Tampere University

Computing in Cardiology

September 4th – 7th, 2022

Tampere, Finland

Table of Contents

Sponsors

Computing in Cardiology 2022 is supported by several institutions, companies, and academic partnerships. The Local Organizing Committee would like to thank the following partners:

Welcome to Tampere!

On behalf of the local organizing committee, we warmly invite you to attend Computing in Cardiology 2022 to be held on September 4-7, 2022, in Tampere, Finland. It will be the very first time the conference will be hosted in Finland and the third time in Northern Europe, after Linköping 1985 and Lund 1997.

The city of Tampere is dynamic, international, and easily accessible. It is in the Pirkanmaa region, in the western part of Finland, only 180 km from the Finnish capital Helsinki. The city hosts Tampere University (TAU), the new University born in 2019 by the merger of the old Tampere University of Technology and the University of Tampere. Together with the Tampere University of Applied Sciences (TAMK), TAU represents the most international university community in Finland, having more than 30,000 students every year.

The Tampere location is quite evocative. Founded in 1775 by King Gustav III of Sweden between the two lakes Näsijärvi and Pyhäjärvi, Tampere has in its core the Tammerkoski rapids linking the lakes and used as the source of energy for one of the first industrial plants in the country, the Finlayson textile factory, established in 1820. In 1882 the first electric light was lit in Finlayson, making Tampere the fifth city in the world to have electric light. Almost 140 years later, it is now the central hub for ICT – and HealthTech – in Finland.

The Sunday Symposium program highlights our research at Tampere University and tackles in many ways the theme personalized medicine in cardiovascular research with round table participants also from industry. The conference venue is at Tampere city center, Tampere Hall (Tampere-talo), the largest congress center in the Nordic countries.

The organizing committee has been working hard to organize an exciting and enjoyable meeting, and we are very happy to welcome you all to one of the most exciting cities in Finland and CinC2022!

CinC2022 local organisation committee

Board of Directors

Local Organizing Committee

Prof. Jari Hyttinen, Chair, Tampere University

Dr. Antti Ahola, Co-Chair, Tampere University

Dr. Jussi Koivumäki, Co-Chair, Tampere University

Dr. Michelangelo Paci, Co-Chair (-> 06/2022), Tampere University

Mohamadamin Forouzandehmehr, **MSc**, Tampere University

Birhanu Belay, **MSc**, Tampere University

Prof. Katriina Aalto-Setälä, Tampere University

Prof. Matti Mäntysalo, Tampere University

Prof. Reijo Laaksonen, Tampere University

Prof. Esa Räsänen, Tampere University

Prof. Antti Vehkaoja, Tampere University

Prof. Jari Viik, Tampere University

Welcome from the president

Dear CinC 2022 Participant,

Will we ever really be `post-pandemic'? We were sure 2021 would be the last time for such uncertainty but, instead, we have to accept that uncertainty is the new normal. However, we should be deeply proud that through the pandemic CinC has run every year, with a hybrid format rather than going completely virtual. This year, we continue to emerge and to come together with almost 90% of all presentations in-person. In that light, let me welcome you all to a very in-person CinC 2022!

Our hosts in Tampere have assembled an outstanding program that will be diverse, contemporary, and hopefully more usefully provocative than the recent social-media flurry over Finland's remarkable Prime Minister, Sanna Marin, and her ability to relax and celebrate. I think we all share her need to balance the serious business of our careers with a little time to relax and be with friends. And it is just this balance that we hope to achieve at CinC—a chance to focus and learn about the latest in computing and its application to cardiology but also to relax together and form and renew friendships that are so important to our lives, both personal and professional.

This year, you can expect all the regular elements of CinC, starting with the Sunday Symposium that will leverage and inform us about the unique blend of academia and industry in Finland. Monday's events are always unique and invaluable to set the social stage, and this year's Special Sessions will open our minds to new directions in our field, presented by the experts in those fields.

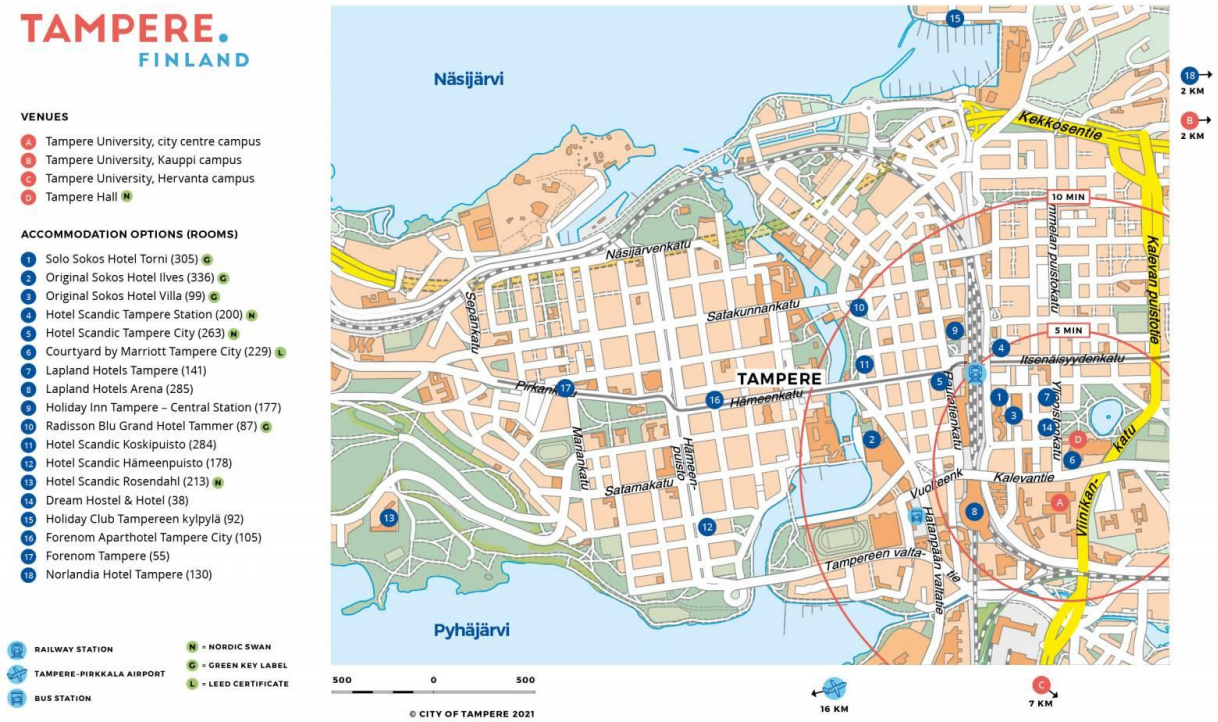
Preparing a conference is always a huge but rewarding job and it has been a big pleasure for me to work together with the Tampere Local Organizing Committee. Jari Hyttinen, head of BioMediTech unit at the Faculty of Medicine and Health Technology, Tampere University has directed a very committed and capable team to create the conference we are all here to enjoy. And, as always, please extend your thanks—and your suggestions and feedback—to the members of the CinC Board of Directors, who perform endless hours of volunteer effort for our society.

More than ever before, I look forward to seeing you in Tampere!

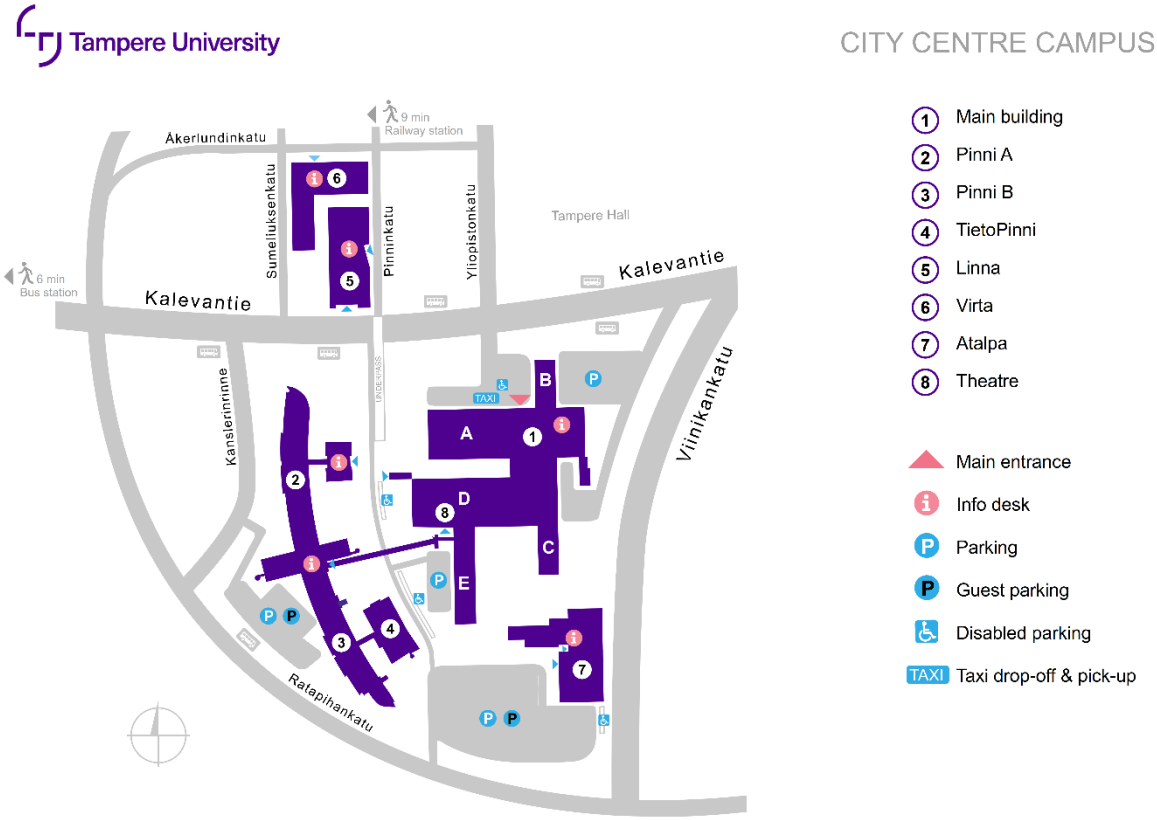
Rob MacLeod, President, Computing in Cardiology

Maps

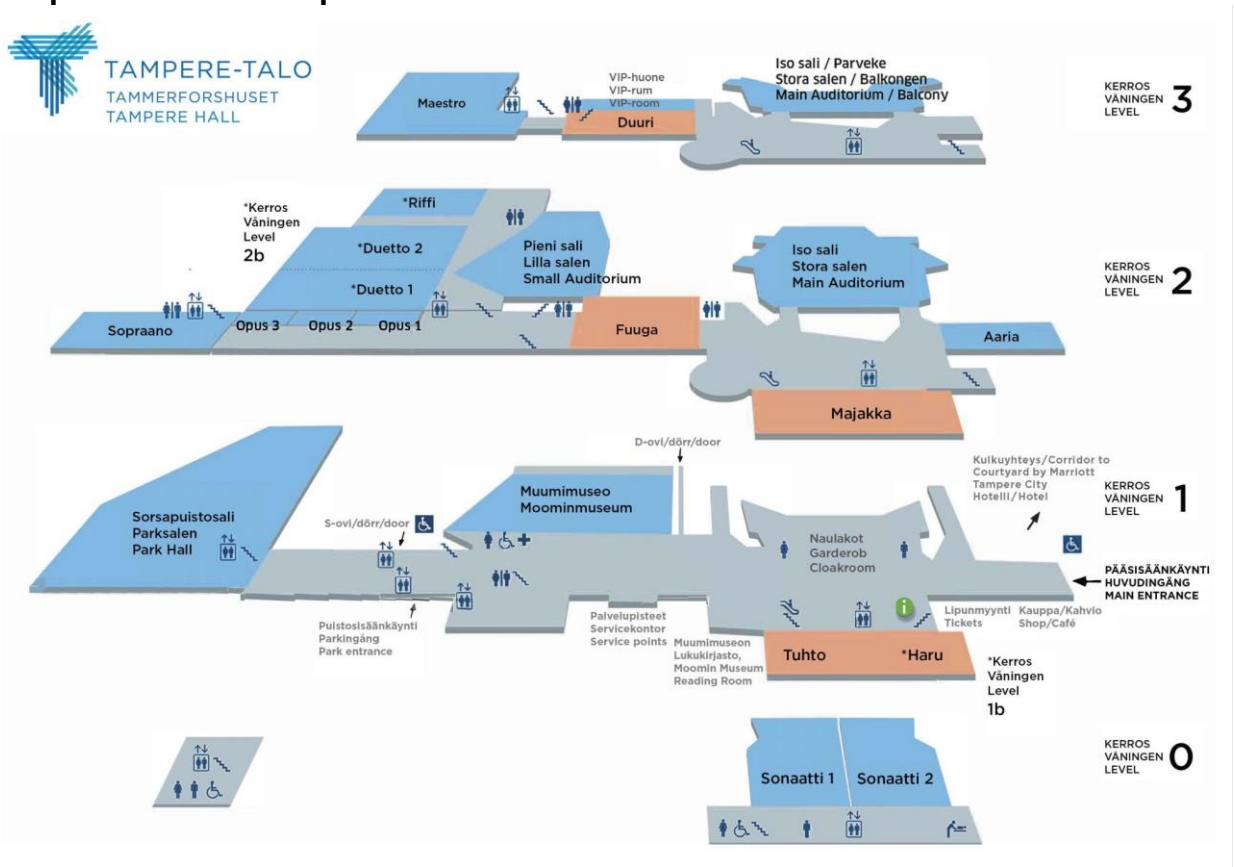
General map of Tampere



City center campus map (Sunday Symposium venue)

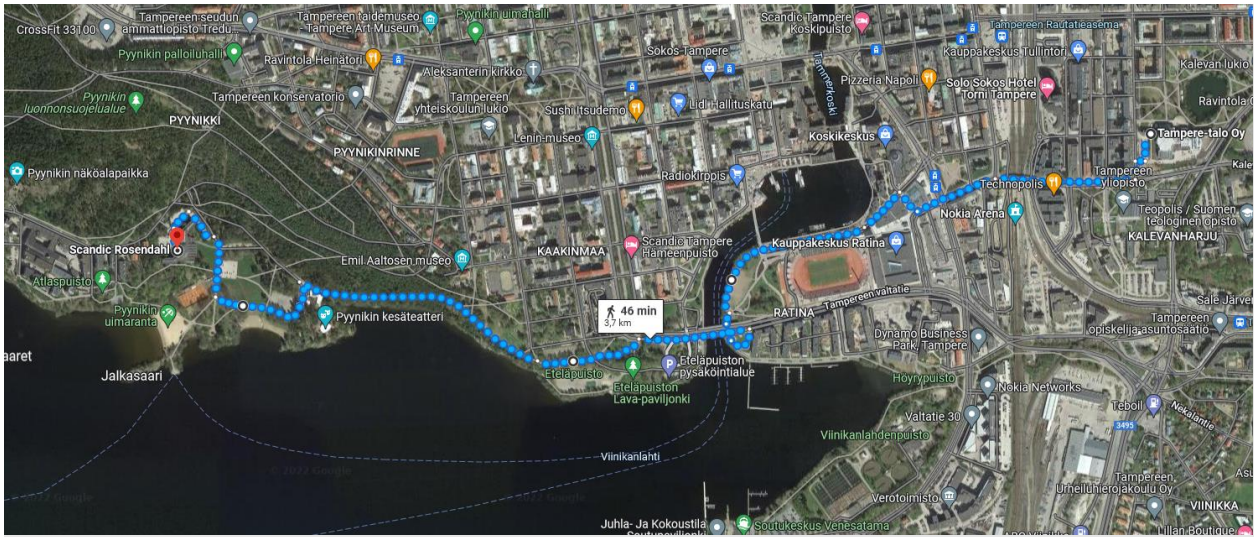


Tampere Hall floor map



Optional walking route to/from Scandic Rosendahl (gala dinner, Monday)

- 3.7 kms, mostly flat terrain
- Starting from Tampere Hall (Tampere-talo), there are nice views first of the city center, then of Pyhäjärvi lake from the Southern Park (Eteläpuisto), and finally Pyynikki Ridge (Pyynikinharju) the tallest longitudinal esker in the world.



Conference information

Conference venues and contact information

The Sunday Symposium will be held at the City Center Campus, Tampere University. The CinC2022 conference main events will be held at Tampere Hall. Please check the maps and further instructions on how to reach the venues at https://events.tuni.fi/cinc2022/venue/. Information on the accessibility, facilities, and parking of Tampere Hall are also available at https://www.tampere-talo.fi/en/visitors/arrival/accessibility/.

Please do not hesitate to contact us if you have any questions about CinC2022 using the following addresses: cinc2022@tuni.fi.

Registration and information desk

The conference registration and information desk will be located at the event venues. The registration desk will be labelled with the CinC sign and will be open during the following hours:

• Sun, September 4th	1:00pm – 06:00pm	Main auditorium at campus
• Mon-Wed, September 5th – 7th	8:00am – 12:00am	Tampere Hall

Participants are required to wear their CinC badges, when they attend both scientific and social events. Participants will be assigned to the social activities during registration.

Meals

- The **Sunday** symposium concludes with a reception. Details will be announced at the conference webpage.
- On **Monday**, a lunch box will be provided for all participants at Duetto Foyer, before leaving for the social activities.
- On **Monday**, the conference gala dinner will be held at Hotel Scandic Rosendahl.
- On **Tuesday** and **Wednesday**, the lunch will be served at Small Auditorium Foyer and Fuuga. To ensure that the meeting is running in a timely fashion, the attendees are kindly asked to proceed quickly to the buffet immediately after the session finishes.
- Finland has excellent quality tap water, so bottled water is not necessary.

Wireless guest network

At University campus: As a guest of the higher education community, you can connect to the guest network if your own organization has not joined https://www.eduroam.fi or https://www.roam.fi services. The TUNI-GUEST network is *unencrypted*. It is only recommended for temporary use.

- Connect to the TUNI-GUEST network with your device.
- Choose your e-mail address or phone number as the means to sign in.
- Familiarize yourself with the Terms of use of IT Services and auth.fi privacy statement in the activation form and tick the box where you commit to adhering to the terms.
- Fill in the information required in the activation form (e-mail address or phone number).
- Choose Proceed. You will receive the activation link by e-mail or text message.
- By opening the activation link you have access to the visitor network for 12 hours.

At Tampere Hall: guest network is available at the venue. Detailed information for connect is available in all rooms.

Accompanying persons (guests)

The accompanying person (guest) registration allows the guest to attend:

- the reception on Sunday evening (after the symposium),
- the Monday box lunch and social event including the gala dinner, and
- the closing plenary session.

For authors and speakers

This year, CinC will again be a hybrid format conference. The emphasis is on ONSITE attendance, so the REMOTE access and functionality of the online platform is not as versatile as last year. The online platform will be available for all registrants for one year allowing access to all oral presentations and posters.

Oral presentations

Please note that this year both onsite and remote presentations will be live. That is, pre-recorded presentations will not be used.

Some general guidelines for both onsite and remote presenters:

- Please be aware that the total duration for your speech is 15 min = 10 min presentation + 5 min Q&A. You will be introduced by the session's Chairperson, who will also open the Q&A session after your presentation.
- Questions will be asked exclusively at the end of each speech, to avoid interruptions and guarantee online attendees a better experience.
- Speakers are expected to adhere strictly to the event schedule, which will be enforced to finish sessions on time and to permit participants to move successfully from one parallel session to another.
- We highly recommend you to prepare your presentation in 16:9 aspect ratio with high quality pictures and as little text as possible. Remote attendees might be viewing your presentation on small devices, where reading a lot of text and equations is very difficult.

Onsite check-in

- Onsite speakers must come to the conference room where they will be presenting at least 15 minutes prior to the session.
- Please provide your slides on a memory stick and check your presentation in the dedicated folder on the PC connected to the projector.
- The session chairpersons need to know who will be presenting each scheduled paper. Help them by introducing yourself and letting them know which paper you will be presenting.
- There will also be a local person available to provide technical support.

Remote check-in and recommendations:

- Remote speakers must connect with the link provided by the technical staff of the conference venue at least 15 minutes prior to the session.
- Present your slides from your own computer.
- Use a PC/laptop for your speech, as tablets, smartphones and other devices might have compromised quality of screen sharing.
- Check your internet connection.
- Use headphones and a dedicated microphone.
- Check the operation of your webcam as you will be visible to the audience during your presentation and Q&A.
- Close other programs (especially communication apps such as Skype and Teams) during your presentation and Q&A.

Poster presentations

Some general guidelines for both onsite and remote presenters:

- Your poster should be max height 1250 x width 1000 mm in portrait (vertical) orientation.
- Print the poster prior to your arrival. If you prefer to your print the poster onsite, please check info at the conference website.
- Your digital poster needs to be in PDF format.
- Upload your poster content here: https://cinc2022.site.ibrida.io

- Please check the uploaded poster yourself. The conference organizers will not check the posters for content or technical correctness.

Remote presenters

- You can upload short poster video, but this is not required. Length of the video should be ~3 minutes. Record your video in 16:9 aspect ratio. The video should be in .mp4 format. Max file size is 500 MB.
- There will be no online poster sessions. The onsite attendees can view the poster (and the videos) on the online platform and contact you via email.

Onsite check-in for poster presenters

- Presenters are required to check-in at the poster session site 15 minutes prior to the start of session.

Practical information

Weather

The climate of Finland has characteristics of both maritime and continental climate. The late summer weather in Finland can be anything between 10-25 C, sunny or rainy and/or windy, so prepare with proper clothing. Bring a rain jacket just in case since it will be raining a few days during this period. Plan on layering your clothes.

Money and currency

Finland is Euro area member since January 1st 1999.

You can withdraw euros from ATMs using your credit card or exchange currency at any money exchange (Helsinki airport if you have extra time, Tampere city center, etc. ATMs can be found throughout Brno, the logo says “Otto” in Finnish. The type of cards accepted are shown beside the machine. Credit cards (Mastercard and Visa) are accepted in shops, hotels, and restaurants.

Similar to other Nordic countries, use of cash is declining in Finland, as card and mobile payments are becoming the standart. Some small businesses don’t accept cash anymore, or at least strongly prefer digital payments.

Language

Official languages in Finland are Finnish and Swedish. English is widely spoken.

Time Zone

Eastern European Summer Time (EEST), UTC+03:00.

Safety and Security

Overall, Tampere is a safe city, and most visitors experience no difficulties. Still, it’s advisable to use common sense and be aware pickpocketing.

The Pan-European Emergency Number: 112.

COVID-19 safety measures

At the moment, we do not have mask use mandate. General sensible behavior is requested with obvious instruction not to participate in any of the onsite CinC2022 activities with symptoms or covid transmission.

Sunday symposium

Sunday September 4th 2022, 13:00 – 18:00

Main Auditorium (Juhlasali), City Center Campus, Tampere University (Kalevantie 4, 33100, Tampere)

13:00 – 13:45 Registration

13:45 – 14:00 Opening remarks, Jari Hyttinen

14:00 – 14:30 "*iPSC-derived cardiomyocytes to model cardiac diseases*"
Katriina Aalto-Setälä, PhD (Professor of Physiology at Tampere University)

14:30 – 15:00 "*Biomarkers for early identification of patients at risk*"
Reijo Laaksonen, PhD (Research Director of clinical medicine at Tampere University)

15:00 – 15:30 "*In silico cardiac modeling for disease-specific and drug safety predictions*"
Jussi Koivumäki, PhD (Adjunct Professor at Tampere University)

15:30 – 16:00 "*Novel technologies in Cardiovascular Healthcare delivery – Uptake and Impact*"
Mark van Gils, PhD (Professor of Digital Healthcare at Tampere University)

16:00 – 16:30 Coffee break

16:30 – 18:00 Round table "*Building blocks for future personalized cardiovascular health*" with our Tampere University speakers and panelists from industry:

David E. Albert, MD, Founder & Chief Medical Officer in AliveCor

Hannu Kinnunen, PhD, Former developer in Suunto and Oura

Heikki Väänänen, Principal Engineer, GE Healthcare

The round table will be moderated by **Jari Hyttinen, PhD** (Professor of Biomedical Engineering at Tampere University).

18:00-20:00 Sunday Symposium Reception, Tampere University City Center Campus (front of the Main Auditorium)

Monday social program

Each year at CinC, Monday afternoon is set aside for a social event. This is an important part of the conference program as it allows attendees to meet each other in a more informal setting away from the scientific sessions. The social program is planned so that all of you have a chance to see some parts of Tampere!

All social program participants are required to wear their CinC badges and T-shirts.

The social program will start from 12:30 h onwards (first buses start) in front of Tampere Hall on Monday, after the morning sessions (box lunch provided). As the social program starts immediately after the sessions, the participants may consider comfortable informal dress for the whole day. The attendees will be split in groups depending on the chosen activity. All activities will finish at 18:00 at the latest.

There are four social program categories (detailed info at https://events.tuni.fi/cinc2022/social-events/):

- Passivist: *Industrial Heritage of Tampere* walking tour or *Tampere in a Nutshell* bus tour (both start at Tampere Hall, bus at 13:00).
- Lazy activist: *Rauhaniemi Folk Spa* (bus transportation from 12:45 onwards)
- Normal activist: *Varala Flow Park* (bus transportation from 12:30 onwards)
- Super activist: *Church Boat Rowing*, “kirkkovenesoutu” in Finnish (walk from Tampere Hall to the event site)

Gala dinner at Hotel Scandic Rosendahl

https://www.scandichotels.com/hotels/finland/tampere/scandic-rosendahl

The gala dinner will be held at the Hotel Scandic Rosendahl that is beautifully located next to Lake Pyhäjärvi and the Pyynikki Park. There, you will enjoy a buffet dinner of seasonal produce and local specialties. Dress code is smart casual / business casual.

There will be bus transport to/from Hotel Scandic Rosendahl starting from the conference venue, Tampere Hall. The bus schedule will be announced as part of the “conference housekeeping info” on Monday, also shown on the conference web site.

Alternatively, you can opt to walk, weather permitting, to/from Hotel Scandic Rosendahl. It is a very nice scenic ~45-minute walk. Further details are available in the Map section of the program booklet.

Tuesday reception at Tampere City Hall 19:00-20.30

(Offered by City of Tampere, address: Keskustori, Tampere, 15-min walk from the venue)

The stunning neo-renaissance style Tampere City Hall is located on the Tampere Central Square (Keskustori). It was designed by Georg Schreck and completed in 1890.

Awards

Rosanna Degani Young Investigator Award

Computing in Cardiology hosts an annual competition to encourage young investigators and to provide a living memorial to Rosanna Degani.

Finalists in the competition will present their work in session RDYIA, at 8:45am on Monday, 5th September at Tampere Hall (see "Map of the Conference venue"). The name of the winner will be announced during the closing plenary session on Wednesday.

The Rosanna Degani YIA finalists are required to give their talk live even if they are presenting remotely. They are each allotted 15 minutes for their talks, followed by 5 minutes for discussion.

Clinical Needs Translational Award

This award represents a joint initiative between the Working Group on e-Cardiology of the European Society of Cardiology (ESC) and CinC, and it is designed with the aim of promoting and further stimulating the translational component of CinC research to clinical needs. This award programme is designed to encourage participation of multidisciplinary research teams, with emphasis on the potential clinical applicability and impact of the research. A representative of the winning team will present their work at the beginning of the Closing Plenary Session on Wednesday, 7th September at Tampere Hall (see "Map of the Conference venue").

Physionet/CinC Challenge Awards 2022

For the past 23 years, PhysioNet and Computing in Cardiology have co-hosted a series of annual challenges, now called the George B. Moody PhysioNet Challenges, to tackle clinically interesting questions that are either unsolved or not well-solved.

Congenital and acquired heart diseases affect roughly 1-2% of children. The lack of early diagnosis and treatment of these conditions represents a significant public health problem, especially in countries with limited healthcare infrastructure or accessibility. Non-invasive assessments performed at point-of-care settings can provide early information regarding congenital and acquired heart diseases in children. In particular, cardiac auscultation and the analysis of the phonocardiogram (PCG) can improve access to early diagnosis and treatment of heart disease.

The George B. Moody PhysioNet Challenge 2022 invites participants to design automated approaches for identifying murmurs in heart sound recordings collected from multiple auscultation locations.

Maastricht Simulation Award

The goal of this award is to recognize the best submission to the conference each year on the topic of cardiovascular simulations. A representative of the winning submission will present the work at the Closing Plenary Session on Wednesday, 7th September at Tampere Hall (see "Map of the Conference venue").

Scientific Program Details

Oral sessions: Sxx & Poster sessions: Pxx.

Monday, September 5, 2022

8:30 - 8:45 Welcome to CinC 2022

Chairs: Rob MacLeod and Jari Hyttinen **Duetto 1-2**

8:45 - 10:15 Session RDYIA - Rosanna Degani Young Investigator Finals

Chairs: Maria Guillem and Rob MacLeod **Duetto 1-2**

8:45 - 9:05 Session RDYIA, ID 57
Exploring Role of Accessory Pathway Location in Wolff-Parkinson-White Syndrome in a Model of Whole Heart Electrophysiology
Karli Gillette, Matthias Gsell, Stefan Kurath-Koller, Anton Prassl, Gernot Plank

9:05 - 9:25 Session RDYIA, ID 240
A Human-Based Computational Investigation Into Sarcomeric and Ionic Remodelling in Hypertrophic Cardiomyopathy
Alex Lipov, Francesca Margara, Xin Zhou, Blanca Rodriguez, Alfonso Bueno-Orovio

9:25 - 9:45 Session RDYIA, ID 325
The Effect of Segmentation Variability in Forward ECG Simulation
Beata Ondrusova, Machteld Boonstra, Jana Svehlikova, Dana Brooks, Peter van Dam, Ali Rababah, Akil Narayan, Rob MacLeod, Nejib Zemzemi, Jess Tate

9:45 - 10:05 Session RDYIA, ID 324
Model-based and Unsupervised Machine-learning Approaches for the Characterization of Responder Profiles for Cardiac Resynchronization Therapy
Marion Taconné, Virginie Le Rolle, Alban Gallard, Kimi Owashi, Adrien al Wazzan, Elena Galli, Jens-Uwe Voigt, Jurgen Duchenne, Otto Smiseth, Erwan Donal, Alfredo Hernandez

10:15 - 10:45 Coffee break

10:45 - 12:15 Session S21 - ECG- Analysis: Ischemia and COVID-19

Chairs: Cees A. Swenne and Roberto Sassi **Duetto 1-2**

10:45 - 11:00 Session S21, ID 416
Comparing the Efficacy of Electrocardiographic Leads in Recovery Phase in Detecting Coronary Artery Disease in Women
Serkalem Beyene, Kjell Nikus, Terho Lehtimäki, Mika Kähönen, Jari Viik

11:00 - 11:15 Session S21, ID 216
The Role of Beta-1 Receptors in the Response to Myocardial Ischemia
Lindsay Rupp, Brian Zenger, Jake Bergquist, Anna Busatto, Rob MacLeod

11:15 - 11:30 Session S21, ID 299
Application of Synthesized ECG Leads for Real-Time Ischemia Monitoring – From Basic ST-Segment Monitoring to Cardiac Multi-Modality Imaging Analysis
John Wang and Milan Horáček

11:30 - 11:45 Session S21, ID 276
Machine learning based classification of ischemic and non- ischemic exercise stress test ECG
Dibya Chowdhury, Bala Chakravarthy Neelapu, Kunal Pal, Sivaraman Jayaraman

11:45 - 12:00 Session S21, ID 208
Initial Reference Values of Electrocardiographic Alternans by Enhanced Adaptive Matched Filter
Ilaria Marcantoni, Erica Iammarino, Agnese Sbrollini, Micaela Morettini, Laura Burattini

12:00 - 12:15 Session S21, ID 196
A CNN for Covid Detection using ECG signals
Federico Muscato, Valentina Corino, Massimo W Rivolta, Pietro Cerveri, Antonio Sanzo, Alessandro Vicentini, Roberto Sassi, Luca Mainardi

10:45 - 12:15 Session S22 - Atrial Arrhythmias: Electrocardiography

Chair: Frida Sandberg and Edward Vigmond **Sopraano**

10:45 - 11::00 Session S22, ID 32
Drug Dependent Circadian Variations in AV-nodal Properties During Atrial Fibrillation
Mattias Karlsson, Mikael Wallman, Pyotr Platonov, Sara Ulimoen, Frida Sandberg

11:00 - 11:15 Session S22, ID 59
Estimation of f-wave Dominant Frequency Using a Voting Scheme
Shany Biton, Mahmoud Suleiman, Noam Ben Moshe, Leif Sornmo, Joachim A. Behar

11:15 - 11:30 Session S22, ID 61
ArNet-ECG: Deep Learning for the Detection of Atrial Fibrillation from the Raw Electrocardiogram
Noam Ben-Moshe, Shany Biton, Joachim A. Behar

11:30 - 11:45 Session S22, ID 81
Tilt-Induced Changes in RR Series Characteristics: An AV Node Simulation Study
Felix Plappert, Mikael Wallman, Pyotr Platonov, Sten Östenson, Frida Sandberg

11:45 - 12:00 Session S22, ID 124
Improving Clinical ECG-based Atrial Fibrosis Quantification with Neural Networks Through in silico P waves From an Extensive Virtual Patient Cohort
Claudia Nagel, Johannes Osypka, Laura Anna Unger, Deborah Nairn, Armin Luik, Reza Wakili, Olaf Doessel, Axel Loewe

12:00 - 12:15 Session S22, ID 171
Reproducibility of machine learning models for paroxysmal atrial fibrillation onset prediction
Cédric Gilon, Jean-Marie Grégoire, Jérome Hellinckx, Stéphane Carlier, Hugues Bersini

10:45 - 12:15 Session S23 - Heart Rate Variability in Antepartum and Peripartum

Chairs: Philip Warrick and Christoph Hoog Antink **Sonaatti 1**

10:45 - 11:00 Session S23, ID 268
The Nonlinear Dynamic Response of Fetal Heart Rate to Intrapartum Uterine Pressure
Johann Vargas-Calixto, Yvonne Wu, Michael Kuzniewicz, Marie-Coralie Cornet, Heather Forquer, Lawrence Gerstley, Emily Hamilton, Philip Warrick, Robert Kearney

11:00 - 11:15 Session S23, ID 271
Longitudinal Assessment of Fetal Heart Rate Variability During Pregnancy
Maretha Bester, Rohan Joshi, Massimo Mischi, Judith van Laar, Rik Vullings

11:15 - 11:30 Session S23, ID 300
Influence of Gestational Diabetes on Fetal Heart Rate in Antepartum Cardiotocographic Recordings
Giulio Steyde, Beniamino Daniele, Edoardo Spairani, Giovanni Magenes, Maria Signorini

11:30 - 11:45 Session S23, ID 305
Model-Based Analysis of Apnea-Bradycardias in Newborns
Orlane Duport, Virginie Le Rolle, Gustavo Guerrero, Alain Beuchée, Alfredo Hernandez

11:45 - 12:00 Session S23, ID 344
Assessing Intrapartum Risk of Hypoxic-Ischemic Encephalopathy using Fetal Heart Rate with Long Short-term Memory Networks
Derek Kweku Degzui, Michael Kuzniewicz, Cornet Marie-Coralie, Yvonne Wu, Heather Forquer, Lawrence Gerstley, Emily Hamilton, Doina Precup, Philip Warrick, Robert Kearney

12:00 - 12:15 Session S23, ID 402
Use of AI algorithms to assess heart rate variability in IUGR and normal children
Taher Biala, Sau Vana, Joao, A. Lobo Marques, Ye Lia, Fernando Schlindwein

10:45 - 12:15 Session S24 - Cardiovascular Imaging

Chairs: Cristian Linte and Cristiana Corsi **Opus 3**

10:45 - 11:00 Session S24, ID 387
A new computer-aided solution for the automatic detection of metal stent struts in follow-up evaluation in OCT images
Zofia Schneider, Elżbieta Pociask, Klaudia Proniewska

11:00 - 11:15 Session S24, ID 428
Assessment of Transcatheter heart valve Migration and Embolization Risk Following Valve-in-MAC
Sam Hill, Alistair Young, Ronak Rajani, Adelaide De Vecchi

11:15 - 11:30 Session S24, ID 22
An Automated Pipeline to Create Patient Specific 3D LV Geometry Models of Patients with Mitral Annular Disjunction
Gabriel Balaban, Eivind Aabel, Margareth Ribe, Anna Castrini, Kristina Haugaa, Mary Maleckar

11:30 - 11:45 Session S24, ID 197
Weakly-Supervised Deep learning for Left Ventricle Fibrosis Segmentation in Late Gadolinium Enhanced Cardiac MRI using Image Level Labels
Roel Klein, Florence van Lieshout, Maarten Kolk, Kylian van Geijtenbeek, Fleur Tjong, Romy Vos, Samuel Ruipérez-Campillo, Ruibin Feng, Brototo Deb, Prasanth Ganesan, Reinoud Knops, Ivana Isgum, Sanjiv Narayan, Erik Bekkers, Bob de Vos

11:45 - 12:00 Session S24, ID 371
A New Approach to Derive a Dynamic Anatomical Model of the Left Atrium from 3D Echocardiography in Atrial Fibrillation
Matteo Falanga, Sachal Hussain, Matteo Lisi, Corrado Tomasi, Claudio Fabbri, Cristiana Corsi

12:00 - 12:15 Session S24, ID 357
Regional Segmentation of the Left Atrium: A Preliminary Test in Atrial Fibrillation Patients
Sachal Hussain, Matteo Falanga, Claudio Fabbri, Cristiana Corsi

12:15 Social Event

Tuesday, September 6, 2022

8:30 - 10:00 Session S31 - ECG-Analysis: SCD and LVH

Chairs: Elisabete Aramendi and Laura Burattini **Duetto 1-2**

8:30 - 8:45 Session S31, ID 270
Automated algorithm for QRS detection during pulseless electrical activity in cardiac arrest patients
Jon Urteaga, Andoni Elola, Elisabete Aramendi, Anders Norvik, Eirik Unneland, Eirik Skogvoll

8:45 - 9:00 Session S31, ID 40
A QT Interval Inaccuracy Index for Highly Automated TQT Studies
Mously Diaw, Stéphane Papelier, Alexandre Durand-Salmon, Jacques Felblinger, Julien Oster

9:00 - 9:15 Session S31, ID 286
Classifying Left Ventricular Hypertrophy from Extracted Morphological Electrocardiogram Biomarkers using Random Forest
Hafiz Naderi, Julia Ramírez, Stefan van Duijvenboden, Esmeralda Ruiz Pujadas, Lin Wang, Karim Lekadir, Steffen Petersen, Patricia Munroe

9:15 - 9:30 Session S31, ID 49
Arrhythmia detection using spiking variable projection neural networks
Peter Kovacs and Kaveh Samiee

9:30 - 9:45 Session S31, ID 190
A movement-artefact-free heart-rate prediction system
Maarten Thoonen, Peter Veltink, Frank Halfwerk, Robby van Delden, Ying Wang

9:45 - 10:00 Session S31, ID 52
Scalable, Multiplatform, and Autonomous ECG Processor Supported by AI for Telemedicine Center
Filip Plesinger, Adam Ivora, Eniko Vargova, Radovan Smisek, Jan Pavlus, Petr Nejedly, Veronika Bulkova, Roman Kozubik, Josef Halamek, Pavel Jurak

8:30 - 10:00 Session S32 - Atrial Arrhythmias: Endocardiography 1

Chairs: Jorge Sánchez and Stef Zeemering **Sopraano**

8:30 - 8:45 Session S32, ID 83
Electrogram analysis reveals ionic current dysregulation relevant for atrial fibrillation
Albert Dasí, Claudia Nagel, Axel Loewe, Julia Camps, Alfonso Bueno-Orovio, Blanca Rodriguez

8:45 - 9:00 Session S32, ID 176
Estimation of the Atrial Activity from Electrograms – a Beamforming Perspective
Tijs Moree, Mathijs van Schie, Natasja de Groot, Richard Hendriks

9:00 - 9:15 Session S32, ID 247
The effects of electrode configuration on omnipolar signals: An in-silico approach
Jothi Letchumy Mahendra Kumar, Joe Brook, Konstantinos Ntagiantas, Dimitrios Panagopoulos, Nicholas S Peters, Danya Agha-Jaffar, Norman Qureshi, Rasheda Chowdhury, Chris Cantwell

9:15 - 9:30 Session S32, ID 347
In Vivo Analysis of Conduction Pattern Dynamics: System Development and Application Using OpenEP
Ali Gharaviri, Louisa O'Neill, Paul Smith, Caroline Roney, Neil Grub, Matthew Wright, Mark O'Neill, Steven Williams

9:30 - 9:45 Session S32, ID 366
Rotors drift toward and stabilize in low power regions in heterogeneous models of atrial fibrillation
Laura Martinez-Mateu, Javier Saiz, Omer Berenfeld

9:45 - 10:00 Session S32, ID 375
Unipolar R:S Development in Chronic Atrial Fibrillation
Eric Paccione, Bram Hunt, Eugene Kwan, Derek Dosdall, Rob MacLeod, Ravi Ranjan

8:30 - 10:00 Session S33 - Methods for Heart Rate and Cardiovascular Variability Analysis

Chairs: Vlasta Bari and Olivier Meste **Sonaatti 1**

8:30 - 8:45 Session S33, ID 80
Automatic arousal detection using heart rate from a single-lead electrocardiogram
Franz Ehrlich, Johannes Bender, Hagen Malberg, Miriam Goldammer

8:45 - 9:00 Session S33, ID 147
Quantifying the Autonomic Nervous System influence on Heart Rate Turbulence using Partial Least Squares Path Modeling
Helena Puente-Díaz, Rafael García-Carretero, Rebeca Goya-Esteban, Óscar Barquero-Pérez

9:00 - 9:15 Session S33, ID 209
Characterization of Heart Rate Variability Dynamics in Heart Failure Patients Admitted to Intensive Care Unit
Maximiliano Mollura, Christian Niklas, Stefanie Messner, Markus Weigand, Jan Larmann, Riccardo Barbieri

9:15 - 9:30 Session S33, ID 211
Listening effort: cardiovascular investigation through the point process
Edoardo Maria Polo, Maximiliano Mollura, Alessia Paglialonga, Riccardo Barbieri

9:30 - 9:45 Session S33, ID 273
Transfer Entropy between RR and QT Intervals in Long QT Syndrome
Jiyeong Kim, Matias Kanniainen, Ilya Potapov, Esa Rasanen

9:45 - 10:00 Session S33, ID 303
Transfer Function Gain Between Heart Period and QT Interval Variability Decreases at a 10-year Follow-up in Half-Marathon Runners
Beatrice De Maria, Vlasta Bari, Beatrice Cairo, Francesca Gelpi, Daniela Lucini, Massimo Pagani, Mara Malacarne, Aparecida Maria Catai, Mariana de Oliveira Gois, Francesca Perego, Laura Adelaide Dalla Vecchia, Alberto Porta

8:30 - 10:00 Session S34

Special Session: Non-invasive blood pressure monitoring

Chairs: Francesco Renna and Pietro Cerveri **Opus 3**

8:30 - 9:00 Session S34, ID 430
Non-Invasive Blood Pressure Monitoring: The Role of Signal Processing and Deep Learning for Systemic and Pulmonary Pressure Estimation
Pietro Cerveri and Francesco Renna

9:00 - 9:15 Session S34, ID 42
Porcine model for validation of noninvasive estimation of pulmonary artery pressure
Samuel Emil Schmidt, Mathias Dolmer, John Hansen, Johannes Struijk, Peter Søgaard, Benedict Kjærgaard

9:15 - 9:30 Session S34, ID 295
Explainable Deep Learning for Non-Invasive Detection of Pulmonary Artery Hypertension from Heart Sounds
Alex Gaudio, Miguel Coimbra, Aurélio Campilho, Asim Smailagic, Samuel Emil Schmidt, Francesco Renna

9:30 - 9:45 Session S34, ID 429
End-to-end deep learning and sensor fusion for non-invasive BP monitoring using multivariate physiological signals
Pietro Cerveri, Mattia Sarti, Matteo Rossi, Giulia Alessandrelli, Carolina Lombardi, Luca Mainardi

9:45 - 10:00 Session S34, ID 433
Final discussion
Francesco Renna and Pietro Cerveri

10:00 - 10:15 Coffee break

10:15 - 11:45 Session S41 - ECG Analysis: Signal Processing Techniques

Chairs: Ana Mincholé and Daniel Güldenring **Duetto 1-2**

10:15 - 10:30 Session S41, ID 168
Multichannel ECG Filtering: Source Consistency Filtering, Eigenfiltering and Traditional Methods
Lorenzo Bachi, Maurizio Varanini, Lucia Billeci

10:30 - 10:45 Session S41, ID 230
Ultra-high Frequency Deep-learning Beat Detector Delivering QRS Onsets and Offsets
Zuzana Koscova, Radovan Smisek, Petr Nejedly, Josef Halamek, Pavel Jurak, Pavel Leinveber, Karol Curila, Filip Plesinger

10:45 - 11:00 Session S41, ID 365
Influence of the Training Set Size on the Subject-to-Subject Variability of the Estimation Performance of Linear ECG-Lead Transformations
Daniel Guldenring, Dewar Finlay, Raymond Bond, Alan Kennedy, Peter Doggart, James McLaughlin

11:00 - 11:15 Session S41, ID 367
Novel Method for Orientation-Independent Analysis in Equi-Spaced Multi-Electrode Arrays
Izan Segarra, Samuel Ruiperez-Campillo, Francisco Castells, Jose Millet

11:15 - 11:30 Session S41, ID 380
Adaptive filtering methods for ECG waveform restoration during cardiopulmonary resuscitation
Alvaro Iza, Andoni Elola, Iraia Isasi, Elisabete Aramendi, Trygve Eftestøl, Jo Johansen, Lars Wik

11:30 - 11:45 Session S41, ID 157
A New DDE Smoothing Filter for ECG Signal Denoising
Arman Kheirati Roonizi and Roberto Sassi

10:15 - 11:45 Session S42 - Atrial Arrhythmias: Endocardiography 2

Chairs: Ismael Hernández and Leif Sornmo **Sopraano**

10:15 - 10:30 Session S42, ID 70
Computational Study of the Effects of AF-related Genetic Mutations in 3D Human Atrial Model
Rebecca Belletti, Lucía Romero, Javier Saiz

10:30 - 10:45 Session S42, ID 97
Thrombogenesis and Hemodynamics in Left Atrium Under Atrial Fibrillation
João Lameu, Italo Sandoval Ramos de Oliveira, Joao Salinet

10:45 - 11:00 Session S42, ID 306
Location of rotor and ectopic's atrial fibrillation mechanisms: a computational study using 2D Discrete Helmholtz Hodge Decomposition
Italo Sandoval Ramos de Oliveira, John Sims, Joao Salinet

11:00 - 11:15 Session S42, ID 342
Reducing Noise in Atrial Fibrillation Electrograms Using Autoencoder Neural Networks
Samuel Ruiperez-Campillo, Brototo Deb, Prasanth Ganesan, Ruibin Feng, Fleur Tjong, Maarten Kolk, Paul Clopton, Albert Rogers, Sanjiv Narayan

11:15 - 11:30 Session S42, ID 352
Local Conduction Velocity Estimation during Wave-front Collisions and Reentrant Scenarios
Ismael Hernández-Romero, Carlos Fambuena Santos, Clara Herrero Martín, Andreu M. Climent, Maria de la Salud Guillem Sánchez

11:30 - 11:45 Session S42, ID 394
Incidence of Distinct Repetitive Atrial Activation Patterns as a Metric for Atrial Fibrillation Complexity
Ozan Özgül, Ben Hermans, Arne van Hunnik, Sander Verheule, Ulrich Schotten, Pietro Bonizzi, Stef Zeemering

10:15 - 11:45 Session S43 - Photoplethysmography I

Chairs: Martin Schmidt and Joaquim Behar **Opus 3**

10:15 - 10:30 Session S43, ID 23
Pulse Wave Analysis of Photoplethysmography Signals to Enhance Classification of Cardiac Arrhythmias
Loïc Jeanningros, Fabian Braun, Jérôme Van Zaen, Mathieu Le Bloa, Alessandra Porretta, Cheryl Teres2, Claudia Herrera, Giulia Domenichini, Patrice Carroz, Denis Graf, Patrizio Pascale, Jean-Marc Vesin, Jean-Philippe Thiran, Etienne Pruvot, Mathieu Lemay

10:30 - 10:45 Session S43, ID 120
Effect of Oxygen Concentration Reduction on Photoplethysmographic Morphological Characteristics
Yang Li, Jianqing Li, Zhengtao Cao, Chengyu Liu

10:45 - 11:00 Session S43, ID 135
Effect of Filtering on Pulse Wave Transit Time Measured by Photoplethysmography
Shangdi Liao, Fei Chen, Haipeng Liu, Dingchang Zheng

11:00 - 11:15 Session S43, ID 237
Movement, sweat, and wristband fit as sources of heart rate inaccuracy in wearable devices
Michele Orini, Gabrielle Guvensen, Alexandra Jamieson, Nishi Chaturvedi, Alun Hughes

11:15 - 11:30 Session S43, ID 219
Non-contact Measurement of Respiration Rate with Camera-based Photoplethysmography During Rest and Mental Stress
Hannes Ernst, Hagen Malberg, Martin Schmidt

11:30 - 11:45 Session S43, ID 316
Coronary Health Index (CHI) as a Determinant for Arterial Stenosis, derived Using PPG and ECG Signals
Poulomi Pal and Manjunatha Mahadevappa

10:15 - 11:45 Session S44

Special Session: Addressing and assessing uncertainty in cardiac simulations

Chairs: Akil Narayan and Olaf Doessel **Sonaatti 1**

10:15 - 10:45 Session S44, ID 386
Methods and Tools for Uncertainty Quantification: Applications and Impact on Cardiac Models
Jess Tate, Akil Narayan, Dana Brooks

10:45 - 11:00 Session S44, ID 361
Parametric Uncertainty Quantification in Electrocardiographic Forward and Inverse Problems
Jake Bergquis, Lindsay Rupp, Dana Brooks, Jess Tate, Rob MacLeod, Akil Narayan

11:00 - 11:15 Session S44, ID 283
A Workflow for Probabilistic Calibration of Models of Left Atrial Electrophysiology
Richard Clayton, Samuel Coveney, Cesare Corrado, Caroline Roney, Richard Wilkinson, Jeremy Oakley, Steven Niederer

11:15 - 11:30 Session S44, ID 425
Uncertainty Quantification of Cardiac Position on Deep Graph Network ECGI
Xiajun Jiang, Jess Tate, Jake Bergquist, Akil Narayan, Rob MacLeod, Linwei Wang

11:30 - 11:45 Session S44, ID 434
Final discussion
Akil Narayan

11:45 - 12:30 Lunch

12:00 - 12:15 **Product Demos**
GE healthcare

12:30 - 14:00 Session S51 - ECG Analysis: Clinical Applications

Chairs: Johan DeBie and Pyotr Platonov **Duetto 1-2**

12:30 - 12:45 Session S51, ID 87
Multi-Class ECG Feature Importance Rankings: Cardiologists vs. Algorithms
Philip Aston, Temesgen Mehari, Alen Bosnjakovic, Peter Harris, Ashish Sundar, Steven Williams, Axel Loewe, Claudia Nagel, Nils Strodthoff, Olaf Doessel

12:45 - 13:15 Session S51, ID 432 **Clinical Talk**
Aspects of ischemia detection in the ECG in acute coronary syndromes: Clinician's perspective.
Kjell Nikus

13:15 - 13:30 Session S51, ID 281
Classification of Fetal Behavioral States by employing 1D-CNN based on Fetal Electrocardiography
Amna Samjeed, Maisam Wahbah, Leontios Hadjileontiadis, Ahsan Khandoker

13:30 - 13:45 Session S51, ID 136
Electrophysiological Simulation Of Maternal-Fetal ECG on a 3D Maternal Torso Model
Julie Johanne Uv and Hermenegild Arevalo

13:45 - 14:00 Session S51, ID 170
Employing Support Vector Machine Regression to Estimate the Fetal Gestational Age
Maisam Wahbah, Raghad Al Sakaji, Kiyoe Funamoto, Anita Krishnan, Yoshiyuki Kasahara, Yoshitaka Kimura, Ahsan Khandoker

12:30 - 14:00 Session S52 - Atrial Arrhythmias

Chairs: Fernando Schlindwein and Javier Saiz **Opus 3**

12:30 - 12:45 Session S52, ID 53
Spectral Distribution Complexity of the Surface Fibrillatory Waves Predicts Post-Catheter Ablation Relapse in Persistent Atrial Fibrillation
Pilar Escribano Cano, Juan Ródenas, Manuel García, Miguel A Arias, José J Rieta, Raul Alcaraz

12:45 - 13:00 Session S52, ID 56
Atrial Fibrillation Recurrence Risk Prediction from 12-lead ECG Recorded Pre- and Post-Ablation Procedure
Eran Zvuloni, Sheina Gendelman, Sanghamitra Mohanty, Jason Lewen, Andrea Natale, Joachim A. Behar

13:00 - 13:15 Session S52, ID 236
Towards the Prediction of Atrial Fibrillation Based on Interpretable ECG Features
Alexander Hammer, Hagen Malberg, Martin Schmidt

13:15 - 13:30 Session S52, ID 326
Novel electrogram-based features for the classification between paroxysmal and persistent atrial fibrillation during sinus rhythm
Hanie Moghaddasi, Borbala Hunyadi, Alle-Jan van der Veen, Natasja de Groot, Richard Hendriks

13:30 - 13:45 Session S52, ID 396
Effects of Acetylcholine Release and Spatial Distribution on the Frequency of Atrial Reentrant Circuits: a Computational Study.
Chiara Celotto, Carlos Sánchez, Jose F Rodriguez Matas, Pablo Laguna, Esther Pueyo

13:45 - 14:00 Session S52, ID 424
Autocorrelation function for predicting arrhythmic recurrences in patients undergoing persistent atrial fibrillation ablation
Raquel Cervigón, Eduardo Franco, Cristina Lozano, Javier Moreno, Francisco Castells

12:30 - 14:00 Session S53 - Modeling Ion channels and Cells

Chairs: Chiara Bartolucci and Ronald Wilders **Sonaatti 1**

12:30 - 12:45 Session S53, ID 91
Contribution of the Slow Delayed Rectifier K+ current to Pacemaker Activity of the Human Sinoatrial Node
Arie Verkerk and Ronald Wilders

12:45 - 13:00 Session S53, ID 228
An in Silico Investigation into the Role of SK Channels in Failing Ventricular Myocytes
Marta Gomez, Jesús Carro, Esther Pueyo, Violeta Monasterio

13:00 - 13:15 Session S53, ID 410
Controllability of Voltage- and Calcium-Driven Alternans in a Cardiac Ionic Model
Laura Munoz, Mark Ampofo, Elizabeth Cherry

13:15 - 13:30 Session S53, ID 101
Numerical Simulations Indicate IK1 Dynamic Clamp Can Unveil the Phenotype of Cardiomyocytes Derived from Induced Pluripotent Stem Cells
Sofia Botti, Chiara Bartolucci, Claudia Altomare, Lucio Barile, Rolf Krause, Luca Pavarino, Stefano Severi

13:30 - 13:45 Session S53, ID 195
Electromechanical Coupling in Human Atrial Cardiomyocytes: Force-Frequency Relationship Study
Fazeelat Mazhar, Francesco Regazzoni, Chiara Bartolucci, Cristiana Corsi, Luca Dedè, Alfio Quarteroni, Stefano Severi

13:45 - 14:00 Session S53, ID 50
Mechanical Translation of Electrical Abnormalities with a New Electromechanical Model of Human Ventricular Cell
Chiara Bartolucci, Mohamadamin Forouzandehmehr, Michelangelo Paci, Stefano Severi

12:30 - 14:00 Session S54 - The George B. Moody PhysioNet Challenge 2022 - I

Chairs: Gari Clifford and Matt Reyna **Sopraano**

12:30 - 12:45 Session S54, ID 109
Heart Murmur Detection from Phonocardiogram Recordings: The George B. Moody PhysioNet Challenge 2022
Matthew Reyna, Yashar Kiarashinejad, Andoni Elola, Jorge Oliveira, Francesco Renna, Annie Gu, Nadi Sadr, Erick Andres Perez Alday, Sandra Mattos, Miguel Coimbra, Reza Sameni, Ali Bahrami Rad, Gari Clifford

12:45 - 13:00 Session S54, ID 254
Heart Murmur Detection from Phonocardiogram Recordings by Self-Operational Neural Networks
Muhammad Uzair Zahid, Serkan Kiranyaz, Moncef Gabbouj

13:00 - 13:15 Session S54, ID 153
Detection of Heart Sound Murmurs and Clinical Outcome with Bidirectional Long Short-Term Networks
Sofia Monteiro, Ana Fred, Hugo Silva

13:15 - 13:30 Session S54, ID 126
Learning Time-Frequency Representations of Phonocardiogram for Murmur Detection
Jae-Man Shin, Hyun-Seok Kim, Woo-Young Seo, Sung-Hoon Kim

13:30 - 13:45 Session S54, ID 137
Outcome Prediction and Murmur Detection in Sets of Phonocardiograms by a Deep Learning-Based Ensemble Approach
Sven Festag, Gideon Stein, Tim Büchner, Maha Shadaydeh, Joachim Denzler, Cord Spreckelsen

13:45 - 14:00 Session S54, ID 20
Detection of Heart Murmurs in Phonocardiograms with Parallel Hidden Semi-Markov Models
Andrew McDonald, Mark Gales, Anurag Agarwal

14:00 - 14:15 Coffee break

14:15 - 15:45 Session S61 - Modeling Arrhythmias

Chairs: Juan Pablo Martinez and Axel Loewe **Duetto 1-2**

14:15 - 14:30 Session S61, ID 150
Modeling of the Effect of Alcohol on Episode Patterns in Atrial Fibrillation
Vilma Pluščiauskaitė, Andrius Rapalis, Monika Butkuvienė, Vaidotas Marozas, Leif Sornmo, Andrius Petrėnas

14:30 - 14:45 Session S61, ID 334
Personalized Modeling of Atrial Activation and P-waves: a Multimodality Approach
Patricia Martinez Diaz, Jorge Sánchez, Claudia Nagel, Deborah Nairn, Ismael Hernández-Romero, Maria de la Salud Guillem Sánchez, Olaf Doessel, Axel Loewe

14:45 - 15:00 Session S61, ID 346
Tailoring Process for the Regional Personalization of Atrial Fibrillation with a Novel Cardiac Model
Clara Herrero Martín, Carlos Fambuena Santos, Maria de la Salud Guillem Sánchez, Andreu M. Climent, Ismael Hernández-Romero

15:00 - 15:15 Session S61, ID 400
Machine Learning Based Cell Model for fast approximation of cellular action potential to enable clinical translation
Pau Romero, Miguel Lozano, Giada Romitti, Dolors Serra, Ignacio Garcia-Fernandez, Alejandro Liberos, Miguel Rodrigo, Rafael Sebastian

15:15 - 15:30 Session S61, ID 54
Diffusion Reaction Eikonal Alternant Model: Towards Fast Simulations of Complex Cardiac Arrhythmias
Cristian Barrios Espinosa, Jorge Sánchez, Olaf Doessel, Axel Loewe

15:30 - 15:45 Session S61, ID 139
Arrhythmogenic Response to Beta-Adrenergic Stimulation in Hypertrophic Cardiomyopathy
Ruben Doste, Raffaele Coppini, Alfonso Bueno-Orovio

14:15 - 15:45 Session S62 - Photoplethysmography II

Chair: Pedro Gomis and Luca Mainardi **Opus 3**

14:15 - 14:30 Session S62, ID 93
ECG and PPG-Based Hypertension Screening Under Non-Hypertensive Blood Pressure Recordings
Jesús Cano, Lorenzo Fácila, Vicente Bertomeu-González, José Moreno-Arribas, Raul Alcaraz, José J Rieta

14:30 - 14:45 Session S62, ID 238
A Machine Learning Approach to Predict Arterial Blood Pressure from Photoplethysmography Signal
Felipe Meneguitti Dias, Thiago Costa, Diego Cardona Cardenas, Marcelo Toledo, Jose Eduardo Krieger, Marco Gutierrez

14:45 - 15:00 Session S62, ID 262
Generalization Capability of a Neural Network for Blood Pressure Estimation from Photoplethysmography
Clémentine Aguet, Jérôme Van Zaen, Martin Proença, Guillaume Bonnier, Pascal Frossard, Mathieu Lemay

15:00 - 15:15 Session S62, ID 92
Cuffless Hypertension Risk Assessment and the Significance of Calibration
Jesús Cano, Lorenzo Fácila, Fernando Hornero, Philip Langley, Raul Alcaraz, José J Rieta

15:15 - 15:30 Session S62, ID 226
Association between photoplethysmography pulse upslope and cardiovascular events in over 170,000 UK Biobank participants
Michele Orini, Stefan van Duijvenboden, Andrew Tinker, Patricia Munroe, Pier Lambiase

15:30 - 15:45 Session S62, ID 307
Improved Pulse Pressure Estimation Based on Imaging Photoplethysmographic Signals
Matthieu Scherpf, Hagen Malberg, Martin Schmidt

14:15 - 15:45 Session S63 - BSPM & ECGI Technical Advances

Chairs: Jana Svehlikova and Peter van Dam **Sonaatti 1**

14:15 - 14:30 Session S63, ID 279
Greedy Selection of the Torso Electrodes for the Solution of Inverse Problem with a Single Dipole
Beata Ondrusova, Jana Svehlikova, Jan Zelinka, Milan Tysler, Peter Tino

14:30 - 14:45 Session S63, ID 217
Unexpected Errors in the Electrocardiographic Forward Problem
Anna Busatto, Jake Bergquist, Lindsay Rupp, Brian Zenger, Rob MacLeod

14:45 - 15:00 Session S63, ID 232
Assessment of inter-operator Reproducibility of CardioInsight ECG-Imaging
Michele Orini, Peter Waddingham, Adam Dennis, Jan Mangual, Pier Lam, Antony Chow

15:00 - 15:15 Session S63, ID 214
Impact of Noise on Electrocardiographic Imaging Resolution with Zero Order Tikhonov Regularization and L-Curve Optimization
Rubén Molero Alabau, Jana Reventós Presmanes, Ivo Roca, Lluis Mont, Andreu M. Climent, Maria de la Salud Guillem Sánchez

15:15 - 15:30 Session S63, ID 250
Utilising Surrogate Models to Approximate Cardiac Potentials when Solving Inverse Problems via Bayesian Techniques
Abbish Kamalakkannan, Peter Johnston, Barbara Johnston

15:30 - 15:45 Session S63, ID 374
Heart Position Uncertainty Quantification in the Inverse Problem of ECGI
Jake Bergquist, Lindsay Rupp, Anna Busatto, Ben Orkild, Brian Zenger, Wilson Good, Jaume Coll-Font, Jess Tate, Dana Brooks, Akil Narayan, Rob MacLeod

14:15 - 15:45 Session S64 - The George B. Moody PhysioNet Challenge 2022 - II

Chairs: Gari Clifford and Matt Reyna **Sopraano**

14:15 - 14:30 Session S64, ID 193
Multitask and Transfer Learning for Murmur Detection in Heart Sounds
João Costa, Rui Rodrigues, Paula Couto

14:30 - 14:45 Session S64, ID 224
Using Mel-Spectrograms and 2D-CNNs to detect Murmurs in Variable Length Phonocardiograms
Marius Knorr, Jan Bremer, Renate Schnabel

14:45 - 15:00 Session S64, ID 234
Towards uncertainty-aware heart sound murmur detection via DirichletNet and tandem learning
Erika Bondareva, Jing Han, Tong Xia, Cecilia Mascolo

15:00 - 15:15 Session S64, ID 138
Two-Stage Multitask-Learner for PCG Murmur Location Detection
Maurice Rohr, Benedikt Müller, Sebastian Dill, Gökhan Güney, Christoph Hoog Antink

15:15 - 15:30 Session S64, ID 46
Transfer Learning in Heart Sound Classification using Mel spectrogram
Xin Li, Fernando Schlindwein, G. Andre Ng

15:45 - 17:45 Coffee break and Poster Session

15:45 - 17:45 Session P7_1 - Cardiovascular Imaging

Session P7_1, ID 191
Deep Learning Models for Automatic Segmentation of Left Ventricular Fibrosis on Late Gadolinium Enhancement Cardiac Magnetic Resonance Imaging
Florence van Lieshout, Roel Klein, Maarten Kolk, Kylian van Geijtenbeek, Romy Vos, Samuel Ruiperez-Campillo, Ruibin Feng, Brototo Deb, Prasanth Ganesan, Reinoud Knops, Ivana Isgum, Sanjiv Narayan, Erik Bekkers, Bob Vos, Fleur Tjong

Session P7_1, ID 242
Early Myocardial Infarction Detection with One-Class Classification over Multi-view Echocardiography
Aysen Degerli, Fahad Sohrab, Serkan Kiranyaz, Moncef Gabbouj

Session P7_1, ID 348
Shear Wave Imaging Framework for Quantification of Myocardial Tissue Properties
Martin Andersen, Johannes Struijk, Samuel Emil Schmidt

Session P7_1, ID 60
Lirot.ai: A Novel Platform for Crowd-Sourcing Retinal Image Segmentations
Jonathan Fhima, Jan Van Eijgen, Moti Freiman, Ingeborg Stalmans, Joachim A. Behar

15:45 - 17:45 Session P7_2 - Cardiovascular Mechanics

Session P7_2, ID 3
Description of the Volume-Clamp Method of Blood Pressure Measurements Using the Mathematical Model of the Lamé Problem
Marek Żyliński, Wiktor Niewiadomski, Gerard Cybulski, Anna Gąsiorowska

Session P7_2, ID 19
Impact of Rigid Versus Dynamic Boundaries on Computational Fluid Dynamics Predictor of Left Atrial Appendage Thrombus Formation
Henrik Kjeldsberg, Kristian Valen-Sendstad, Joakim Sundnes

Session P7_2, ID 85
Comparison Of Newtonian And Non-Newtonian Blood Flow In Ascending Aortic Aneurysm
Aleksandra Petuchova and Algirdas Maknickas

Session P7_2, ID 102
In Silico Evaluation of New Approaches in Cardiac Resynchronization Therapy
Cristóbal Ruiz, Juan Gómez, Jesús Almendral, Eduardo Castellanos, Beatriz Trenor

Session P7_2, ID 182
Age-specific Topology Minimization in a One-dimensional Model Describing Carotid Haemodynamics
Irene Suriani, Massimo Mischi, R. Arthur Bouwman, Kevin Lau

Session P7_2, ID 243
The Influence of Left Atrial Wall Thickness and Curvature on Wall Strain in Patient-Specific Atrium Models
Tiffany Baptiste, Angela Lee, Daniel Ennis, Ulrike Haberland, Ronak Rajani, Aldo Rinaldi, Steven Niederer

Session P7_2, ID 264
Prediction of deterioration in critically ill patients with heart failure based on vital signs monitoring
Yijing Li, Kang Yang, Wenyu Ye, Haoyu Jiang, Xianliang He, Lei Wang, Shengyu Zhang

Session P7_2, ID 301
Feature Contributions to ECG-based Heart-Failure Detection: Deep Learning vs. Statistical Analysis
Agnese Sbrollini, Chiara Leoni, Marjolein de Jongh, Micaela Morettini, Laura Burattini, Cees A. Swenne

Session P7_2, ID 409
Harnessing Dermal Blood Flow Thermoregulation for Mitigating Skin Heating Effects in Transcutaneous Energy Transfer Systems for Wirelessly Energizing Heart Pumps
Mohammad Karim, Antonio Bosnjak, James McLaughlin, Paul Crawford, David McEneaney, Omar Escalona

15:45 - 17:45 Session P7_3a - Ventricular Arrhythmias

Session P7_3a, ID 173
Arrhythmia detection based on semantic segmentation for Multi-lead ECG
Hanshuang Xie, Huaiyu Zhu2, Yun Pan

15:45 - 17:45 Session P7_3b - Atrial Arrhythmias: Electrocardiography

Session P7_3b, ID 11
The P-wave Time-domain Significant Features to Evaluate Substrate Modification After Catheter Ablation of Paroxysmal Atrial Fibrillation
Aikaterini Vraka, Vicente Bertomeu-González, Leif Sornmo, Roberto Zangróniz, Raul Alcaraz, José J Rieta

Session P7_3b, ID 12
Left Pulmonary Veins Isolation: The Cornerstone in Noninvasive Evaluation of Substrate Modification After Catheter Ablation of Paroxysmal Atrial Fibrillation
Aikaterini Vraka, José Moreno-Arribas, Juan M Gracia-Baena, Flavia Ravelli, Raul Alcaraz, José J Rieta

Session P7_3b, ID 55
A Machine Learning based approach for localization of Atrial Tachycardia origin
Céline Hajjar, Thomas Boudou, Jérôme Kalifa, Clément Bars, Julien Seitz

Session P7_3b, ID 68
Exaggerated amplitude and peak location of Ta wave in tachycardia as an indicator for atrial disorders
Arya Bhardwaj, Bala Chakravarthy Neelapu, Kunal Pal, Sivaraman Jayaraman

Session P7_3b, ID 94
Mechanisms of Initiation and Acute Termination by Non-invasive Identification of Atrial Fibrillation Drivers
Miguel Rodrigo, Albert Rogers, Prasanth Ganesan, Brototo Deb, Mahmood Alhusseini, Sanjiv Narayan

Session P7_3b, ID 106
Exercise Test Predictors of Late Recurrence of Atrial Fibrillation After Catheter Ablation
Jakub Hejc, Richard Redina, Tomas Kulik, Martin Pesl, Zdenek Starek

Session P7_3b, ID 154
Clustering of time-evolving frequency patterns in atrial fibrillation on the surface electrocardiogram
Adrian Luca, Patrizio Pascale, Etienne Pruvot, Jean-Marc Vesin

Session P7_3b, ID 184
Detecting atrial fibrillation with a wearable device
Jonas Sandelin, Jukka-Pekka Sirkiä, Tero Koivisto

Session P7_3b, ID 220
A Lightweight Unidimensional Deep Learning Model for Atrial Fibrillation Detection
Quenaz Bezerra Soares and Marco Gutierrez

Session P7_3b, ID 282
Arrhythmia database with annotated intracardial atrial signals from pediatric patients undergoing catheter ablation
Richard Ředina, Jakub Hejc, David Pospisil, Marina Ronzhina, Petra Novotna, Zdenek Starek

Session P7_3b, ID 312
AI-enabled ECG combined with dry electrode sensors for population-based screening of Atrial Fibrillation
Alan Kennedy, Peter Doggart, Dewar Finlay, Raymond Bond, Daniel Guldenring, James McLaughlin, Chris Crockford

Session P7_3b, ID 314
Detection of Supraventricular Tachycardias in Single-Lead ECGs Recorded from a Handheld Device
Hesam Halvaei, Emma Svennberg, Leif Sörnmo, Martin Stridh

Session P7_3b, ID 320
Analysis of P-wave Changes for Prediction of Atrial Fibrillation Episodes
Cristina Moreno, Alba Martin, Aleksei Savelev, Pyotr Platonov, Pablo Laguna, Juan Pablo Martínez

Session P7_3b, ID 418
Is the Dominant Frequency Accurate Enough for Atrial Fibrillation Signals?
Aline Cabasson, Olivier Meste, Stef Zeemering, Ulrich Schotten, Pietro Bonizzi

15:45 - 17:45 Session P7_4a - ECG-Waveform Analysis

Session P7_4a, ID 34
Efficiency of different heartbeat detection methods by using alternative noise reduction algorithms
Marcus Vollmer and Jader Giraldo Guzmán

Session P7_4a, ID 373
Extraction algorithm for morphologically preserved non-invasive multi-channel fetal ECG
Giulia Baldazzi, Danilo Pani, Hau-Tieng Wu

Session P7_4a, ID 148
Sport?Sicuro! A Graphical User Interface for Continuous Cardiovascular Monitoring while Playing Sport Based on Heart Rate and Heart-Rate Variability
Sofia Romagnoli, Agnese Sbrollini, Ilaria Marcantoni, Micaela Morettini, Laura Burattini

Session P7_4a, ID 422
Sex Detection Based Self-Supervised Learning for Prediction of LVEF from the ECG
James Brundage, Brian Zenger, Jake Bergquist, Ann Lyons, Ryan Butcher, Bao Wang, Rashmee Shah, Rob MacLeod, Benjamin Steinberg, Tolga Tasdizen

Session P7_4a, ID 338
Robustness of Residual Network in Predicting PR Interval Trained using Noisy Labels
Loc Cao, Hamid Ghanbari, Negar Farzaneh, Kevin Ward, Sardar Ansari

Session P7_4a, ID 121
Decision Tree-based Model for Signal Quality Scanning in Wearable ECG
Caiyun Ma, Zhongyu Wang, Meicheng Yang, Jianqing Li, Chengyu Liu

Session P7_4a, ID 158
An Extension of Quadratic variation regularization for simultaneous baselinewander and powerline interference removal from ECG
Arman Kheirati Roonizi and Roberto Sassi

Session P7_4a, ID 213
Automated Rhythm Transcription for Arrhythmia Sequences
Gonzalo Romero and Elaine Chew

Session P7_4a, ID 239
Adaptive approach for denoising ECG measurements using unconventional sensing technology.
Henry Dore, Rodrigo Aviles-Espinosa, Elizabeth Rendon-Morales

Session P7_4a, ID 423
ECG analysis to study social connections in older cardiac patients
Raquel Cervigón, María Cardo, Alejandra Chulián, Francisco Castells, Samuel Ruipérez-Campillo

Session P7_4a, ID 333
Passive Conductance of ECG and Other Biopotentials
Teodor Buchner, Maryla Zajdel, Kazimierz Pęczalski, Paweł Nowak

Session P7_4a, ID 332
Transfer Entropy for Linear QT Correction Under Stationary and Gaussian Assumptions of the QT/RR Probability Distribution
Massimo W Rivolta

Session P7_4a, ID 397
Time-warping Analysis of the T-wave Peak-to-End Interval During Ischemia as Arrhythmia Risk Marker
Neurys Gómez Fonseca, Julia Ramírez, Pablo Laguna, Juan Pablo Martínez

Session P7_4a, ID 122
An Optimized Automatic P Wave Delineation Method based on Phasor Transform
Jiayi Yan, Hanshuang Xie, Yun Pan

Session P7_4a, ID 384
Detection of arterial hypertension through electrocardiograms
Larissa Vieira, Eduardo Mio, Derick Oliveira, Antonio Luiz Ribeiro, Wagner Meira Jr.

Session P7_4a, ID 377
Development and validation of a desktop user-friendly quantitative tool for analyzing cardiac restitution activation-repolarization dynamics from multimodal data
Enrique Almar Muñoz, Antonio Rodriguez, Oscar Arias, Manuel Zarzoso, Conrado J. Calvo

Session P7_4a, ID 63
The Advantage of Layer Freezing for Fine-Tune Deep Learning Algorithms in ECG Quality Assessment
Alvaro Huerta Herraiz, Arturo Martínez-Rodrigo, José J Rieta, Raul Alcaraz

Session P7_4a, ID 255
Edge-based Real-time Fetal Electrocardiography Monitoring in the Home Setting
Floranne Ellington, Berken Demirel, Daniel Jilani, Mohammad Al Faruque, Hung Cao

Session P7_4a, ID 39
A new filtering method for smoothing intracardiac records preserving the steepness of A, V, H waves

Oto Janousek, Jakub Hejc, David Pospisil
Session P7_4a, ID 75
Chest-Lead Generation with Single-Lead
Giwon Yoon, Hyo-Chang Seo, Kyungmin Choi, Hannah Kim, Segyeong Joo

Session P7_4a, ID 252
Impact of Pre-Processing Decisions on Automated ECG Classification Accuracy
Adrian Cornely and Grace Mirsky

Session P7_4a, ID 308
Depressed Patients Identification using Cardiovascular Signals
Mohammad Sami Zitouni and Ahsan Khandoker

Session P7_4a, ID 123
A fractal-based approach for suppressing chest compression noise in ECG signal
Shengyu Zhang, Mimi Hu, Junbiao Hong, Haoyu Jiang, Xianliang He, Lei Wang

Session P7_4a, ID 185
Identification of myocardial infarction by high frequency serial ECG measurement
Jonas Sandelin, Jukka-Pekka Sirkiä, Arman Anzanpour, Tero Koivisto

Session P7_4a, ID 179
Adaptive Electrocardiogram Enhancement in Strong Noise Environment
Qian Li, Xingyao Wang, Chenxi Yang, Jianqing Li, Chengyu Liu

Session P7_4a, ID 96
Segmented-Beat Modulation Method-Based Procedure for Extraction of Electrocardiogram-Derived Respiration from Data Acquired by Wearable Sensors During High-Altitude Activity
Agnese Sbrollini, Danilo Bondi, Sofia Romagnoli, Micaela Morettini, Ilaria Marcantoni, Tiziana Pietrangelo, Vittore Verratti, Laura Burattini

Session P7_4a, ID 192
Automated Detection of Ventricular Heartbeats from Electrocardiogram (ECG) acquired during Magnetic Resonance Imaging
Pierre Aublin, Jacques Felblinger, Julien Oster

Session P7_4a, ID 204
Relationship between ECG-pattern of depolarization abnormalities and an mildly reduced ejection fraction
Maria Gordeeva, Irina Serdiukova, Elena Parmon, Alexander Krasichkov

15:45 - 17:45 Session P7_5a - Modeling Ion Channels and Cells

Session P7_5a, ID 74

A simulation study on the effect of antiarrhythmic drugs during myocardial infarction
Cuiping Liang, Cunjin Luo, Qince Li, Jun Liu3, Suiping Jiang

Session P7_5a, ID 356
Normalisation of Action Potential Data Recorded with Sharp Electrodes Maximises Its Utility for Model Development
Yann-Stanislas Barral, Liudmila Polonchuk, Gary Mirams, Michael Clerx, Guy Page, Katrina Sweat, Najah Abi-Gerges, Ken Wang, David Gavaghan

Session P7_5a, ID 51
Modelling the Effect of Intracellular Calcium in the Rundown of L-Type Calcium Current
Aditi Agrawal, Michael Clerx, Ken Wang, Liudmila Polonchuk, David Gavaghan, Gary Mirams

Session P7_5a, ID 287
Derivative-based Inference for Cell and Channel Electrophysiology Models
Michael Clerx1, David Augustin2, Alister Dale-Evans2, Gary Mirams1

15:45 - 17:45 Session P7_5b - Modeling Cardiac Tissue

Session P7_5b, ID 37
Mechanical Consequences of Electrical Remodeling due to Persistent Atrial Fibrillation: a Cellular Level Sensitivity Analysis
Jorge Sánchez and Axel Loewe

Session P7_5b, ID 296
Cellular Heterogeneity in the Atria: An in-silico Study in the Impact on Re-entries.
Jordan Elliott, Daniele Cinque, Luca Mainardi, Jose F Rodriguez Matas

Session P7_5b, ID 258
Effects of Long- and Short-term Memory on Action Potential Duration for Atrial Cellular Automata
Giada Sira Romitti, Pau Romero de Antonio, Alejandro Liberos Mascarell, Dolors Serra Almor, Ignacio García Fernandez, Miguel Lozano Ibañez, Rafael Sebastian Aguilar, Miguel Rodrigo Bort

Session P7_5b, ID 233
Toward a quasi-dynamic pulsed field electroporation numerical model for cardiac ablation: Predicting tissue conductance changes and ablation lesion patterns
Richard Simon, Nishaki Mehta, Kuldeep Shah, David Haines, Cristian Linte

15:45 - 17:45 Session PA_6 - Medical Informatics and Technology

Session PA_6, ID 302
Aerobic Fitness Level Estimation Using Wearables
Radovan Smisek, Andrea Nemcova, Lukas Smital, Daniela Chlibkova, Martin Kralik, Jana Kolarova, Vojtech Myska, Martin Kolarik, Jaromir Hubalek

15:45 - 17:45 Session PA_7 - System Study and Heart Rate Variability

Session PA_7, ID 265
Autonomic Nervous System Recovery after Various Exercises in Highly Trained Athletes
Lucie Saclova, Andrea Nemcova, Radovan Smisek, Marina Ronzhina, Lukas Smital, Martin Vítek

15:45 - 17:45 Session P7_8 - Challenge

Session P7_8, ID 1
Classification of phonocardiograms using residual convolutional neural network and MLP
Guohui Peng, Haitao Zou, Jin Wang

Session P7_8, ID 7
Heart murmur classification with time-frequency representations of phonocardiograms and transfer-learning
Anna McCann and Jean-Marc Vesin

Session P7_8, ID 27
Convolutional Recurrent Neural Networks for Heart Murmur Detection
Lampros Kokkalas, Nicolas Tatlas, Stelios Potirakis

Session P7_8, ID 31
Location-wise Heart Murmur Detection using CNN-Transformers
Yingyu Yang and Maxime Sermesant

Session P7_8, ID 35
Ensemble Transformer-Based Neural Networks Detect Heart Murmur In Phonocardiogram Recordings
Mohanad Alkhodari, Syafiq Azman, Leontios Hadjileontiadis, Ahsan Khandoker

Session P7_8, ID 41
Classification of heart murmurs using an ensemble of residual CNNs
Petr Nejedly, Jan Pavlus, Radovan Smisek, Zuzana Koscova, Eniko Vargova, Ivo Viscor, Pavel Jurak, Filip Plesinger

Session P7_8, ID 43
Convolutional neural network aproach for heart MurMur detection in auscultation signals using wavelet transform based features
Robertas Petrolis, Renata Paukstaitiene, Gabriele Rudokaite, Andrius Macas, Arturas Grigaliunas, Algimantas Krisciukaitis

Session P7_8, ID 47
Detection of murmurs from heart sound recordings with deep residual networks
Lei Hu, Wenjie Cai, Xinyue Li, Jia Li

Session P7_8, ID 65
Classification of Murmurs in PCG Using Combined Frequency Domain and Physician Inspired Features
Julia Ding, Jing-Jing Li, Max Xu

Session P7_8, ID 67
Murmur Identification Using Supervised Constrastive Learning
Ľubomír Antoni, Erik Bruoth, Alexander Szabari, Gabriela Vozáriková, Peter Bugata2 Peter Bugata Jr., Dávid Gajdoš, Dávid Hudák, Vladimíra Kmečová, Monika Staňková
Session P7_8, ID 69
Automatic Screening of Murmurs applying MFCC and Tensor Based Analysis on Multiple Heart Sound Signals
Nidhi Sawant and Shivnarayan Patidar

Session P7_8, ID 71
Deep Learning Based Heart Murmur Detection using Frequency-time Domain Features of Heartbeat Sounds
Jungguk Lee, Taein Kang, Narin Kim, Soyul Han, Hyejin Won, Wuming Gong, Il-Youp Kwak

Session P7_8, ID 72
Murmur Classification with U-net State Prediction
Sanghoon Choi, Hyo-Chang Seo, Kyungmin Choi, Giwon Yoon, Segyeong Joo

Session P7_8, ID 84
Classification of Phonocardiogram Recordings using Vision Transformer Architecture
Joonyeob Kim, Gibeom Park, Bongwon Suh

Session P7_8, ID 108
Phonocardiogram Classification Using 1-Dimensional Inception Time Convolutional Neural Networks
Bjørn-Jostein Singstad, Lars Bongo, Markus Johnsen, Johan Ravn, Antony Gitau, Henrik Schirmer

Session P7_8, ID 114
Heart Murmur Detection from Phonocardiogram Based on Residual Neural Network with Classes Distinguished Focal Loss
Pan Xia, Yicheng Yao, Changyu Liu, Hao Zhang, Yuqi Wang, Lirui Xu, Lidong Du, Yusi Zhu, Zhen Fang

Session P7_8, ID 115
Heart Murmur Detection from PCG Signals Using an Ensemble Convolutional Neural Network
Baiju Yan

Session P7_8, ID 130
Searching for Effective Neural Network Architectures for Heart Murmur Detection from Phonocardiogram
Hao Wen and Jingsu Kang

Session P7_8, ID 144
Heart Murmur Detection and Clinical Outcome Prediction using Multilayer Perceptron Classifier
Kiarash Jalali, Mohammad Amin Saket, Saman Noorzadeh

Session P7_8, ID 151
Developing an LSTM-based Listener for Early Detection of Heart Disease
Philip Gemke, Nicolai Spicher, Tim Kacprowski

Session P7_8, ID 152
ReverbNet: Heart Murmur Detection from the Perspective of Acoustic Properties
Shuo Meng

Session P7_8, ID 165
Automatic Heart Murmur Detection Using a Convolutional Neural Network
Hui Lu and Julia Yip

Session P7_8, ID 172
Heart Murmur Detection of PCG Using ResNet with Selective Kernel Convolution
Yonghao Gao, Lihong Qiao, Zhixiang Li

Session P7_8, ID 178
Heart Sound Classification Algorithm Based on Neural Network
Rui Yu, Guangyu Bin, Ziyang Xu, Fengya Liu, Zhenbo Han

Session P7_8, ID 181
Transformer embedded with learnable filters for heart murmur detection
Pengfei Fan, Yucheng Shu, Yiming Han

Wednesday, September 7, 2022

8:30 - 10:00 Session S81 - Modeling Drug Effects and other Species

Chairs: Beatriz Trenor and Chema Ferrero **Duetto 1-2**

8:30 - 8:45 Session S81, ID 44
Simulation study of the protective effect of drugs in acute myocardial ischemia
Ander Loidi and Jose M Ferrero

8:45 - 9:00 Session S81, ID 62
Using computational modelling to define the ideal characteristics of protective drugs in acute ischemia
Ander Loidi and Jose M Ferrero

9:00 - 9:15 Session S81, ID 294
Alleviating Effects of Long-QT Syndrome Type 2 by Allele-Specific Inhibition of the KCNH2 Mutant Allele
Ronald Wilders

9:15 - 9:30 Session S81, ID 359
Label-Free Estimation of Sarcomere Orientation from Brightfield Microscopy Images of Induced Pluripotent Stem Cell Derived Cardiomyocyte Nuclei
Antti Ahola, Birhanu Belay, Carolina Wählby, Jari Hyttinen

9:30 - 9:45 Session S81, ID 30
Ventricular Conduction System Modeling for Electrophysiological Simulation of the Porcine Heart
Ricardo Rosales, Konstantinos Mountris, Manuel Doblaré, Esther Pueyo

9:45 - 10:00 Session S81, ID 221
A Model for Zebrafish Ventricular Tissue
Ludovica Cestariolo, Marina Bataller Martinez, Jose M Ferrero, Jose F Rodriguez Matas

8:30 - 10:00 Session S82 - Medical Informatics and Technology I

Chairs: Saman Parvaneh and Xin Li **Opus 3**

8:30 - 8:45 Session S82, ID 164
Raising High Risk-aware in Hemodynamic Treatment Optimization with Reinforcement Learning for Septic Shock Patients
Meicheng Yang, Runfa Li, Tong Hao, Caiyun Ma, Jianqing Li, Chengyu Liu

8:45 - 9:00 Session S82, ID 345
Patient Phenotyping Using Interpretable Clustering to Study Clinical Outcome in TAVR Patients
Roy Zawadzki, Terri Johnson, Saman Parvaneh

9:00 - 9:15 Session S82, ID 169
Motion Artifact Detection and Classification for Unobtrusive Cardiorespiratory Signals Using Machine Learning
Onno Linschmann, Carl Revander, Steffen Leonhardt, Markus Lüken

9:15 - 9:30 Session S82, ID 349
Classification of Atrial Tachycardia Types Using Dimensional Transforms of ECG Signals and Machine Learning
Samuel Ruiperez-Campillo, Jose Millet, Francisco Castells

9:30 - 9:45 Session S82, ID 5
Fetal Heart Sound Split Detection and Classification in Phonocardiographic Signals
Kristóf Müller, Bálint Üveges, Márton Áron Goda

9:45 - 10:00 Session S82, ID 116
Prediction of Delivery Mode from Cardiotocography and Electronic Medical Records Using Machine Learning
Xue Kang, Rongdan Zeng, Hao Yi, Chuan Wang, Mujun Liu, Zheng Zheng, Yaosheng Lu, Huijin Wang, Jieyun Bai

8:30 - 10:00 Session S83 - BSPM & ECGI Applications

Chairs: Andreu Climent and Yesim Serinagaoglu Dogrusoz **Sonaatti 1**

8:30 - 8:45 Session S83, ID 353
Variability of Premature Ventricular Contraction Localization with Respect to Source and Forward Model Variation in Clinical Data
Nika Rasoolzadeh, Jana Svehlikova, Beata Ondrusova, Yesim Serinagaoglu Dogrusoz

8:45 - 9:00 Session S83, ID 159
On the Initial Estimate of Repolarization Times for Inverse Reconstruction Using the Equivalent Dipole Layer Source Model
Jeanne van der Waal, Veronique Meijborg, Machteld Boonstra, Thom Oostendorp, Ruben Coronel

9:00 - 9:15 Session S83, ID 278
Cine-ECG Analysis in Familial ST-depression Syndrome
Rasmus Frosted, Christian Müller, Oliver Vad, Oscar Petersen, Morten Olesen, Henning Bundgaard, Peter van Dam, Alex Christensen

9:15 - 9:30 Session S83, ID 163
Non-Invasive Atrial Fibrillation Driver Localization Using Recurrent Neural Networks and Body Surface Potentials
Miriam Gutiérrez Fernández-Calvillo, Miguel Ángel Cámara-Vázquez, Ismael Hernández-Romero, Maria de la Salud Guillem Sánche, Andreu M. Climent, Óscar Barquero-Pérez

9:30 - 9:45 Session S83, ID 369
Validation of a customized method for estimation of torso AF biomarkers from the atria: a computational-clinical study
Camila Restivo, Gabriel Costa, Italo Sandoval Ramos de Oliveira, Maria de la Salud Guillem Sánchez, Joao Salinet

9:45 - 10:00 Session S83, ID 26
Intracardiac electrical imaging using the 12-lead ECG: a machine learning approach using synthetic data
Mikel Landajuela, Rushil Anirudh, Joe Loscazo, Robert Blake

8:30 - 10:00 Session S84

Special Session: Multidisciplinar research in atrial fibrillation

Chair: María S Guillem **Sopraano**

8:30 - 9:00 Session S84, ID 330
Computer electrophysiological models in drug therapy for atrial fibrillation
Blanca Rodriguez

9:00 - 9:15 Session S84, ID 426
Impact of mechanically-induced fibrosis on atrial electromechanical function
Teresa Schiatti, Marilu Casini, Thomas Hutschalik, Remi Peyronnet, Ursula Ravens

9:15 - 9:30 Session S84, ID 414
Structural, functional and mechanical tissue characterisation in atrial fibrillation by image processing
Eric Invers-Rubio, Sachal Hussain, Cristiana Corsi, Maria de la Salud Guillem Sánchez, Andreu M. Climent, Lluis Mont, Till Althoff

9:30 - 9:45 Session S84, ID 368
Identification of mechanisms of maintenance of atrial fibrillation by signal processing
Carlos Fambuena Santos, Ozan Özgül, Narimane Gassa, Stef Zeemering, Pietro Bonizzi, Nejib Zemzemi, Uli Schotten, Maria de la Salud Guillem Sánchez

9:45 - 10:00 Session S84, ID 435
Final discussion
Maria de la Salud Guillem Sánchez

10:00 - 10:30 Coffee break

10:30 - 12:00 Session S91 - Whole Heart Modeling

Chairs: Gernot Plank and Steven Niederer **Duetto 1-2**

10:30 - 10:45 Session S91, ID 166
Inter-individual differences in cell composition across the ventricular wall may explain variability in ECG response to serum potassium and calcium variations
Syed Hassaan Ahmed Bukhari, Carlos Sánchez, Pablo Laguna, Mark Potse4, Esther Pueyo

10:45 - 11:00 Session S91, ID 203
Method for Incorporating Changes in Extracellular Volume and Myocyte Size into Cardiac Bidomain Equations
Vladimir Sobota, Sarah Nordmeyer, Christoph Augustin, Gernot Plank, Edward Vigmond, Jason Bayer

11:00 - 11:15 Session S91, ID 111
Development of a Biventricular Coordinate System with Representation of an Anatomically Detailed Base
Lisa Pankewitz, Kristian Hustad, Sachin Govil, James Perry, Sanjeet Hegde, Renxiang Tang, Andrew McCulloch, Hermenegild Arevalo

11:15 - 11:30 Session S91, ID 419
Segmentation Uncertainty Quantification in Cardiac Propagation Models
Jess Tate, Nejib Zemzemi, Shireen Elhabian, Beata Ondrusova, Machteld Boonstra, Peter van Dam, Dana Brooks, Akil Narayan, Rob MacLeod

11:30 - 11:45 Session S91, ID 90
Electrophysiological Closed Loop Model of the Heart as Supporting Tool for Cardiac Pacing
Niccolò Biasi, Matteo Mercati, Paolo Seghetti, Alessandro Tognetti

11:45 - 12:00 Session S91, ID 28
A Comparative Study of Normal and High-Fidelity Approaches to Predict Flow Physics of Left Atrium
Ehsan Khalili, Cecile Daversin-Catty, Kristian Valen-Sendstad

10:30 - 12:00 Session S92 - Medical Informatics and Technology II

Chairs: Rafael Sebastian and Gerard Cybulski **Sopraano**

10:30 - 10:45 Session S92, ID 335
An Open-Source Platform for Collaborative Annotation of Physiological Waveforms
Lucas McCullum, Hasan Saeed, Benjamin Moody, Diane Perry, Eric Gottlieb, Tom Pollard, Xavier Borrat Frigola, Dana Moukheiber, Qiao Li, Gari Clifford, Li-wei Lehman, Roger Mark

10:45 - 11:00 Session S92, ID 336
CER-S, an ECG platform for the management of continuous ECG database
Fabio Badilini, Martino Vaglio, Gianfranco Toninelli, Lamberto Isola, Francesca Ferrari, Pierre Maison-Blanche

11:00 - 11:15 Session S92, ID 363
Updates on OpenEP: The Open-Source Platform for Elec-trophysiological Data Analysis
Steven Williams, Paul Smith, Ali Gharaviri, Chris O'Shea, Adam Connolly, Louisa O'Neill, Irum Kotadia, Iain Sim, Neil Bodagh, Neil Grubb, John Whitaker, Matthew Wright, Steven Niederer, Mark O'Neill, Nick Linton

11:15 - 11:30 Session S92, ID 245
Emulation of Biological Cells
Jerry Jacob, Nitish Patel, Sucheta Sehgal

11:30 - 11:45 Session S92, ID 88
Automatic Identification of the Best Auscultation Area for the Estimation of the Time of Closure of Heart Valves through Multi-Source Phonocardiography
Noemi Giordano, Gabriella Balestra, Marco Ghislieri, Marco Knaflitz, Samanta Rosati

11:45 - 12:00 Session S92, ID 244
Improving Aorta segmentation from phase contrast MRI using adaptive velocity-dependent weighting on the deep learning output for magnitude and phase images
Mohamed Elbayumi, Samira Saraya, Tamer Basha

10:30 - 12:00 Session S93 - Cardiovascular System Regulation

Chairs: Riccardo Barbieri and Massimo Rivolta **Sonaatti 1**

10:30 - 10:45 Session S93, ID 17
Instantaneous Time-Courses of Baroreflex Sensitivity, Sympathetic and Vagal Activities in Response to Valsalva Maneuver
Salvador Carrasco-Sosa and Alejandra Guillén-Mandujano

10:45 - 11:00 Session S93, ID 64
The Asymmetric Nature of Transitions in Heart Rate Variations
Rafał Pawłowski, Katarzyna Buszko, Paweł Zalewski

11:00 - 11:15 Session S93, ID 76
Frequency Domain Causal Analysis Allows the Detection of Baroreflex Control Recovery in Patients Undergoing Surgical Aortic Valve Replacement After a Three-month Follow-up
Vlasta Bari, Francesca Gelpi, Beatrice Cairo, Noemi Cornara, Beatrice De Maria, Marco Ranucci, Alberto Porta

11:15 - 11:30 Session S93, ID 223
Heart Rate Variability Analysis Reveals a Non-monotonic Relationship between Humanin Concentration and Cardiac Autonomic Regulation
Hibba Yousef1, Herbert Jelinek, Samuel Feng, Ahsan Khandoker, Mika Tarvainen

11:30 - 11:45 Session S93, ID 229
Uncoupling Between Heart Rate Variability and Heart Rate During Exercise and Recovery as a Predictor of Cardiovascular Events
Michele Orini, Stefan van Duijvenboden, Julia Ramirez, Andrew Tinker, Patricia Munroe, Pier Lambiase

11:45 - 12:00 Session S93, ID 311
Deep Learning and Permutation Entropy in the Stratification of Patients with Chagas Disease
Diego Cornejo, Miguel Vizcardo, Antonio Ravelo, Esteban Alvarez, Luz Diaz, Maria Rodriguez, Victor Cabrera, Dante Condori-Merma

10:30 - 12:00 Session S94 - Cardiovascular Mechanics

Chairs: Jari Hyttinen and Ivo Provaznik **Opus 3**

10:30 - 10:45 Session S94, ID 405
Cell Unexcitability and Electrotonic Coupling Phenomenon Analysis of Ablation-Created Lesions: A Study Case with Ablated Explanted Human Heart
Jimena Siles Paredes, Joao Salinet, Christopher Crowley, Flavio Fenton, Neal Bhatia, Ilija Uzelac

10:45 - 11:00 Session S94, ID 33
Omecamtiv Mecarbil Improves Contraction Behaviour in a 3D Electromechanical Tissue Model of Heart Failure
Ilse van Herck, Maria T Mora, Henrik Finsberg, Cécile Daversin-Catty, Beatriz Trenor, Hermenegild Arevalo, Samuel Wall

11:00 - 11:15 Session S94, ID 319
Computational Analysis of the Effect of Cardiac Motion on Left Main Coronary Artery Hemodynamics
Laila Fadhillah Ulta Delestri, Foo Ngai Kok, Amr Al Abed, Socrates Dokos, Mohd Jamil Mohamed Mokhtarudin, Neil W Bressloff, Azam Ahmad Bakir

11:15 - 11:30 Session S94, ID 132
Effects of Ventricular Myofiber Orientation on Mechanical Function in Human Heart Simulations
Jonathan Krauss, Tobias Gerach, Axel Loewe

11:30 - 11:45 Session S94, ID 269
The Use of Autocorrelation Maps for Evaluation of Cardiac Resynchronization Therapy Outcome
Jana Svehlikova, Anna Pribilova, Michal Sasov, Jan Zelinka, Robert Hatala, Milan Tysler

11:45 - 12:00 Session S94, ID 297
Conduction System Pacing Versus Biventricular Pacing for Cardiac resynchronization
Vito Starc, Tadej Zlahtic, David Žižek, Dinko Zavrl, Marta Cvijić, Anja Zupan Mežnar

12:00 - 14:00 Lunch

12:00 - 14:00 Lunch and Poster Session

12:00 - 14:00 Session PA_3b - Atrial Arrhythmias: Endocardiography

Session PA_3b, ID 48
Can sequentially collected electrograms be effectively used for dominant frequency mapping during persistent AF?
Xin Li, Charlie Hugill, Gavin Chu, Mahmoud Ehnesh, Tiago Paggi de Almeida, Bharat Sidhu, Ibrahim Anton, Ahmed Kotb, Peter Stafford, G. Andre Ng, Fernando Schlindwein

Session PA_3b, ID 105
Using High-resolution voltage maps to predict "redo" in the treatment of atrial fibrillation (AF)
Jean Bragard, Leire Moriones, Blas Echebarria, Susana Ravassa, Ignacio García-Bolao

Session PA_3b, ID 142
Cycle length estimation using accurate adaptive detection of local activations in atrial intracardiac electrograms
Dinara Veshchezerova, Clement Bars, Julien Seitz

Session PA_3b, ID 145
Far-field Intracardiac Electrograms Removal Enables Highly Reliable Automatic Cycle Length Estimation During Atrial Arrhythmias
Thomas Boudou, Julien Seitz, Clément Bars

Session PA_3b, ID 155 - Fibrosis Reduces the Coincidence of Repetitive Activations Patterns between the **Coronary Sinus and Atrial Regions in Simulated Atrial Fibrillation**
Margot van Montfoort, Victor Marques, Ozan Özgül, Ali Gharaviri, Simone Pezzuto, Angelo Auricchio, Pietro Bonizzi, Ulrich Schotten, Stef Zeemering

Session PA_3b, ID 174
Tracking of Atrial Fibrillation Drivers Based on Propagation Patterns: an In-Silico Study
Victor Marques, Ali Gharaviri, Simone Pezzuto, Angelo Auricchio, Pietro Bonizzi, Stef Zeemering, Ulrich Schotten

Session PA_3b, ID 227
Electrogram-based estimation of myocardial conduction using deep neural networks
Konstantinos Ntagiantas, Dimitrios Panagopoulos, Wing Poon, Danya Agha-Jaffar, Nicholas Peters, Chris Cantwell, Anil Bharath, Rasheda Chowdhury

Session PA_3b, ID 360
Computer Simulations of Composite Maps for Detection of Atrial Fibrillation Mechanisms
Ozan Özgül, Victor Marques, Ben Hermans, Arne van Hunnik, Sander Verheule, Ulrich Schotten, Ali Gharaviri, Simone Pezzuto, Angelo Auricchio, Pietro Bonizzi, Stef Zeemering

Session PA_3b, ID 404
Non-contact heart chamber modeling using catheter mediated ultrasound returns
Steve Yon

12:00 - 14:00 Session P7_4b - BSPM and ECGI

Session P7_4b, ID 160
Modeling Structural Abnormalities in Equivalent Dipole Layer Based ECG Simulations
Manon Kloosterman, Machteld Boonstra, Folkert Asselbergs, Peter Loh, Thom Oostendorp, Peter van Dam

Session P7_4b, ID 175
Analysis of Atrial Fibrillation Dynamics in Body Surface Potential Maps and Electrocardiographic Imaging
Rubén Molero Alabau, Olivier Meste, Joel Karel, Ralf Peeters, Pietro Bonizzi, Maria de la Salud Guillem Sánchez

Session P7_4b, ID 187
Effect of Torso Mesh Density on Electrocardiographic Imaging Resolution from Atrial Fibrillation Simulations
Rubén Molero Alabau, Ana González-Ascaso, Ismael Hernández-Romero, Andreu M. Climent, Maria de la Salud Guillem Sánchez

Session P7_4b, ID 205
Validation of a Novel Imageless Non-Invasive Electrocardiographic Imaging for the Characterization of Atrial Tachycardias
Jana Reventós Presmanes, Eric Invers-Rubio, Elisenda Ferro, Ismael Hernández-Romero, Clara Herrero-Martín, Javier Milagro, David Lundback, Eduard Guasch, Jose Tolosana, Ivo Roca-Luque, María Guillem, Lluís Mont, Jean Guichard, Andreu Climent

Session P7_4b, ID 235
Inference of Purkinje structure and ventricular conduction properties from clinical 12-lead electrocardiograms
Julia Camps, Rafael Sebastian, Lucas Berg, Zhinuo Jenny Wang, Xin Zhou, Cristian Trovato, Leto Riebel, James Coleman, Rafael Sachetto4, Brodie Lawson, Vicente Grau, Kevin Burrage, Alfonso Bueno-Orovio, Rodrigo Weber, Blanca Rodriguez

Session P7_4b, ID 260
A Patient-Specific Equivalent Dipole Model
Gabriel Victorino Cardoso, Geneviève Robin, Andony Arrieula, Mark Potse, Michel Haïssaguerre, Eric Moulines, Remi Dubois

Session P7_4b, ID 275
Effect of Segmentation Uncertainty on the ECGI Inverse Problem Solution and Source Localization
Narimane Gassa, Nejib Zemzemi, Machteld Boonstra, Beata Ondrusova, Jana Svehlikova, Dana Brooks, Ali Rababah, Rob MacLeod, Jess Tate, Peter Van Dam, Akil Narayan

Session P7_4b, ID 289
Equivalent Dipole Trajectories Assessed From the 12-Lead ECG Using an Adaptable Human Torso Model
Vito Starc

Session P7_4b, ID 350
A personalized pipeline to reduce ECGi-AF biomarkers disparity: a clinical-computational study
Gabriel Costa, Camila Restivo, Italo Sandoval Ramos de Oliveira, Maria de la Salud Guillem Sánchez, Joao Salinet

Session P7_4b, ID 362
Dominant Frequency Estimation in AF from ECGI
Carlos Fambuena Santos, Ismael Hernández-Romero, Clara Herrero Martín, Jana Reventós Presmanes, Eric Invers Rubio, Luis Mont, Andreu M. Climent, Maria de la Salud Guillem Sánchez

Session P7_4b, ID 395
Activation Sites Estimation using a Fast Algorithm Based on an Eikonal Equation
Jérôme Fehrenbach and Lisl Weynans

Session P7_4b, ID 403
A Sliding Window Approach to Regularization in Electrocardiographic Imaging
Ben Orkild, Jake Bergquist, Lindsay Rupp, Anna Busatto, Brian Zenger, Wilson Good, Jaume Coll-Font, Rob MacLeod

12:00 - 14:00 Session PA_5c - Modeling Arrhythmias

Session PA_5c, ID 420
In Silico Investigation of the Functional Effects of Long QT Syndrome Variant 3 on Electrical Conduction at PVJ
Cunjin Luo and Ying He

Session PA_5c, ID 89
A Computational Model of Brugada Syndrome in 3D Heterogeneous Cardiac Tissue
Paolo Seghetti, Niccolò Biasi, Marco Laurino, Alessandro Tognetti

Session PA_5c, ID 143
N2091S Mutation in L-type Calcium Channel Promotes Action Potential Alternans in M Cells of Human Ventricle: A Simulation Study

Yumin Shen, Na Zhao, Zhipeng Cai, Chengyu Liu, Jianqing Li
Session PA_5c, ID 104
In-silico Inducibility of Ventricular Tachycardia in Patient-Specific Post-Infarction Ventricular Models
Javier Villar Valero, Juan Gomez, David Soto-Iglesias, Diego Penela, Antonio Berruezo, Beatriz Trenor

Session PA_5c, ID 45
Mechanistic Investigations of Pro-arrhythmic Interplay Between Fibrosis, Ischemia and Ionic Remodelling in Hypertrophic Cardiomyopathy
James Coleman, Rubén Doste, Alfonso Bueno-Orovio

Session PA_5c, ID 392
Modelling and Simulation Reveal Density-Dependent Re-Entry Risk in the Infarcted Ventricles after Stem Cell-Derived Cardiomyocyte Delivery
Leto Riebel, Zhinuo Wang, Hector Martinez-Navarro, Cristian Trovato, Jacopo Biasetti, Rafael Sachetto Oliveira, Rodrigo Weber dos Santos, Blanca Rodriguez

Session PA_5c, ID 188
Physics-informed Fully Connected and Recurrent Neural Networks for Cardiac Electrophysiology Modelling
Ihsahe Olakorede, Iulia Nazarov, Ahmed Qureshi, Shaheim Ogbomo-Harmitt, Oleg Aslanidi

Session PA_5c, ID 218
Impact of Fibrosis Border Zone Characterisation on Fibrosis-Substrate Isolation Ablation Outcome for Atrial Fibrillation
Shaheim Ogbomo-Harmitt, Ahmed Qureshi, Andrew King, Oleg Aslanidi

12:00 - 14:00 Session PA_5d - Whole Heart Modeling

Session PA_5d, ID 24
Sensitivity Analysis of ECG Features to Computational Model Input Parameters
Jenny Venton, Karli Gillette, Matthias Gsell, Axel Loewe, Claudia Nagel, Benjamin Winkler, Louise Wright

Session PA_5d, ID 399
A comparison of multithreading, vectorization, and GPU computing for the acceleration of cardiac electrophysiology models
Chiheb Sakka, Amina Guermouche, Olivier Aumage, Emmanuelle Saillard, Mark Potse, Yves Coudière, Denis Barthou

Session PA_5d, ID 291
Cardiac Function Assessment Using Personalized Reduced-Order Pulse Wave Modeling
Kamil Wołos and Jan Poleszczuk

Session PA_5d, ID 388
Accelerating stabilization of whole-heart models after changes in cycle length

Syed Hassaan Ahmed Bukhari, Carlos Sánchez, Esther Pueyo, Mark Potse

12:00 - 14:00 Session PA_6 - Medical Informatics and Technology

Session PA_6, ID 2
Probabilistic Inference of Comorbidities from Symp-toms in Patients with Atrial Fibrillation: An Ontology-Driven Hybrid Clinical Decision Support System
Alexander Lacki, Diego Diego Boscá Tomás, Antonio Martínez-Millana

Session PA_6, ID 134
Accuracy of Kubios HRV software respiratory rate estimation algorithms
Jukka Lipponen and Mika Tarvainen

Session PA_6, ID 189
Optimal Fluid and Vasopressor Interventions in Septic ICU Patients Through Reinforcement Learning Model
Maximiliano Mollura, Cristian Drudi, Li-wei Lehman, Riccardo Barbieri

Session PA_6, ID 321
Automated Identification of Label Errors in Large Electrocardiogram Datasets
Peter Doggart and Alan Kennedy

Session PA_6, ID 328
Multimodal Analysis of Physiological Signals for Wearable-Based Emotion Recognition Using Machine Learning
Feryal Alskafi, Ahsan Khandoker, Uichin Lee, Cheul Park, Herbert Jelinek

Session PA_6, ID 339
Detecting Intrapartum Fetal Hypoxia from Cardiotocography using machine learning
Farah Francis, Honghan Wu, Saturnino Luz, Sarah Stock, Rosemary Townsend

Session PA_6, ID 401
AI Based Directory Discovery Attack and Prevention of the Cardiac Medical Diagnosis Systems
Ying He and Cunjin Luo

Session PA_6, ID 25
Use of Recurrent Neural Networks for Mean Blood Pressure Prediction Based on Impedance Cardiography Measurements
Marek Żyliński, Gerard Cybulski, Wiktor Niewiadomski

Session PA_6, ID 167
Machine learning of drug influence based on iPSC cardiomyocyte calcium transient signals
Martti Juhola, Henry Joutsijoki, Risto-Pekka Pölönen, Katriina Aalto-Setälä

Session PA_6, ID 177

In silico assessment of a multihole electrode design for High Power Short Duration ablation
Argyrios Petras, Massimiliano Leoni, Zoraida Moreno Weidmann, Jose Guerra, Luca Gerardo-Giorda

Session PA_6, ID 253
Effect of lower limb muscles activity on postural control in Parkinson's patients with orthostatic hypotension
Rabie Fadil, Asenath Huether, Andrew Blaber, Jau-Shin Lou, Kouhyar Tavakolian

Session PA_6, ID 277
Naive Bayesian-based nomogram for identification of early asymptomatic Dilated Cardiomyopathy
Aleksandar Miladinovic, Katerina Iscra, Milos Ajcevic, Luca Restivo, Simone Kresevic, Marco Merlo, Gianfranco Sinagra, Agosino Accardo

Session PA_6, ID 215
Verification of the Assumptions of Volume-Clamp Method for Continuous Blood Pressure Measurement in a Silicone Phantom
Marek Żyliński and Gerard Cybulski

Session PA_6, ID 231
Remote Monitoring of Cardiorespiratory Parameters in COVID-19 Patients Following Hospital Discharge
Ganesh Raam Kumarasamy, Hélène De Cannière, Julie Vranken, Michiel Jacobs, Peter Karsmakers, Pieter Vandervoort

Session PA_6, ID 259
A validation study of two wrist worn wearable devices for remote assessment of exercise capacity
Alexandra Jamieson, Michele Orini, Siana Jones, Nish Chaturvedi, Alun Hughes

12:00 - 14:00 Session PA_7 - System Study and Heart Rate Variability

Session PA_7, ID 4
Heart rate variability in heart transplant recipients with graft hypertrophy
Danuta Makowiec and Joanna Wdowczyk

Session PA_7, ID 9
Using Signal Quality Assessment (SQA) to help sleep stage classification
Mahtab Mohammadpoorfaskhodi and Miguel Garcia-Gonzalez

Session PA_7, ID 14
Comparison of Heart Rate Variability Indices Based on Seismocardiograms from Healthy Volunteers and Patients with Valvular Heart Diseases
Szymon Siecinski, Pawel Kostka, Ewaryst Tkacz
Session PA_7, ID 16

Respiratory-Vagal Modulatory Effects of Cold Face Test on the High Frequency Components of Systolic and Diastolic Blood Pressure Variability
Alejandra Guillén-Mandujano, Salvador Carrasco-Sosa, Aldo Mejía-Rodríguez

Session PA_7, ID 77
Comparison of signal combinations for cardiorespiratory sleep staging
Miriam Goldammer, Sebastian Zaunseder, Franz Ehrlich, Hagen Malberg

Session PA_7, ID 86
Hidden Hazards Beneath Cross-Validation Methods in Machine Learning-Based Sleep Apnea Detection
Daniele Padovano, Arturo Martinez-Rodrigo, Jose Pastor, José J Rieta, Raul Alcaraz

Session PA_7, ID 133
Circadian Modulation of Electrocardiographic Alternans in Kidney Failure Patients on Dialysis
Ilaria Marcantoni, Chiara Leoni, Claudia Peroni, Agnese Sbrollini, Micaela Morettini, Laura Burattini

Session PA_7, ID 140
Physiologic Patients' Response to Fluid Administration in the Intensive Care Unit
Maximiliano Mollura, Claudia Salerni, Li-wei Lehman, Riccardo Barbieri

Session PA_7, ID 199
Does Ectopic Beats Bring More Discriminatory Information to Diagnose Ischemic Heart Disease?
Katerina Iscra, Aleksandar Miladinovic, Milos Ajcevic, Luca Restivo, Simone Kresevic, Marco Merlo, Gianfranco Sinagra, Agostino Accardo

Session PA_7, ID 206
Densely Connected Neural Network and Permutation Entropy in the Early Diagnostic in COVID patients
Luz Diaz, Maria Rodriguez, Diego Cornejo, Miguel Vizcardo, Antonio Ravelo, Esteban Alvarez, Victor Cabrera, Dante Condori-Merma

Session PA_7, ID 225
Effects of Beta-Blocker on Heart Rate Variability of Heart Failure with Preserved Ejection Fraction
Shiza Saleem, Mohanad Alkhodari, Leontios Hadjileontiadis, Ahsan Khandoker, Herbert Jelinek

Session PA_7, ID 248
Recovery Assessment of Open-heart Cardiac Surgery Patients Using Heart Rate Variability Parameters
Seyedsadra Miri, Sabina Lähteenmäki, Heidi Mahrberg, Antti Vehkaoja, Jari Laurikka, Jari Viik

Session PA_7, ID 284
Reduced RR Interval Correlations of Long QT Syndrome Patients
Teemu Pukkila, Matti Molkkari, Jiyeong Kim, Esa Rasanen

Session PA_7, ID 293

Derangement of Cardiovascular Regulatory Mechanisms in COVID-19 Patients in Intensive Care Unit and its Association with Mortality
Francesca Gelpi, Vlasta Bari, Beatrice Cairo, Beatrice De Maria, Noemi Cornara, Riccardo Colombo, Alberto Porta

Session PA_7, ID 313
Approximate Entropy and Densely Connected Neural Network in the Early Diagnostic of Patients with Chagas Disease
Maria Rodriguez, Miguel Vizcardo, Antonio Ravelo, Esteban Alvarez, Luz Diaz, Diego Cornejo, Victor Cabrera, Dante Condori-Merma

Session PA_7, ID 327
Investigating Phase Coherence between Respiratory Sinus Arrhythmia and Respiration in Depressed patients with Obstructive Sleep Apnea across the Sleep Stages
Yahya Alzaanbi and Ahsan Khandoker

Session PA_7, ID 343
Generalization of Deep Sequence Models for Forecasting Aortic Pressure Cross-Cohort
Elise Jortberg, Alan Li, Zihao Zhou, Rose Yu

Session PA_7, ID 383
Blood Pressure Classification by Analyzing the behavior of Heart Rate Variability in Poincare Plot
Shahab Rezaei, Keivan Maghooli, Nader Jafarnia Dabanloo, Fardad Farrokhi

Session PA_7, ID 417
Feasibility of Wearable Armband Bipolar ECG Lead-1 for Long-term HRV Monitoring Using a Combined Signal Averaging and 2-stage Wavelet Denoising Technique
Omar Escalona, Sophie Magwood, Anna Hilton, Niamh McCallan

12:00 - 14:00 Session PA_8 - Challenge

Session PA_8, ID 198
Beat-wise uncertainty learning for murmur detection in heart sounds
Xingyao Wang, Foli Fan, Hongxiang Gao, Shuo Zhang, Chenxi Yang, Jianqing Li, Chengyu Liu

Session PA_8, ID 201
ACQuA: Anomaly Classification with Quasi-Attractors
William Rudman, Jack Merullo, Laura Mercurio, Carsten Eickhoff

Session PA_8, ID 241
Heart Murmur Detection using Ensemble of Boosted Classifiers for Phonocardiograms Recorded from Multiple Auscultation Locations
Saman Parvaneh, Matt Song, Zaniar Ardalan

Session PA_8, ID 246
Heart Murmurs Detection Using Traditional and Deep Learning Methods
YunChen Yen, Xueqiao Peng, Changchang Yin, Ping Zhang

Session PA_8, ID 249
Maiby's Algorithm: A Two-stage Deep Learning approach for Murmur Detection in Mel Spectrograms for Automatic Auscultation of Congenital Heart Disease
Matheus Araujo, Dewen Zeng, Joao Palotti, Xinrong Hu, Yiyu Shi, Lee Pyles, Quan Ni

Session PA_8, ID 251
Heart Murmur Detection Using Wavelet Time Scattering and Support Vector Machines
Adrian Cornely and Grace Mirsky

Session PA_8, ID 266
A Deep Learning-based Heart Murmurs Detector
Daniel Eneriz, Antonio Rodriguez-Almeida, Himar Fabelo, Samuel Ortega, Francisco Balea-Fernandez, Nicolás Medrano, Belén Calvo, Gustavo Callico

Session PA_8, ID 272
Automated Methods for the Detection of Heart Murmurs in Phonocardiography Recordings
Alexis Dorier, Shaun Davidson, Sotirakis Charalampos, Mauricio Villarroel Montoya

Session PA_8, ID 274
Abnormal Waves Detection from Phonocardiogram Recordings using SE_ResNet with Sign Loss Function
Yangming Guo, Zhuo Liu, Xingzhi Sun

Session PA_8, ID 280
Heart Murmur Detection in Phonocardiographic Signals Using Breathing Noise Suppression
Kristóf Müller and Dr. Márton Áron Goda

Session PA_8, ID 285
Heart Murmur Detection Using an Ensemble Model Based on Multi-Feature Fusion
Yue Zhao, Zhuoyang Xu, Tingting Zhao

Session PA_8, ID 290
End-To-End Model for Detecting Murmurs from Phonocardiograms Using Asymmetric Loss
Hussain Alasmawi and Mohammad Yaqub

Session PA_8, ID 292
Heart Murmurs Detection from Phonocardiograms Using a Multi-input Deep Learning Model
Ali Rababah, Raymond Bond, Khaled Rjoob, Alan Kennedy, Peter Doggart, Magd Kotb, Dewar Finlay

Session PA_8, ID 298

Listen to your heart: A self-supervised approach for detecting murmur in heart-beat sounds for the Physionet 2022 challenge
Aristotelis Ballas, Vasileios Papapanagiotou, Anastasios Delopoulos, Christos Diou

Session PA_8, ID 309
Multi-Task Prediction of Murmur and Outcome from Heart Sound Recordings
Yale Chang, Luoluo Liu, Corneliu Antonescu

Session PA_8, ID 310
A Fusion of Handcrafted Features and Deep Learning Classifiers for Heart Murmur Detection
Zaria Imran, Ethan Grooby, Chiranjibi Sitaula, Vinayaka Malgi, Sunil Aryal, Faezeh Marzbanrad

Session PA_8, ID 315
Modified Variable Kernel Length ResNets for Heart Murmur Detection and Clinical Outcome Prediction using Multi-positional Phonocardiogram Recording
Vijay Vignesh Venkataramani, Akshit Garg, U. Deva Priyakumar

Session PA_8, ID 318
Murmur Detection and Clinical Outcome Classification Using a VGG-like Network and Combined Time-Frequency Representations of PCG Signals
Zhongrui Bai, Baiju Yan, Xianxiang Chen, Yirong Wu, Peng Wang

Session PA_8, ID 322
Two-stage Detection of Murmurs from Phonocardiograms using Deep and One-class Methods
Sara Summerton, Darcy Murphy, Danny Wood, Matti Kaisti, Gavin Brown, David Wong

Session PA_8, ID 329
Detecting Murmurs in Phonocardiogram Recordings Using Feature Based Ensemble Learning
Mohammed Baydoun, Hassan Ghaziri, Ali El-Hajj, Lise Safatly

Session PA_8, ID 355
Multimodal Heart Murmur Detection through Path Signature
Felix Krones, Benjamin Walker, Adam Mahdi, Ivan Kiskin, Terry Lyons

Session PA_8, ID 390
Murmur Detection from Phonocardiogram Recordings using Spectral Features
Imad Eddine Toubal, Yang Yang Wang, Filiz Bunyak, Kannappan Palaniappan

Session PA_8, ID 393
Classification of Heart Murmurs by a hybrid Deep-Learning Architecture based on Residual Convolutional Neural Networks and Attention-based Convolution-free Audio Spectrogram Transformers
Enrique Almar Muñoz, Marawan Elbatel, Santiago Jimenez, Conrado Calvo
Session PA_8, ID 406

PCG Murmur Detection by GA ensemble of Scalogram Based Convolutional Neural Network and Random Forest Classifier
Muhammad Zoraiz Ramay and Muhammad Usman Akram

Session PA_8, ID 408
Phonocardiographic Murmur Detection by Scattering-Recurrent Networks
Philip Warrick and Jonathan Afilalo

Session PA_8, ID 439
Hierarchical Multi-Scale Convolutional Network for Murmurs Detection on PCG Signals
Yujia Xu, Xinqi Bao, Hak-Keung Lam, Ernest Kamavuako

14:00 - 15:00 Session SB1 - Ventricular Arrhythmias

Chairs: Mark Potse and Till Althoff **Sopraano**

14:00 - 14:15 Session SB1, ID 340
Right ventricular vs left bundle branch pacing-induced changes in ECG depolarization and repolarization
Clara Sales Bellés, Jorge Melero, Inés Julián, Javier Ramos, Ana Minchole, Esther Pueyo

14:15 - 14:30 Session SB1, ID 351
Efficacy of spectral signatures for the automatic classification of ventricular abnormal potentials in substrate-guided mapping procedures
Giulia Baldazzi, Marco Orrù, Mirko Matraxia, Graziana Viola, Danilo Pani

14:30 - 14:45 Session SB1, ID 381
A New Approach for Mapping Electrical Conduction in Ventricular Tachycardia
Claudio Fabbri, Matteo Diani, Nicola Trevisi, Cristiana Corsi

14:45 - 15:00 Session SB1, ID 382
Exploring transfer learning for ventricular tachycardia electrophysiology studies
Andrea Pitzus, Giulia Baldazzi, Marco Orrù, Alberto Valdes Rey, Mirko Matraxia, Graziana Viola, Petar Djuric, Danilo Pani

14:00 - 15:00 Session SB2 - Ballistocardiography and Seismocardiography

Chairs: Kouhyar Tavakolian and Steven Williams **Opus 3**

14:00 - 14:15 Session SB2, ID 110
Cuff-less Estimation of Blood Pressure from Vibrational Cardiography using a Convolutional Neural Network
James Skoric, Yannick D'Mello, Nathan Clairmonte, Angus McLean, Siddiqui Hakim, Ezz Aboulezz, Michel Lortie, David Plant

14:15 - 14:30 Session SB2, ID 370
Cardiac Time Intervals Derived from Electrocardiography and Seismocardiography in Different Patient Groups
Ismail Elnaggar, Jouni Pykäri, Tero Hurnanen, Olli Lahdenoja, Antti Airola, Matti Kaisti, Tuija Vasankari, Mikko Savontaus, Tero Koivisto

14:30 - 14:45 Session SB2, ID 364
Multichannel Bed Based Ballistocardiography Heart Rate Estimation using Continuous Wavelet Transforms and Autocorrelation
Ismail Elnaggar, Tero Hurnanen, Jonas Sandelin, Olli Lahdenoja, Antti Airola, Matti Kaisti, Tero Koivisto

14:45 - 15:00 Session SB2, ID 304
Heart pulse demodulation from Emfit mattress sensor using spectral and source separation techniques.
Jose Maria Perez-Macias, Alpo Värri, Sari-Leena Himanen, Mirja Tenhunen, Jari Viik

14:00 - 15:00 Session SB3 - ECG and Sleep Disorders

Chairs: Alba Martin and Alfredo Hernández **Sonaatti 1**

14:00 - 14:15 Session SB3, ID 82
ECG, EEG, Breathing Signals, and Machine Learning: Computer-Aided Detection of OSAS and Depression in OSAS Patients
Mostafa Moussa, Yahya Alzaabi, Ahsan Khandoker

14:15 - 14:30 Session SB3, ID 100
Predicting daytime sleepiness from ECG-based respiratory rate using deep learning
Emmi Antikainen, Rana Zia Ur Rehman, Teemu Ahmaniemi, Meenakshi Chatterjee

14:30 - 14:45 Session SB3, ID 194
Cardiopulmonary Analysis of Sleep Apnea Based on Weighted Limited Penetrable Visibility Graph
Kejun Dong, Li Zhao, Cairong Zou, Jianqing Li, Chengyu Liu

14:45 - 15:00 Session SB3, ID 389
Characterization of Autonomic Dysfunction in REM Sleep Behavior Disorder
Nicla Mandas, Maximiliano Mollura, Giulia Baldazzi, Michela Figorilli, Monica Puligheddu, Danilo Pani, Riccardo Barbieri

14:00 - 15:00 Session SB4 - YIA semi-finalists

Chairs: Blanca Rodriguez and Pablo Laguna **Duetto 1-2**

14:00 - 14:15 Session SB4, ID 378
Modelling Virchow's Triad to Improve Stroke Risk Assessment in Atrial Fibrillation Patients
Ahmed Qureshi, Maximilian Balmus, Steven Williams, Gregory Lip, David Nordsletten, Oleg Aslanidi, Adelaide de Vecchi

14:15 - 14:30 Session SB4, ID 337
Effect of Contact Force on Local Electrical Impedance in Atrial Tissue - an In Silico Evaluation
Carmen Martinez Anton, Jorge Sánchez, Andreas Heinkele, Laura Anna Unger, Annika Haas, Kerstin Schmidt, Armin Luik, Axel Loewe, Olaf Doessel

14:30 - 14:45 Session SB4, ID 341
Cosinor-Based Circadianity of T-Wave Alternans Activity as a Predictor of Sudden Cardiac Death in Heart Failure: a Post-Hoc Analysis of the GISSI-HF Holter Substudy
Marcos Usón, Johannes de Bie, Roberto Maestri, Maria Teresa La Rovere, Juan Pablo Martínez, Alba Martin

14:45 - 15:00 Session SB4, ID 103
Comparison Between ECG-Derived Respiration and Respiratory Flow for the Assessment of Cardiorespiratory Coupling Before and After Cardiopulmonary Exercise Test Protocol
Beatrice Cairo, Vlasta Bari, Francesca Gelpi, Beatrice De Maria, Anita Mollo, Francesco Bandera, Alberto Porta

15:00 - 16:00 Session CP - Closing Plenary

Chairs: Rob MacLeod and Jari Hyttinen **Duetto 1-2**

15:00 - 15:15 Session CP, ID 212
The Effect of Heart Rate and Atrial Contraction on Left Ventricular Function
Rosie Barrows, Marina Strocchi, Christoph Augustin, Matthias Gsell, Caroline Roney, Jose Solis-Lemus, Hao Xu, Karli Gillette, Ronak Rajani, John Whitaker, Edward Vigmond, Martin Bishop, Gernot Plank, Steven Niederer

15:15 - 15:30 Session CP, ID 202
Mutation-specific hypertrophic cardiomyopathy and Mavacamten: a mechano-energetic in silico study
Mohamadamin Forouzandehmehr, Michelangelo Paci, Jussi Koivumäki, Jari Hyttinen

15:30 - 16:00 Session CP, ID 438 **Clinical Talk**
Personal ECG Devices- Practical Aspects and Clinical Relevance
David Albert

16:00 - 16:30 Awards and Closing Remarks

Chair: Rob MacLeod **Duetto 1-2**

Program overview

Monday, September 5, 2022

8:30	Welcome to CinC 2022	Duetto 1-2
8:45	RDYIA: Rosanna Degani Young Investigator Finals	Duetto 1-2
10:15	Coffee Break	
10:45	S21: ECG- Analysis: Ischemia and COVID-19	Duetto 1-2
	S22: Atrial Arrhythmias: Electrocardiography	Sopraano
	S23: Heart Rate Variability in Antepartum and Peripartum	Sonaatti 1
	S24: Cardiovascular Imaging	Opus 3
12:15	Social Event	

Tuesday, September 6, 2022

8:30	S31: ECG-Analysis: SCD and LVH	Duetto 1-2
	S32: Atrial Arrhythmias: Endocardiography 1	Sopraano
	S33: Methods for Heart Rate and Cardiovascular Variability Analysis	Sonaatti 1
	S34: Special Session: Non-invasive blood pressure monitoring	Opus 3
10:00	Coffee break	
10:15	S41: ECG Analysis: Signal Processing Techniques	Duetto 1-2
	S42: Atrial Arrhythmias: Endocardiography 2	Sopraano
	S43: Photoplethysmography I	Opus 3
	S44: Special Session: Addressing and assessing uncertainty in cardiac simulations	Sonaatti 1
11:45	Lunch	
12:30	S51: ECG Analysis: Clinical Applications	Duetto 1-2
	S52: Atrial Arrhythmias	Sopraano
	S53: Modeling Ion channels and Cells	Sonaatti 1
	S54: The George B. Moody PhysioNet Challenge 2022 - I	Opus 3
14:00	Coffee break	
14:15	S61: Modeling Arrhythmias	Duetto 1-2
	S62: Photoplethysmography II	Opus 3
	S63: BSPM & ECGI Technical Advances	Sonaatti 1
	S64: The George B. Moody PhysioNet Challenge 2022 - II	Sopraano
15:45	Poster Session with Coffee	

Wednesday, September 7, 2022

8:30	S81: Modeling Drug Effects and other Species	Duetto 1-2
	S82: Medical Informatics and Technology I	Opus 3
	S83: BSPM & ECGI Applications	Sonaatti 1
	S84: Special Session: Multidisciplinar research in atrial fibrillation	Sopraano
10:00	Coffee break	
10:30	S91: Whole Heart Modeling	Duetto 1-2
	S92: Medical Informatics and Technology II	Sopraano
	S93: Cardiovascular System Regulation	Sonaatti 1
	S94: Cardiovascular Mechanics	Opus 3
12:00	Lunch and Poster Session	
14:00	SB1: Ventricular Arrhythmias	Sopraano
	SB2: Ballistocardiography and Seismocardiography	Opus 3
	SB3: ECG and Sleep Disorders	Sonaatti 1
	SB4: YIA semi-finalists	Duetto 1-2
15:00	CP: Closing Plenary	Duetto 1-2
16:00	Awards & Closing Remarks	