

Computing in Cardiology

September 4th – 7th, 2022

Tampere, Finland



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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

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SCI Institute, Univ. of Utah
Salt Lake City, UT, USA

Director, CinC Physionet Challenge

Gari Clifford, DPhil
Georgia Institute of Technology &
Emory University, Atlanta, Georgia,
USA.

Local Organizing Committee

Prof. Jari Hyttinen, Chair, Tampere University

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Dr. Jussi Koivumäki, Co-Chair, Tampere University

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

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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

Welcome to Atlanta for CinC 2023

Dear CinC Friends,

We are delighted to invite you to Atlanta, USA, for the 50th Computing in Cardiology conference, on September 24-27th, 2023. For the first time the conference is being co-hosted by three universities: Emory, Morehouse School of Medicine, and Georgia Institute of Technology.

Metro Atlanta is a proudly diverse home to more than 6 million people – and the world's busiest airport, which has over 2500 daily flights to over 50 countries and a direct connection to the conference venue by a modern subway system. Located in the U.S. state of Georgia near the foothills of the Appalachian Mountains, Atlanta is a short drive from the Atlantic and Caribbean coasts and a short flight from the U.S. cities of New Orleans, Miami, Chicago, New York, Boston and even LA. Its southerly location also makes Atlanta an excellent jumping off point for exploring Central America and the Caribbean.

Atlanta has a grand history. Formerly the homeland of the Muscogee Creek and Cherokee Nations and their ancestors, modern Atlanta was founded in 1837 and quickly grew into a railroad hub between northern and southern U.S. states. Burned to the ground during the American Civil War, Atlanta has rebuilt and grown into 'The City Too Busy To Hate', serving as the cradle of the American Civil Rights Movement and home of many of its leaders, including Martin Luther King, Jr. Today, Atlanta is a hub of people, culture, food – and, perhaps surprisingly, film, due to its progressive temperament, temperate climate, and proximity to unspoiled forests, mountains, and coastal beaches (and of course, generous tax incentives).

During CinC 2023, we hope to show you the beauty and complexity of Atlanta and share the past, present, and future of Atlanta as a sanctuary for those escaping persecution. We will start the conference on Emory University's stunning campus, a private university renowned for its outstanding liberal arts colleges, graduate and professional schools, and one of the world's leading health care systems (and Georgia's largest employer). Our Sunday Symposium will highlight the wonderful work of researchers around Atlanta working on health equity and cardiovascular disease. We will then move the conference to Georgia Institute of Tech's vibrant campus in Midtown Atlanta, which is surrounded by restaurants and cultural institutions and only minutes away from the Georgia Aquarium (until recently the largest aquarium in the world) and Centennial Olympic Park (home of the 1996 Summer Olympics). The area has multiple affordable hotels within a few minutes walk of the conference center, as well as the wonderful Atlanta BeltLine connecting Piedmont Park to Atlanta's Emerald Necklace, a collection of parks and greenspaces that traverse the 'City in a Forest'.

We hope that you will join us for CinC 2023 to explore the incredible beauty of the state of Georgia, from the Appalachian Mountains (and the Appalachian Trail terminus) to the intoxicating wonders of Savannah, and its unspoiled coastal beaches and barrier islands. Late September is the perfect time to visit!

Gari Clifford, Matthew Reyna, Omer Inan, Rishi Kamaleswaran, Reza Sameni, Herman Taylor & May Wang, Co-chairs of CinC 2023

Maps

General map of Tampere

TAMPERE.
FINLAND

VENUES

- 1 Tampere University, city centre campus
- 2 Tampere University, Kauppi campus
- 3 Tampere University, Hervanta campus
- 4 Tampere Hall

ACCOMMODATION OPTIONS (ROOMS)

- 1 Solo Sokos Hotel Torni (305)
- 2 Original Sokos Hotel Ilves (336)
- 3 Original Sokos Hotel Villa (99)
- 4 Hotel Scandic Tampere Station (200)
- 5 Hotel Scandic Tampere City (263)
- 6 Courtyard by Marriott Tampere City (229)
- 7 Lapland Hotels Tampere (141)
- 8 Lapland Hotels Arena (285)
- 9 Holiday Inn Tampere - Central Station (177)
- 10 Radisson Blu Grand Hotel Tammer (87)
- 11 Hotel Scandic Koskipuisto (284)
- 12 Hotel Scandic Hämeenpuisto (178)
- 13 Hotel Scandic Rosendahl (213)
- 14 Dream Hostel & Hotel (38)
- 15 Holiday Club Tampereen kylpylä (92)
- 16 Forenom Aparthotel Tampere City (105)
- 17 Forenom Tampere (55)
- 18 Norlandia Hotel Tampere (130)

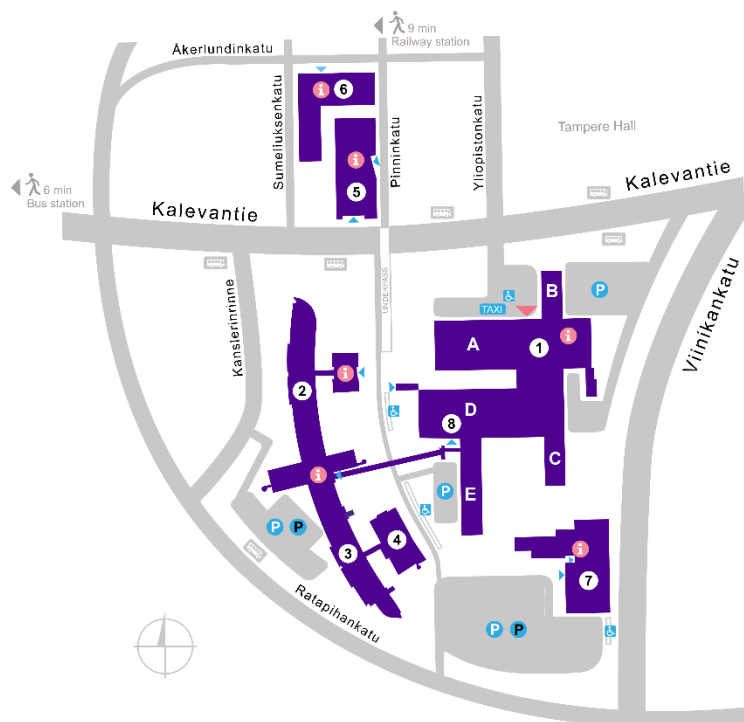
- RAILWAY STATION
- TAMPERE-PIRKKALA AIRPORT
- BUS STATION
- NORDIC SWAN
- GREEN KEY LABEL
- LEED CERTIFICATE



City center campus map (Sunday Symposium venue)

Tampere University

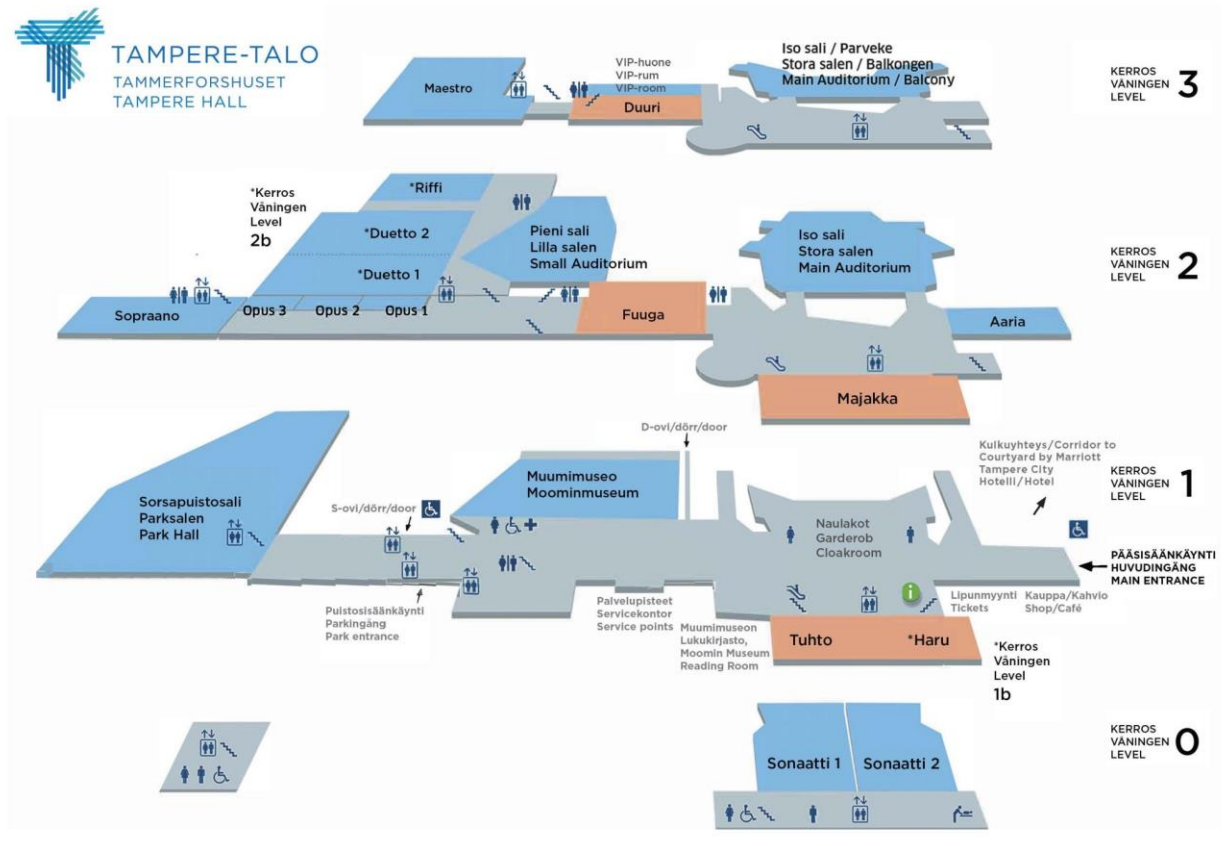
CITY CENTRE CAMPUS



- 1 Main building
- 2 Pinni A
- 3 Pinni B
- 4 TietoPinni
- 5 Linna
- 6 Virta
- 7 Atalpa
- 8 Theatre

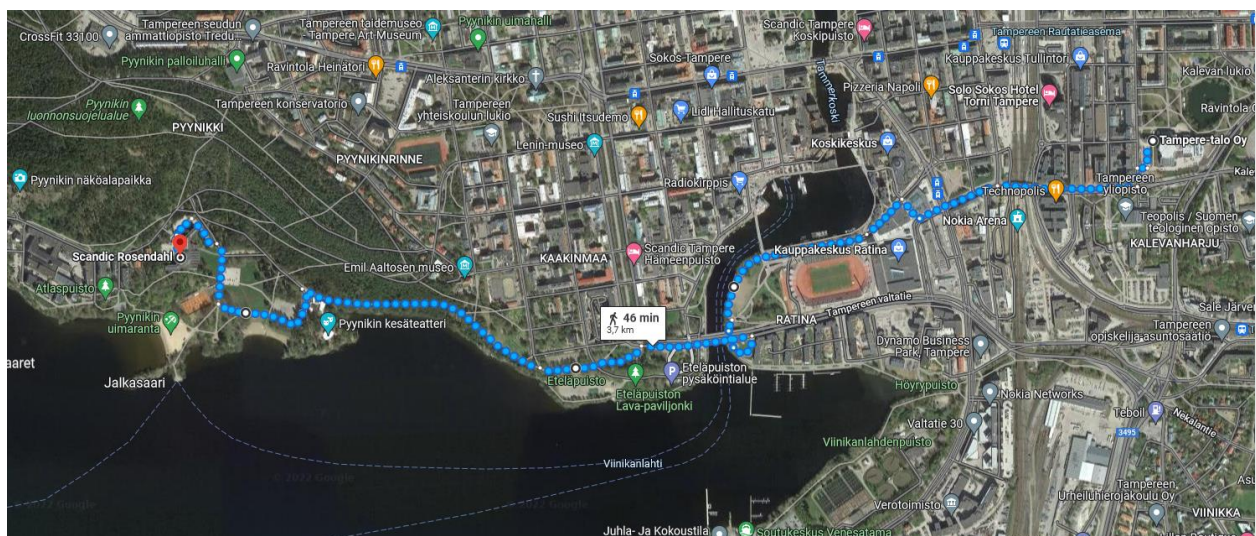
- Main entrance
- Info desk
- Parking
- Guest parking
- Disabled parking
- TAXI Taxi drop-off & pick-up

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 Pyykin Ridge (Pyykinharju) 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 4 th | 1:00pm – 06:00pm | Main auditorium at campus |
| • Mon-Wed, September 5 th – 7 th | 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 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, i.e., one hour ahead of Central Europe.

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 Pynikki 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

Iliaria 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, Jérôme 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 Dossdall, 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 Kanninen, 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 Søgaaard, 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 Guldenring

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 CardiolInsight 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, Lluís 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 Sbröllini, 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 Zhu, 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 Sbröllini, 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 Vitek

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 Sánchez, 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: Multidisciplinary 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, Lluís 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 Ehresh, 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

Wednesday, September 7, 2022

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 Symptoms 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 Daggart 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 Źyliński, 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 Iskra, 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 Iskra, 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

Wednesday, September 7, 2022

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, Dwen 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

Wednesday, September 7, 2022

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 Mincholé, 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 Pykärä, 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	Opus 3
	S53: Modeling Ion channels and Cells	Sonaatti 1
	S54: The George B. Moody PhysioNet Challenge 2022 - I	Sopraano
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: Multidisciplinary 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	