The AMPS Insider

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The AMPS Insider is a quarterly magazine dedicated to all AMPS' partners and customers.
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Executive Overview

The ISCE 48th Annual Conference. Continuous Atrial Fibrillation Monitoring From Photoplethysmography. Product news. Looking forward.

Editorial

The 48th Annual Conference of the International Society of Computerized Electrocardiology (ISCE) was held last April at Chateau Elan, Braselton, Georgia.

The meeting was a big success with more than 120 in attendance. Topics presented included machine learning applied to cardiovascular signals, neuroradiology, acute coronary syndromes, and modern MedTech. The traditional Young Investigators Competition selected Nathan Riek as the winner. Nathan is a graduate student researcher in the Electrical and Computer Engineering Department at the University of Pittsburgh, with a project focusing on "*Saliency Maps to Enhance Explainability of Occlusion Myocardial Infarction Classification Among Pre-Hospital Chest Pain Patients*". The keynote dissertation was given by Johann Jakob Schmid, who for many years was the head of R&D department at Schiller AD, and he gave an exciting lecture titled *ECG and Heinrich Schütz: What is the Connection?*

AMPS, as a member of the Board of Trustees, was well represented, starting with our President and Chief Scientist Fabio Badilini, who also serves as the President of the ISCE, plus additional AMPS delegates who presented, 1) a project on the Normality ECG Parameters in Children, presented by Dr. Antonio Sanzo that was conducted in collaboration with the Buzzi Children's Hospital in Milan, 2) a description of the telemetry platform used for the same project, presented by AMPS CTO Ing Gianpietro Spagna, and 3) a machine-learning approach for the detection of atrial fibrillation and atrial flutter in Holter recordings, presented by a doctoral student at the University of Milan, Dr Moklesur Rahman, whose PhD studies are supported by AMPS LLC.

During the conference we also celebrated the 40th anniversary of ISCE as a Society, with a brilliant session organized by the conference Chair Dr. Roger Abächerli who presented a review of old pictures and shared exciting anecdotes that contributed to revamp the spirit ISCE for the younger generations.

We're also happy to introduce a manuscript recently approved for publication on Clinical Electrophysiology: *Continuous Atrial Fibrillation Monitoring From Photoplethysmography.*

The paper Abstract reads:

BACKGROUND. Continuous monitoring for atrial fibrillation (AF) using photoplethysmography (PPG) from smart- watches or other wearables is challenging due to periods of poor signal quality during motion or suboptimal wearing. As a result, many consumer wearables sample infrequently and only analyze when the user is at rest, which limits the ability to perform continuous monitoring or to quantify AF.

OBJECTIVES. This study aimed to compare 2 methods of continuous monitoring for AF in free-living patients: a well-validated signal processing (SP) heuristic and a convolutional deep neural network (DNN) trained on raw signal.

METHODS. We collected 4 weeks of continuous PPG and electrocardiography signals in 204 free-living patients. Both SP and DNN models were developed and validated both on holdout patients and an external validation set.

RESULTS The results show that the SP model demonstrated receiver-operating characteristic area under the curve (AUC) of 0.972 (sensitivity 99.6%, specificity: 94.4%), which was similar to the DNN receiver-operating characteristic AUC of 0.973 (sensitivity 92.2, specificity: 95.5%); however, the DNN classified significantly more data (95% vs 62%), revealing its superior tolerance of tracings prone to motion artifact. Explainability analysis revealed that the DNN automatically suppresses motion artifacts, evaluates

The 48th ISCE Participants

irregularity, and learns natural AF interbeat variability. The DNN performed better and analyzed more signal in the external validation cohort using a different population and PPG sensor (AUC, 0.994; 97% analyzed vs AUC, 0.989; 88% analyzed).

CONCLUSIONS DNNs perform at least as well as SP models, classify more data, and thus may be better for continuous PPG monitoring.

The full article is available on the AMPS web site here.

Products News

The team has been busy with:

- ✓ Finalizing CER-S 4.7.0 and planning for CER-S 4.8.0 (mainly graphical improvements)
- ✓ A Getemed converter
- ✓ Finalizing CalECG 4.2.0
- ✓ Finalizing the installing procedures for CER-SCor on AWS clients.

Looking forward

It is with great pleasure that we announce ISCE 2025 is to take place in Italy for the first time! The location is on the beautiful southeast shore of Lake Garda, in the well-known village of Bardolino, known for its wine and only 30 minutes from the Romeo and Juliet town of Verona in the hills of Valpolicella. The Conference begins Sunday March 23rd with a welcome dinner and reception and concludes Wednesday 26th with the traditional Gala dinner. The beautiful Hotel Caesius (www.hotelcaesiusterme.com) will serve as the conference location which is a resort literally on the shore of Lake Garda and walking distance from the center of Bardolino.

The conference chair Mary Carey and co-chair Claus Graff are preparing an exciting program and because of the convenient location we anticipate a larger number of European attendees and we hope they will become ISCE conference regulars. Because of the different logistics, we recommend early registration and abstract submissions which will be anticipated and promptly announced. For now please save the date (and the place!!!) and we look forward to seeing you all in Bardolino next year.