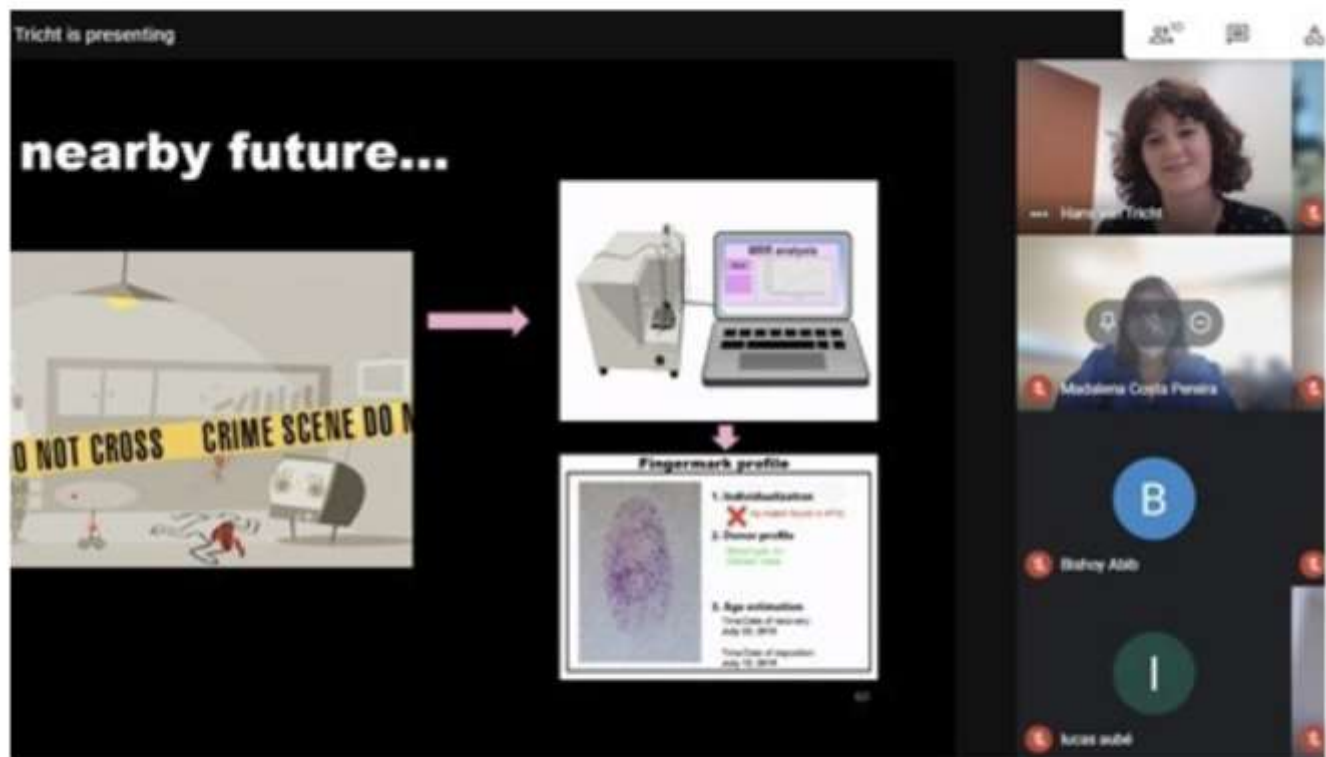
2 months ago



Two weeks ago we organized a lecture it was presented by Dr. Annemieke van Dam and was very insightful, with a clear framework of building a biosensor.

This overview of designing steps is completely helpful in the following stages that we will have in the competition. The side-step on her research of forensic bio-sensing is also a compelling topic! Beside the lecture, Dr. Annemieke van Dam also provided the students very practical recommendations on the experiment setups which, in our opinions, are completely fruitful.

We are really grateful to have Dr. Annemieke van Dam as our lecturer this time, and that some of you joined even though we had some technical problems with signing up...



9 Likes · 1 comment



Like



Comment



Sylvia Zijlstra

2 months ago



Hii,

We, the UT+ team, wanted to share a really interesting article with you that compares the Golden Standard in testing for a virus PCR with CRP. The abbreviations are very similar, however they are two very different tests.


<https://www.tandfonline.com/doi/full/10.1080/02813432.2020.1843942>



Is C-reactive protein associated with influenza A or B in primary care patients with influenza-like illness? A cross-sectional study

TANDFONLINE.COM

(2020). Is C-reactive protein associated with influenza A or B in primary care patients with influenza-like illness? A cross-sectional study ...

 4 Likes



Like



Comment



Sylvia Zijlstra

a month ago




Hii everyone,

A small update from the UT+ team from Enschede.

The artificial saliva has finally arrived, now we can really put our biosensor to the test :).

How is your team doing, do you think you can meet the deadline?

Just under two months until the innovation days, let the countdown begin.

 7 Likes



Like



Comment



Sylvia Zijlstra

15 days ago



Hii all!

Finally the academic year has come to an end, however the work for the competition doesn't stop during the summer..

We are busy with the finishing touches of our biosensor and are starting to promote the team in the region Twente.

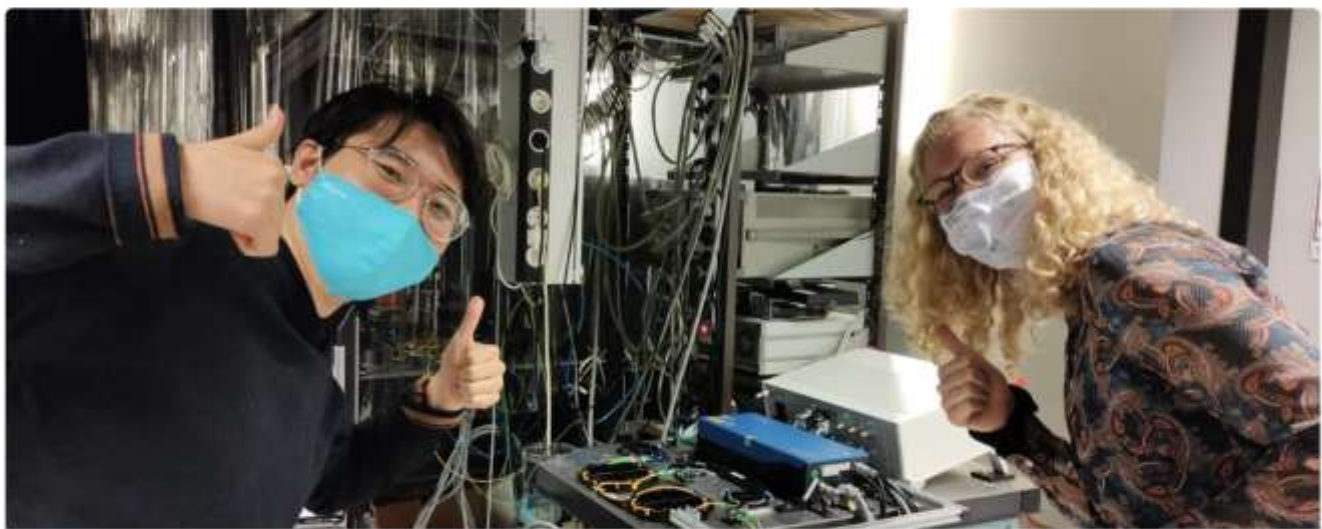
If you are interested I put the link to two articles below. Hopefully Google Translate will help you understand ;)

Good luck to all the other teams with the finishing of your sensor and don't forget to enjoy the summer!

<https://www.utoday.nl/news/70160/ut-team-wil-scoren-met-fotonische-biosensor>

<https://www.utwente.nl/nieuws/2021/7/1121139/studententeam-ut-in-internationale-competitie-biosensoren>

[Read less](#)



Studententeam UT in internationale competitie biosensoren

UTWENTE.NL

Ook dit jaar doet een studententeam van de Universiteit Twente mee aan de internationale competitie SensUs. De studenten worden uitgedaagd om een ...

❤️ 5 Likes



Sylvia Zijlstra

a day ago



Hii all,

UT+ team here with a small update. We enjoy reading the articles that you all post and appreciate that everyone wants to share their knowledge.

We are now busy with writing the final business plan, but also with the last tasks for the medals for the first of August.

Next to the business plan and medal work, we are testing our biosensor and decreasing the size so we can fulfill the competition size requirements. So hopefully everything gets done just in time for the competition!

How are the other teams doing?

[Read less](#)



Like



Comment

3.2 World-value;

In the process of developing biosensors, the following values will be considered by us, including environmental, social, ethical and scientific values. With our biosensor we will fulfill various values that we consider important. The biosensor must be painless and can be used for humans and animals. In addition, no laboratory should be required for the test result, so as not to lose valuable time. The time of getting the result from our test should also be short so that the customer has his/her test result as fast as possible (CDC, n.d.). In other detection methods, the time of getting the result is much higher. It is also an important value to adapt our biosensor to other diseases, so that is applicable in multiple situations.

From environmental value, we want to ensure that no matter whether it is the waste in the research and development stage or the waste caused in actual use, it will not pollute the environment, and we hope that the necessary components can be recycled to ensure sustainable development.

When considering social value, we also expect that social values can bring our biosensors closer to real life, not only about research. To achieve this goal, the data obtained from the biosensor can be presented in a digital form on the map. Also, we do not only want to deliver the result of the test to the customer, but also collect that data. This way big data can be used for further scientific research, which has a big scientific value.

In an interview with Keshen Matura, we learned that it's very important that a test is reliable and valid. This can be proven by a lot of testing. Also it has to have a CE mark (CE Marking, 2017).

By cooperating with GGD (human) and Royal GD (animal), we can trace the spread of influenza and control the spread of the virus by marking influenza spots on the map.

There are several resources and communities that help us live up to those values. MESA+ helps us with their expertise in nanotechnology and sponsorship. Demcon is a great value to us in helping with the business plan. In addition, Royal Animal has a lot of expertise about animal health and points out the animal market can be considered as an entry market for our products.

TedMed Center University of Twente shows more information on health regulations. The Interviewees from all fields, including general practitioner, epidemiologist, virologist, venture capitalist, business developer and health technology regulator. By conducting interviews with them, we gain more insight for the virus itself to actual use, from the animal market to the human market. make sure we reduce the risk of virus transferring from animal to human.

Reference

CDC. (n.d.). Overview of Influenza Testing Methods | CDC. Retrieved August 1, 2021, from <https://www.cdc.gov/flu/professionals/diagnosis/overview-testing-methods.htm#:~:text=Diagnostic%20tests%20available%20for%20detection,includin%20rapid%20influenza%20diagnostic%20tests>

CE marking. (2017, August 30). Internal Market, Industry, Entrepreneurship and SMEs - European Commission. https://ec.europa.eu/growth/single-market/ce-marking_en