SensUs

Let's compete for quality of life!

Information Package

August 2024

contact@sensus.org

SensUs.org

August Information Package

Welcome to the 9th edition of the SensUs Student Competition!

The SensUs Student Competition is an initiative for students, as the name implies. However, many do not know that the competition is organized by students too. These students are, like you, highly motivated to innovate and learn how to become great all-around engineers.

To document and communicate new and relevant information to the teams, the SensUs Organization sends Information Packages to the teams once a month. The Information Package will be your primary source of information where you can find all relevant information regarding SensUs 2024. The Information Package is divided into distinct sections to provide a clear structure. The SensUs Organization will update the document and distribute it to the teams, ideally on the first Monday of the month. Whenever new changes are made to the Information Package, these sections will be highlighted. Please note that the Information Package is a living document and is a subject for addition and change.

In the upcoming months, your team will compete with student teams from all over the world to develop an innovative biosensing system and improve quality of life. Furthermore, your team will write a business plan to translate your designs to the market.

The challenge requires not only knowledge of engineering but also:

- A multidisciplinary approach among many majors and disciplines;
- Communication skills to collaborate with your team members, professors, patients, and healthcare experts;
- Planning and time management to start and finish the development of your prototype in time.

There is a lot to learn during this journey!

Please note that participation in SensUs means that you consent with the Fees, the Rules and Regulations, and with the Privacy Statement, which you can find at the end of this document. Please read them carefully and let us know if anything is unclear.

If you have any questions, please contact us at **contact@sensus.org**, and we will get in touch with you as soon as possible. We wish you the best of luck and an incredible journey!

On behalf of the SensUs Organization,
Chair & Co department

Table of Contents

Timeline

This is an overview of the important dates for the upcoming year. The timeline provides you with an overview and will be updated in every issue of the Information Package. For convenience, these dates are also updated in the online Google Calendar, which you can easily add to your agenda. **This timeline is for the time zone UTC +1.**

August 12-16	Q&A Session 3
August 26 - 30	SensUs Innovation Days

Biosensor Specifications 2024

1. SensUs 2024: Acute Kidney Injury

Acute Kidney Injury (AKI) is characterized by one or both kidneys losing their renal function, namely the ability to filter waste matter from the blood. 10% of the population globally is affected by chronic kidney disease [1]. Healthy kidneys are responsible for filtering creatinine out of the bloodstream. Thus, there is an accumulation of elevated levels of creatinine in the blood during renal failure. A continuous biosensor could be designed for monitoring creatinine levels, facilitating the diagnosis of kidney-related conditions, including kidney failure. Early detection may enable prompt diagnosis and treatment.

2. Biomarker: Creatinine

The biomarker to be measured is *creatinine*. Creatinine is a product of the metabolism of creatine, which is produced in the liver from three amino acids, methionine, arginine, and glycine, and stored in muscle to be used as a source of energy once phosphorylated. Creatinine is normally excreted through the kidneys. During kidney failure when glomerular filtration rate (GFR) reduces, there is a buildup of creatinine in the blood. A standard range of serum creatinine levels (SCr) for healthy men is 0.7 - 1.3 mg/dL (61.9 - 114.9 µmol/L), and for healthy women is 0.6 - 1.1 mg/dL (53 - 97.2 µmol/L) [2]. As diet and hydration have a negligible impact on serum creatinine levels, it serves as a reliable indicator of renal function.

3. Matrix: Interstitial skin fluid

Interstitial skin fluid (ISF) is suited for continuous monitoring as it can be easily accessed [3]. Currently, ISF is used for continuous glucose monitoring. Interstitial skin fluid (ISF) makes up 75% of extracellular fluid and 15-25% of body weight [4]. It surrounds cells and tissues, serving as an interface between blood and cells. It may be a source of biomarkers in addition to blood biomarkers, as research shows that 83% of proteins found in blood serum are also present in ISF, but 50% of proteins in ISF are not found in serum [5]. SensUs will use simulated ISF for the Testing Events, see the Biomaterials section.

4. Continuous Biosensing

The aim of SensUs 2024 is to develop biosensors that can continuously measure creatinine in ISF, with the long-term vision that the technology may lead to a wearable sensor in the future. To be able to test during the SensUs Testing Events if a biosensor can operate continuously, we propose the following requirements:

- A biosensor should be designed as a flow cell, with a flow path that contains a sensing area. During the Testing event, ISF samples will be supplied to the

Teams in separate vials. Consecutive ISF samples are to be inserted into the flow cell, using e.g. a pipette or a pump. The flow path in the flow cell may include a reference channel and the sensing area may include an area for reference sensing.

- During the SensUs Testing Events, consecutive samples are applied into *one and the same flow cell, along the one and the same flow path, to one and the same sensing area*. It is not allowed to direct different samples to different channels, or different samples to different sensing areas, or different samples to different reagents in the sensor device.
- Every ISF sample should be inserted *as is* into the sensor device. Sample pretreatment is not allowed. For example, it is not allowed to add reagents to a sample.
- Each newly inserted sample replaces the previous one in the flow cell when the next sample is supplied, the previous sample will automatically be flushed away. For the flushing to be effective, the internal volume of the biosensor should be much smaller than the volume of the sample. The proposed sample volume provided to the teams during the Testing Events is 100 µL.
- Between consecutive ISF samples, it is allowed to apply an intermediate fluid into the flow cell. The intermediate fluid can be used to e.g. wash the sensing area, recalibrate the sensor, or regenerate the sensor. However, the use of intermediate fluid applications comes at a cost, because teams can obtain a higher score if they minimize the use of intermediate fluids during the Testing Events, see the Analytical Aim section. Note that physical manipulations inside the sensor device are allowed without any penalty, e.g. light, electrical, thermal, or ultrasound
- It is allowed to apply air between consecutive ISF samples; air will not count as an intermediate fluid application. However, air bubbles can easily damage biosensor surfaces.
- Further information will follow in a later iteration of the Information Package.

5. Analytical Aim

The aims of the competition follow the SensUs vision of personalized healthcare: measurements of creatinine levels in ISF should be continuous, rapid, accurate, and as easy as possible. The biosensors of the teams will have to report the concentration of creatinine. This will allow a comparison of the analytical performance of the biosensors, which is key for medical applications.

The winner of the Analytical Performance award will be determined by an algorithm. This algorithm is under development and will be sent out in a later iteration of the Information Package. The algorithm will relate to the following technical aims:

5.1 Concentration Range

The biosensor should measure creatinine in a clinically relevant concentration range. Serum creatinine (SCr) levels in healthy individuals are roughly between 50 and 100 µmol/L. Within the first day of AKI, the patient reaches Stage I of the disease with a rise in SCr of 1.5 times baseline [6]. As acute kidney injury progresses to Stage II, the creatinine level can double [6].

Due to the hydrophilic nature of creatinine, along with its small molecular weight of around 113 Daltons, the concentration of creatinine in ISF can be assumed to be roughly equal to the concentration in serum.

Based on the above, we would propose to use in the SensUs competition creatinine concentrations **between 30 and 300 µmol/L**. Further information will be provided in a later iteration of the Information Package.

5.2 Number of samples

During the Testing Events, a series of samples will be measured, within a limited total amount of time. Parallel testing is not allowed, which means that every team can only measure one sample at a time. Touching another sample while measuring is not allowed. The proposal is that the teams will have **two consecutive hours to measure up to 24 samples**. More information will follow in a later iteration of the Information Package.

5.3 Intermediate fluid application

Between consecutive ISF samples, it is allowed to apply an intermediate fluid into the flow cell, in a single application, either from outside the device or from inside the device. The intermediate fluid can be used to e.g. wash the sensing area, recalibrate the sensor, or regenerate the sensor. However, the use of intermediate fluid applications comes at a cost, because teams can obtain a higher score if they **minimize the use of intermediate fluids** during the Testing Events. The score will be implemented in the algorithm for the Analytical Performance award. More information will follow in a later iteration of the Information Package.

5.4 Size

The biosensor system may be **no larger than 80cm x 80cm x 50cm**. These dimensions exclude the use of a laptop. This year SensUs is focusing on continuous biosensing, and smaller biosensors may be awarded bonus points; this topic is still to be discussed within the Jury group.

6. Algorithm for biosensor assessment during ETE

This algorithm is designed to assess the performance of biosensors during the ETE testing event of SensUs 2024. The algorithm considers the following biosensor attributes:

- Measurement score, including Accuracy and Time
- Dilution
- Intermediate fluid application

The scores are combined into a total score.

6.1 Measurement score

Accuracy is a critical property of a biosensor as it measures how well a biosensor can quantify the creatinine concentration. Accurate creatinine concentration measurements are vital for determining the stage of kidney failure and for guiding clinical decisions about the treatment plan.
The measurement score is based on the number of valid data points that fall within a predefined acceptable range, see Figure 1. Serum creatinine levels (SCr) for healthy individuals range approximately from 62 to 115 µmol/L for men and 53 to 97 µmol/L for women [9]. Consequently, below 120 µmol/L a larger window of error is allowed compared to above 120 µmol/L. Serum creatinine levels below 120 µmol/L are typically indicative of normal kidney function. Within this range, small fluctuations in creatinine levels may not necessarily signify underlying health issues. However, beyond this threshold, the acceptable range is determined by a window of relative error of 20%.

During the testing event, the Teams will be provided with samples with creatinine concentrations ranging between 30 and 300 µmol/L. The duration of the ETE testing event is 2 hours and during this time the Teams will receive 24 samples.

For every sample provided, teams are allowed to report only one datapoint. During the testing event, the SensUs Organization will provide data officers who will monitor what the teams do (sample handling, sample applications, intermediate fluid applications, data reporting, etc) and who will determine if reported datapoints are valid.

The measurement score is determined by the number of valid data points that fall within the acceptable range specified in Figure 1. The measurement score is calculated as follows:

$$Measurement\ score\ =$$

$$10\ \times\ (\frac{Number\ of\ valid\ data\ points\ falling\ within\ the\ acceptable\ range}{24})$$

Since 24 samples will be provided to each Team, the value of the Measurement score ranges between 0 and 10.

As the measurement score scales with the number of reported measurements, it includes the time aspect of the biosensor: for equal accuracy, rapid testing allows a Team to report more data and thus a higher measurement score can be achieved.

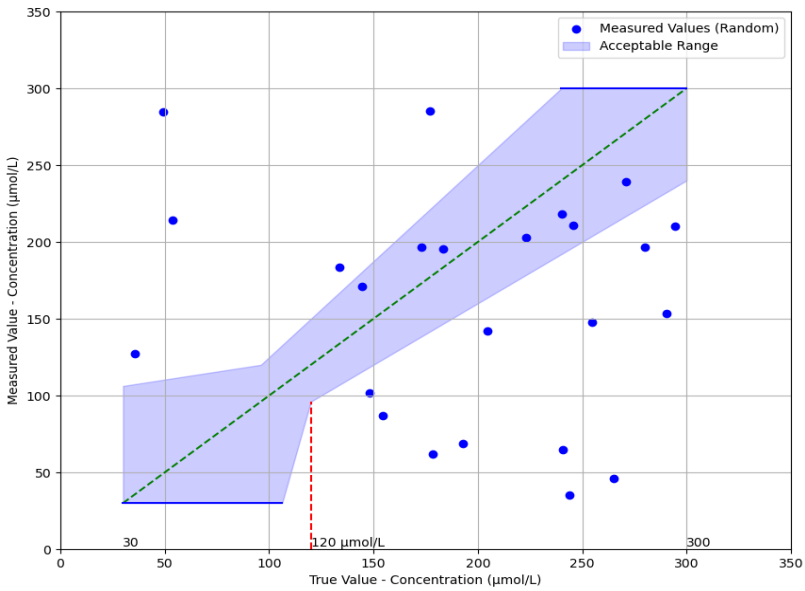

*Figure 1. Acceptable range for calculating the Measurement score. For the indicated data, the Measurement score equals 10 * (7/24) = 2.9 .*

6.2 Dilution

During the testing event, every sample should be inserted as is into the sensor device. This means that sample pretreatment is not allowed. For example, it is not allowed to add reagents to a sample. Also, it is **NOT** allowed to dilute the sample.
The sample volume provided to the teams is 100 µL. Each new sample that is inserted into the biosensor flow cell, replaces the previous fluid in the flow cell. When the next sample is supplied, the previous sample will automatically be flushed away. For the flushing to be effective, the internal volume of the biosensor should be smaller than the volume of the sample. Between samples, it is allowed to once in a while apply an intermediate fluid application (maximum of four, see below).
If a sample is pretreated or diluted, prior to insertion into the sensor device, then the measurement result with that sample is not valid for the SensUs testing event.

6.3 Intermediate fluid application

The use of intermediate fluid applications between consecutive ISF samples should be minimized because a continuous biosensor with intermediate fluid

applications is technologically more complicated, more difficult to miniaturize, and less suited for operation over long time spans.
During the SensUs testing event, it is allowed to apply intermediate fluids into the flow cell, but only a few times. The intermediate fluid should be applied in a single application, either from outside the device or from inside the device. The application can be used to e.g. wash the sensing area, recalibrate the sensor, or regenerate the sensor.
Teams are allowed to apply a maximum of four applications of intermediate fluid. The intermediate fluid score is calculated as follows:

0 intermediate fluid applications:	intermediate fluid score = 10
1 intermediate fluid application:	intermediate fluid score = 9
2 intermediate fluid applications:	intermediate fluid score = 8
3 intermediate fluid application:	intermediate fluid score = 7
4 intermediate fluid applications:	intermediate fluid score = 6
5 intermediate fluid applications (or more):	samples measured after the 5th application are invalid

After the fourth application, the intermediate fluid score remains at 6. However, if there are 5 or more intermediate fluid applications, samples measured after the 5th application are considered invalid and are not included in the Measurement score.

6.4 Bringing it all together

To calculate the Total score, all previous scores are brought together, as follows:

$$Total\ score\ =\ 100\ +\ \ Measurement\ score\ \ *\ Intermediate\ fluid\ score$$

The baseline score of 100 acknowledges the effort of participating in the testing event. The maximum Total score that can be achieved by a Team is 200.

7. Biomaterials and reference assay

The following biomaterials and reference assay are proposed:

- Creatinine will be ordered from Sigma-Aldrich, with code C4255.
- Simulated ISF will be made from diluted reconstituted blood serum. Lyophilized human blood serum will be ordered from Sigma-Aldrich, with code S2257. Reconstitute the blood serum according to the instructions of the supplier. Dilute the serum three times in PBS 1x 150mM. A dilution factor of three simulates the total protein content in human interstitial skin fluid [8]. The SensUs organization uses PBS from Sigma-Aldrich code P4417.
- The SensUs Tech department will collaborate with the Maxima Medical Center for testing of prepared creatinine samples. The tests will be performed on an automated Roche Cobas instrument, which uses an enzymatic detection method.

The Tech department will be testing the proposed biomaterials and preparation protocol. More information will follow in a later iteration of the Information Package.

References

[1] *Global Facts: About kidney Disease*. (2023, November 16). National Kidney Foundation. https://www.kidney.org/kidneydisease/global-facts-about-kidney-disease

[2] *Creatinine blood test*. (n.d.). Mount Sinai Health System. https://www.mountsinai.org/health-library/tests/creatinine-blood-test#:~:text=Normal%20Results,less%20muscle%20mass%20than%20men

[3] Friedel, M., Thompson, I. a. P., Kasting, G. B., Polsky, R., Cunningham, D., Soh, H. T., & Heikenfeld, J. (2023). Opportunities and challenges in the diagnostic utility of dermal interstitial fluid. *Nature Biomedical Engineering*. https://doi.org/10.1038/s41551-022-00998-9

[4] Samant, P. P., Niedzwiecki, M. M., Raviele, N., Tran, V., Mena-Lapaix, J., Walker, D. I., Felner, E. I., Jones, D. P., Miller, G. W., & Prausnitz, M. R. (2020). Sampling interstitial fluid from human skin using a microneedle patch. *Science Translational Medicine*, *12*(571). https://doi.org/10.1126/scitranslmed.aaw0285

[5] Samant, Pradnya P, and Mark R Prausnitz. "Mechanisms of Sampling Interstitial Fluid from Skin Using a Microneedle Patch." *Proceedings of the National Academy of Sciences of the United States of America* (2018), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5939066/

[6] Section 2: AKI Definition. (2012). *Kidney International Supplements*, *2*(1), 19–36. https://doi.org/10.1038/kisup.2011.32

[7] Pundir, C., Kumar, P., & Jaiwal, R. (2019). Biosensing methods for determination of creatinine: A review. *Biosensors and Bioelectronics*, *126*, 707–724. https://doi.org/10.1016/j.bios.2018.11.031

[8] Sprunger, Yann, et al. "Ph Quantification in Human Dermal Interstitial Fluid Using Ultra-Thin Soi Silicon Nanowire Isfets and a High-Sensitivity Constant-Current Approach." Biosensors (2023), . Information about ISF in Section 2.3

[9] Acute Kidney Injury - SENSUS Wiki. (n.d.). https://wiki.sensus.org/index.php?title=Acute_Kidney_Injury

Eindhoven Testing Event

Biosensor timeslots (BST)

The biosensor timeslots take place on **Monday, 26th August, 14:00 – 18:00**, and **Tuesday, 27th August, 09:00-12:00** in the **Light Assembly of Innovation Space** (Matrix). On Tuesday you will get access to your biosensor at 12:30 to prepare for the Eindhoven Testing Event.

Upon arrival, the biosensors of all the teams will be stored in a locked room in the Matrix building that can only be accessed by the SensUs Organization. You will be able to access the biosensors solely during the two biosensor time slots and the Eindhoven Testing Event.

Samples for calibration

During the biosensor time slots, you will get access to calibration samples. You will have the opportunity to finalize adjustments to your biosensor and address any unexpected issues. In each biosensor timeslot, you will receive 3 calibration samples to calibrate your sensor during this period. The SensUs Organization will provide you with materials and calibration samples.

Eindhoven Testing Event (ETE)

Location

The Eindhoven Testing Event takes place at Light Assembly. This is an area at the Matrix building.

Measurement

The testing overseer is a member of the SensUs Organization who documents your measurement reports. This person will remain at the table until the measurements are complete. This year, data will be documented primarily online. Team captains will receive a unique link to the team's data sheet in due course.

The figure below shows part of the datasheet which is similar to the one used in the DTE.

sample	measured concentration (µmol/l)	nediate fluid applica	sample_vol (ul)	finished	lock	timestamp
A				☐	☐	
B				☐	☐	
C				☐	☐	
D				☐	☐	
E				☐	☐	
F				☐	☐	
G				☐	☐	

Measured Concentration

The concentration that the team reports to have measured, is written in µmol/L. This must be a number greater than zero.

Intermediate fluid applications

Record the number of intermediate fluid applications before the particular measurement.

Sample Volume

The value of the sample taken in the tube.

Finished/Lock/Timestamp

The 'finished' checkbox signifies when a team has completed measuring the sample, which the team marks themselves. The 'lock' checkbox indicates that the team may proceed to the next sample. While the team checks this box, the testing overseer must ensure that they do so. The timestamp indicates when a column is locked.

Rules

Teams are only allowed to work on one sample at a time.
The team must be finished with a sample, i.e. the column 'lock' must be checkmarked, before they can start with the next one.
Important note: Samples must be measured in the order that they are given. **It is not possible to remeasure a sample without a valid reason (e.g spillage).**

What if...

...a team spills a sample before they could measure it?
The team may choose to end the measurement and start over. Please contact the SensUs organization for a spare sample.

...a team wants to stop early, before the contest is finished?
Inform the Testing Overseer with a valid reason to stop and remain at the table until released by a member of the SensUs Technology Department.

Pitches

During the Innovation Days, you give two live pitches. Beforehand, you have to send in a pre-recorded 1-minute pitch.

Pre-recorded pitch

During the opening of the SensUs Event on Thursday 29th of August, pre-recorded 1-minute pitches of all teams will be shown. The goal of your pitch is to make the audience curious about your biosensor design and progress. Thereafter, several pitch sessions will run in parallel, with jury and with the public. The main focus of the 1-minute pitch is to attract the public to your session and thus gather more votes for the Public Inspiration award.

The pitch should highlight your biosensor design and application ideas. Note that 1 minute is a hard cut-off; anything beyond 1 minute will not be shown. Please upload your pre-recorded pitch to Google Classroom no later than Friday, August 16th, 23:59 (UTC+2) using a video file format that is downloadable and supported by YouTube (e.g. .mp4, .mpeg). The video should be named in the following fashion: Team Name_1-minute-pitch (e.g. BioSensUM_1-minute-pitch).

Live pitches

The pitches for the Innovation Award and the Translation Potential are two separate pitches. The pitches should be a summary of what has been written in TRD. It is not allowed for the teams to add parts that are not stated in the TRD. The teams will do the Innovation and Translation Potential pitches live during the pitch sessions at the event. Each pitch has a maximum time of 4 minutes, after which you will be cut off to make sure there is enough time for the questions afterwards. You are graded on the pitch itself and on how you answer the questions, so prepare well for possible questions. The pitches will be held in two different time slots: 29th of August 10:45-12:00 UTC+2 and 13:25-14:40 UTC+2. The detailed division within those time slots will be communicated to you during the innovation days.

The guidelines about the live pitches:

- The pitches of Innovation and Translation Potential have a maximum of 4 minutes each;
- The slides should be provided to the SensUs Organization before Tuesday, August 20th, 23:59 (UTC+2)
- Please be aware that the SensUs Organization will introduce the general concepts of biosensors and kidney disease to the Jury members. You are not encouraged to repeat this introduction in your 4-minute pitch;
- If presenting online, make sure you use a webcam and Wi-Fi connection of good quality. The presenter and slides should both be clearly visible, for example, the speaker on one half of the screen and the slides on the other half.

Contact

1. Communication

1.1 Slack

The communication between the SensUs Organization and the teams will occur through the Slack Platform. In the Slack workspace, you will receive announcements regarding upcoming deadlines, documents, and tasks. It will also be the place to ask general or team-specific questions. The utilization of Slack will replace all email contact and it will make sure that you have contact with the SensUs Organization in one place.

As we want to encourage all team members to join the workspace, every team will get an invitation to join the Slack workspace. After registering, you will automatically be added to the Slack workspace. It is recommended to install the desktop Slack app on your PC or laptop.

The Slack workspace will have multiple channels:

- **Announcements:** This channel will be used by the secretary for announcements.
- **Questions:** This channel can be used to ask general questions about the organization that could be relevant for more teams. There will be four different question channels: one for general questions, one for technical questions about the biosensors, one for questions about the event, and one for questions about the jury/medal criteria.
- **Private channel:** All teams will have a private channel together with the secretary to ask team-related questions.
- **Team captain channel:** This channel will contain the team captains and the secretary. The channel can be used by the team captains to communicate with each other. Moreover, the secretary may share documents or announcements on this channel.
- **Quotes and memes:** This channel will be for all the fun things you want to share. You can share memes, fun activities you are organizing and anything else you would like to share with the other teams.

Slack deletes messages after 90 days, so make sure to save important messages or answers to your questions.

1.2 Google Classroom

Google Classroom will be used to share important documents and assignments. Google Classroom provides a great way to submit assignments and to check progress.

If any new materials are uploaded to Google Classroom, the secretary will let you know through the Slack workspace. The instructions on how to submit each assignment will be provided on Google Classroom.

To access Google Classroom, your team will have to create a general Google account. To create a Google account, follow this link. The form will ask for a first and last name and a username. Please use the following username as an email address and substitute the square brackets for the name of your university and the name of your team:

[university].[team_name]@gmail.com

This is the only account that will have access to the SensUs Google Classroom. Make sure to store the password you create carefully. After filling in your name, email address, and password, Google will ask for some other personal information. Preferably, let one of your team coordinators/captains or supervisor fill out this information. After agreeing to the privacy and terms of Google, your account is successfully created and can be used to access Google Classroom in the future.

After creating a Google Account, you can access the Google Classroom by heading to **classroom.google.com**. When the SensUs Organization has processed the team-specific Google Account, the Classroom should automatically appear on this page. Manually joining the classroom is also possible by heading to the plus icon and clicking on 'join a class'. You can use the following class code to join the Google Classroom: **32enyii**.

It is also possible to use this link to get into the SensUs Google Classroom.

After joining the class, you will be greeted by the following welcome screen. Here you are able to view announcements, current and upcoming assignments and events. By heading to the classwork tab, you are able to view your progress.

The first **deadline** on Google Classroom will be **January 31st 2024**, so make sure you are able to access the SensUs page on Google Classroom before this date.

1.3 Registration for the competition

To register as a team, the Team Information Document must be filled in. A Google Form will be used to gather the needed information. The personal registration will later be done via Google Classroom to be more flexible for changing team members. The information in the registration forms will also be used to show your team on the SensUs Website. The Team Information Document has been sent to the supervisors. If you have not received the link, you can contact us via contact@sensus.org. The **deadline** for submitting the Team Information Document is **December 31st 2023**.

2. Team Guidance

The SensUs Student Competition is highly challenging and demands high levels of motivation and initiative from the students. The learning process is guided by a supervisor and coaches.

2.1 Supervisor

The supervisor is responsible for the formation and supervision of the team. The supervisor embeds the project in the university system and is responsible for the activities of the team. The supervisor helps the team to get access to laboratories and ensures that the students follow all required safety training. The insurance necessary for the SensUs work will also be arranged by the supervisor.

2.2 Coaches

The coach helps the team by meeting and discussing with the team regularly. The coach should be available for questions or brief discussions besides the regular meetings. In the meetings, the team can explain what they have done, ask questions, and discuss problems. The coach should stimulate discussions in the team rather than steer what the team should do. Since time management is

extremely difficult in a technological development process, the coach should help the team not fall behind schedule.

2.3 Team Coordinators/Captains

The Team Coordinator is the first point of contact with the SensUs Organization. You are responsible for delivering all documents and important information on time. Please note that the role of Team Coordinator is temporary. Initially, Team Coordinators will be designated instead of Team Captains, and we will request the final selection of Team Captains at a later time.

2.4 Team

The team is responsible for generating ideas and taking decisions on what they want to develop for the SensUs Competition, e.g. which technology they want to use for their biosensor, with whom they want to collaborate, and how they want to develop their business model. Above all, the coaches and supervisors are not allowed to impose decisions on their team. The team is fully responsible for all their decisions.

2.5 Mediate in case of conflicts

The coach and supervisor should act as mediators when a conflict occurs in the team. They have a neutral stance and oversee the project as a whole. When a team is not able to work out a conflict on its own, it can be a big help to involve an outsider.

Partner Information

The information provided below is for the teams to be able to choose which partner(s) could be the most interesting and useful to them. Once that is done, the team can contact the partner using the contact details of the specific partner.

The list will be updated in upcoming versions of the Information Package.

1. Unitron

Unitron Group sees the students who participate in SensUs as the experts. They also devise the technology. Unitron can help them verify and validate things. How do you make something concrete and how do you set it up? We serve as a translator from a lab set up to a device, where we can also help with purchasing and test environment.

Contact details: Maria Dullaert-De Boer (m.dullaert@unitron.nl), Frederik Debeuckelaere (f.debeuckelaere@unitron.nl) and Melissa Puijenbroek (m.puijenbroek@unitron.nl). The teams can also reach us by telephone. This can be done via 0117- 307 300, but ask for Frederik and/or Maria.

2. Metyos

We can help students to challenge their tech and business strategy from the product-market fit analysis, business plan setting, and to the fine details of their device. Nonetheless, we don't think it is our role to do their project instead of them. So we can help them by discussing their ideas and plans and by providing feedback, but we expect them not to come empty-handed to the discussion.

Students can contact me directly by email (olga@metyos.eu) or via LinkedIn (my favorite network). They should send me a connection request with a note that they participate in the SensUs competition. It would help me get the context easier and not leave them among hundreds of spam messages.

2. PalmSens

PalmSens is a company located in the Netherlands, committed to simplifying electrochemistry, enhancing portability, and increasing accessibility for both novice and advanced researchers and entrepreneurs.

Topics they can be contacted for:

- Electrochemistry,
- (Wearable) potentiostats,
- Troubleshooting potentiostats,
- Software for using the potentiostat.

How to contact: Send an email to info@palmsens.com. When getting in touch with them, please supply as much relevant information as you can. For example: a photo of your setup, a paper you are referring to, a Partner Session file with data from your experiments, etc.

3. Demcon

Contact email: eliene.rutten@demcon.com

Q&A Sessions

1. General

Q&A Sessions are organized to provide teams with an opportunity to ask any kind of questions related to the competition, e.g. relating to biosensor development or organizational matters. At a Q&A Session, multiple SensUs Organization members will be present to answer the questions.

Q&A consists of two 1 hour long timeslots during the planned weeks - one in the morning, and one in the afternoon. All teams can register themselves for a personal timeslot within those hours via a form provided by the organization together with the possible times. It is allowed for all team members to join, but it is not mandatory – it can e.g. be one person from the team. If desired, more Q&A Sessions can be arranged in consultation with the organization.

More detailed information will be announced closer to the planned weeks via Slack.

2. Planning

The Q&A Sessions will take place on Microsoft Teams. The Sessions will be scheduled in advance. Take into account the possible time difference between the Netherlands and your country. In the periods listed below, there will be 1-2 scheduled timeslots.

Q&A Session 1: April 29 – May 3 (already passed)
Q&A Session 2: July 1-5 (already passed)
Q&A Session 3: August 12-16

SensUs LinkedIn Group

To keep the SensUs community actively involved, all teams will be asked to join the SensUs LinkedIn group. This is a private group that you can only see if you are invited. Every team member is obliged to create a LinkedIn account individually and will get an invitation to the group from the secretary. In this group, you can send updates about your biosensor, share interesting articles, promote your team and much more. LinkedIn is also a very useful place to get in contact with the partners of the SensUs organization.

To join the LinkedIn group, you will need to make an account on LinkedIn. For this, you will need to execute the following steps:

1. First, navigate to the LinkedIn sign-up page
2. This will ask you for an email address and a password. Fill this out and click on *Agree & Join*.
3. After this, the website will ask you for your first and last name. You must use your real name. LinkedIn does not allow the use of synonyms or company/university names. After filling this out you should click on continue.
4. After signing up, LinkedIn will ask for additional personal information, e.g. where you live and where you work. For students, there is an extra option saying “I’m a student”. After selecting this option, LinkedIn will ask you where you are currently studying and for what degree. When you have completed these steps, you may click the continue button.
5. LinkedIn will verify your email address through a security code. After verifying, you can enjoy being part of the SensUs community!

The general SensUs page is open to the public and you can find it here. Once you have made the account, you can use this link to join the private SensUs student competition group. By clicking the ‘Request to Join’ button, you send a request to be accepted into the private group. After this, you will be added to the private SensUs student competition group.

Instagram takeover and vlog competition

1. Instagram takeover

This year there will be an Instagram takeover and you sign up to compete in the vlog competition, where you can win 30 euros for DanceUs!

Every team gets an Instagram takeover for a week where all of our followers get to know you, your university, and your city. The takeover will last from Monday to Friday, In which you are required to post on Monday, Wednesday, and Friday. On Monday we would like you to write an introduction post with a group picture. On Wednesday and Friday, the second and third posting day, you can choose what you want to post. Be as creative as possible, but keep it professional. During the takeover, you are also allowed to post stories on your Team's progress.

The takeover will take place from the end of February up to July. Look at the scheme below when it is your turn. If you don't see your team's name this is because you have not registered on time and we will be adding it. **Extra information and login credentials will be provided one week before your team's Instagram takeover on Slack.**

2. Vlog competition

If you want to participate in the vlog competition, your takeover will take one extra day. Make the best vlog compilation (VC) and post this on Satu, the fourth posting day of your Instagram takeover. The winner of the VC will receive 30 euros of drinks at the DanceUs event 2024. The PR department of the organization will decide which team has the best VC. This will be decided based on creativity, quality, and entertainment. We will announce the winner during the Innovation Days. If you are not able to come to Eindhoven, there will be thought of an alternative.

Your Vlog will also be posted on our socials to ensure everyone gets to know your team! A personalized assignment called 'Vlog Competition' is available on Google Classroom; please submit your Vlog there!

Please upload your **vlog and introduction group picture** to the Google Classroom assignment, by the **Wednesday (at 17:00 CET time)** of your Instagram takeover week.

The VC must meet the following conditions:

- The VC should be maximum 45-second
- An introduction to your team
- At least one team member should be in the vlog
- Shots of your team working on the biosensor
- Something interesting about your city/country/university.

Good luck everyone and may the best team win!

3. Takeover scheme

Country	Team	Week	Dates dd/mm/yr
Germany	TUcanSense	9	26/02/24-02/03/24
Belgium	PULSe	10	04/03/24-09/03/24
Switzerland	SenSwiss	11	11/03/24-16/03/24
The Netherlands	Team T.E.S.T	12	18/03/24-23/03/24
China	TruSense	14	01/04/24-06/04/24
Turkey	CreaSens	15	08/04/24-13/04/24
United States of America	SenseNC	16	15/04/24-20/04/24
Spain	SensingBarcelona	18	29/04/24-04/05/24
France	AgroSens	19	06/05/24-11/05/24
The Netherlands	WUR/TUD Sensus	20	13/05/24-18/05/24
Canada	BioSensUM	21	20/05/24-25/05/24
United Kingdom	GLASense	22	27/05/24-01/06/24
United States	SensTech	23	03/06/24-08/06/24
Germany	AixSense	26	24/06/24-29/06/24
Czech Republic	UC Team	27	01/07/24-06/07/24
The Netherlands	Biosensing Team	28	08/07/24-13/07/24
Portugal	BioLinkLx	29	15/07/24-20/07/24
Germany	SECRETUM	30	22/07/24-27/07/24
Denmark	DetectUs	31	29/07/24-03/08/24

SensUs Innovation Days

1. Timeline dates

Distributed Testing Event (DTE) *8 July*
Eindhoven Testing Event (ETE) *Week 34 (26-30 Aug)*

2. SensUs Innovation Days

The SensUs Innovation Days 2024 will take place in week 34 of 2024, August 26-30th. We are working hard towards organizing the SensUs Event of 2024 and we hope to see you all during the SensUs Innovation Days here in Eindhoven!

Some parts of the week will be livestreamed. These moments are the opening and closing ceremonies and the pitching rounds.

A schedule of the SensUs Innovation Days can be seen below. It is important to note that small changes can still be made. We will keep you updated in such a case.

Monday (26th August):
(All day) Arrival of teams
14:00-18:00 Biosensor time slot I
18:00-18:15 Opening of the event
18:15-19:45 Dinner[1]
19:45-20:30 Opening activities

Tuesday (27th August):
9:00-12:00 Biosensor time slot II
12:00-13:00 Lunch
13:00-15:00 ETE
16:00-17:45 The Symposium
18:00-19:30 Dinner
19:45-21:30 The Symposium

Wednesday (28th August):
8:00-18:00 Meet the Partners at High Tech Campus
18:00-19:30 Dinner
19:45-21:30 The Symposium

Thursday (29th August):
10:00-10:30 Opening of the Event Day
10:45-12:00 Pitch round 1
12:00-13:15 Lunch
13:25-14:40 Pitch round 2
14:40-16:30 Partner market
16:30-18:00 Closing
18:15-19:00 Recap of the Event Day
18:45-20:30 Dinner
21:00-00:00 DanceUs

Friday (30th August):
Departure of teams

The Symposium is the first international symposium on continuous real-time biomolecular sensing organized with Consense. More information can be found here.

[1] We will provide some small snacks, however, if a full dinner is needed, it should be arranged yourself.

Meet the Partners

Below, the schedule for the Meet the Partners event on Wednesday 28 August at Eindhoven High Tech Campus can be found. The schedule is not yet final and changes can still be made.

8:05	Bus departure near Auditorium building (TU/e campus)
9:15 - 10:00	Official opening of Meet the Partners
10:00 - 10:45	Masterclass by VitalWear
10:45 - 12:30	Company Tours on the HTC
12:30 - 13:15	Lunch
13:15 – 15:00	Company Tours and Workshops
15:00 – 16:00	Speed Dating with the SensUs partners
16:00 - 16:45	Networking and drinks with the SensUs partners
16:45 – 17:00	Official closing of Meet the Partners
17:00 - 18:00	Traveling to TU/e
18:00 - 19:30	Dinner
19:45 - 21:30	Symposium
21:30 - 23:00	Drinks/time off

It is important to be on time for the bus, which will depart from EINDHOVEN, Den Dolech 12-20, which is near TU/e Auditorium. Any teams that are not on time for the bus, will be left behind and will need to arrange their own transportation to the High Tech Campus. It is not allowed to skip the Meet the Partners day for any members of the team.

Soon all the teams will receive the form which all the members can fill in individually with their workshops/company tour preferences.

Awards

During the contest, the teams will be assessed for the following awards:

1. Analytical Performance

The analytical performance award expresses appreciation for the best measurements of creatinine levels in interstitial skin fluid (ISF). The performance is calculated via an algorithm which will be communicated in a future iteration of the Information Package.

2. Innovation

The innovation award expresses appreciation for novelty with respect to the state of the art, the original contributions of the team members themselves, and the potential that the new biosensor concept can work. The biosensor should be supported by model calculations and/or preliminary experimental results.
A detailed version of the rubrics for the Innovation award is included in Appendix (number) **Rubrics - Innovation award**.

3. Translation Potential

The translation potential award expresses appreciation for translating the biosensor towards future applications in healthcare and towards industrialization. This includes the proposed business model.
A detailed version of the rubrics for the translation potential award is included in Appendix (number) **Rubrics - Translation potential award**.

4. Public Inspiration

The Public Inspiration Award provides recognition for inspirational messaging towards the public. The winners of this award are determined by the visitors and viewers of SensUs 2024.
During the Competition, the Public Inspiration award will be given to the team that receives the most votes from the public (true personal votes). It is highly advised to be active on social media; it will create awareness to the public towards your team which is beneficial for collecting votes.
Furthermore, your activities on social media help to make SensUs known in the world and
attract new partners to the competition. More information can be found in the Promotion
section.

Team Results Document

Before the SensUs Innovation Days, the teams will have to hand in a Team Results Document. This document will contain for example the information that will be assessed by the jury to determine the winners of the Innovation award and the winners of the Translation Potential award. Next to the Team Results Document, the teams are asked to hand in a pre-recorded one-minute pitch to convince the public to attend their pitches regarding Innovation and Translation Potential during the SensUs Innovation Days.
A detailed version of the rubrics for the Team Results Document is included in Appendix (number) **Rubrics - Team Results Document**. A template for the Team

Results Document can be found on Google Classroom. More information on the one-minute pitch will be provided in a future iteration of this information package.

Feedback Form

Feedback Form will be an online form that the teams can fill in to give feedback to the SensUs Organization with regards to organizational and any other aspects. It can be filled in anytime and if needed – repeatedly. We would be glad to receive your feedback in case some problems or situations should be resolved or avoided in the future.

Press here to go to the form.

SensUs Fees

Participation in SensUs 2024 requires one fee to be paid, namely the Team Registration fee. No separate fee will be charged for participating in the SensUs Innovation Days. However, participating students need to cover the costs for staying in a hotel, as detailed below.

Team Registration fee

For participation in the SensUs competition with a team. This fee covers part of the costs that the SensUs Organization makes throughout the year. The fee depends on the traveling distance; a longer distance implies a lower fee.

Distance	Registration fee discount	Teams in SensUs 2024	Team Registration Fee for SensUs 2024
< 400 km	0%	Netherlands, Belgium, Germany (Aachen, Darmstadt)	€1100,- + 21% VAT
400 - 999 km	30%	Germany (Munich), Switzerland, Denmark, Scotland, France, Czech Republic	€770,- + 21% VAT
1000 - 2000 km	60%	Portugal, Spain	€440,- + 21% VAT
> 2000 km	90%	Canada, USA, China, Türkiye	€110,- + 21% VAT

The invoice for the Team Registration fee will be sent in December 2023 or January 2024; please inform us if you have a specific preference.

Hotel costs

In previous years the students stayed at a campsite. In SensUs 2024, the students will be staying in a hotel. SensUs has reserved rooms in The Social Hub, a hotel close to the University. SensUs participants can book the rooms with a discount link, provided that bookings are made before the deadline that will be communicated through Google Classroom. With this discount link, a double room can be reserved for Monday the 26th of August until Friday the 30th of August. The costs will be €84,- per two-person room per night plus €3,50 tourist tax per person per night; this translates to **€45,50 per person per night**. The booking and payments will be made directly with The Social Hub (so not by the SensUs Organization). In Google Classroom a registration form for the SensUs Innovation Days will be posted. In this form, the booking link for The Social Hub can be found.

Privacy Statement & Rules and Regulations

Privacy Statement

As the organization of SensUs, we greatly value transparency in what we do. It is in our ethics to respect the privacy of students, members of the organization, and other parties whose personal data we process. This statement is a means to communicate our motivations clearly and in an understandable manner. The privacy statement can be accessed on the SensUs website: https://www.sensus.org/regulations

Rules & Regulations

To participate in the SensUs Student Competition, team members are required to follow the rules & regulations. The rules & regulations can be accessed on the SensUs website: https://www.sensus.org/regulations

Participation in SensUs means that you consent to the abovementioned Privacy Statement and the Rules and Regulations. So you need to carefully read these documents. Please let us know if you have any questions or remarks.