Minutes of the TC_SP Meeting, 150th Convention, June 2 & 3, 2021, 10AM ET

Called to order by Christoph M. Musialik on June 2, 2021 around 10:05AM ET via Zoom.

Attendees: Christoph M. Musialik, Jayant Datta (V-Chair), Vicky Melchior, Steve Hutt, J. Keith McElveen, Gerald Schüller

Introduction by Christoph:

It is our 3rd on-line TC_SP meeting. Hoping everybody stay healthy und we meet soon in person again.

Proposed Agenda:

1. A difficult rule of the TC_SP among other dedicated committees also extensively using signal processing. What should be the future mission of our committee? Is still a need for well-prepared tutorials/workshops discussing signal processing basics?
2. TC_SP covers also analog signal processing. There are less and less experts in this field, it is more and more neglected by teaching institutions. However, constant improvements in DSP performance require better and better quality of input/output stages, mic preamps, and amplifiers.
3. AI and ML increasingly come into play, also in digital signal processing. How should we react?
4. Proposals and commitments for future tutorials/workshops.
5. Others

has been accepted. No additional points have been declared.

After introduction and starting to discuss first point of the agenda, due to overbooking of the AES Zoom account, this meeting abruptly ended around 10:15 [ET] .

Therefore, a new meeting has been

called to order by Christoph M. Musialik on June 3, 2021 around 10:03AM ET via Zoom.

Attendees: Christoph M. Musialik, Jayant Datta (V-Chair), Vicky Melchior (partly), Steve Hutt, Robert Bristow-Johnson, Gerald Schüller (partly)

… meeting continued from previous day's interrupted session

Discussion Summary:

Re. 1: Needs for well-prepared tutorials on signal processing basics.

Yes, there is absolutely a need for presenting tutorials on DSP basics. A continuous refreshment is very welcome. There are many young audio processing adepts programing sometimes quite complex applications, but not being strong enough on basics like sampling theory definitions, necessary resolution, digital formats and calculations details, filter basics, FFT, AD/DA performance (necessary bit depth, limitation by physics, marketing bits), etc.

Example: People think that doubling sampling frequency solves reliable peak detection … A tutorial about true peak limiter in digital domain in context of sampling theory (DSP basics) would be very useful.

Idea of creating a series of tutorials that build on each other.

Question to clarify: Could we have access to archived recordings (there may be recordings from AES 147)? Steve will bring this up to AES Plenary and determine how to take this forward.

JJ had a tutorial on FFT on others presented years ago, but still relevant – RBJ will contact JJ

RBJ would like to do a tutorial on comb filters (both from a time-domain and frequency-domain perspective) – RBJ will speak with JJ (they worked on this together) and then make a suggestion for an upcoming tutorial.

Vicky mentioned that a tutorial on EFX (audio effects) could be a very interesting series – Christoph did such tutorial some years ago and could try to modify and extend for a new presentation.

Thanks to Jayant for an interesting tutorial on All-Pass Filters presented on this AES Convention.

Re. 2: Analog Signal Processing

A dying art, this should also be an important area of focus for this TC. True experts are rarely found. Try to get in contact with them. RBJ want to ask a few od them.

Today analog seems to be bottle neck comparing to the achievable performance in digital domain.

What signal processing (at a macro level) is and bring in the topic of analog signal processing. Noise, distortions: relation between analog and digital domain.

Proper design of high-performance mixed (high-resolution analog and high-speed digital) hardware (e.g.: AD/DA) on board level: analog and digital signal interaction, proper board design, diligence in component selection (in high-end even proper R and C type selection has enormous influence on final performance).

Proper design of audio devices: grounding & shielding (EMV/EMC/ESD), board interconnection. Mistakes here can severely lower the overall performance despite top quality components.

Get experts to speak about analog design, materials used for components and the influence it has on the circuits. Especially AD/DA technology itself but also the analog circuitry around. They may be able to speak in generalities without giving away secrets / proprietary stuff.

Crest Factor and its adequate measurement could have an interesting workshop (also true peak and rms level measurement, understanding of dBFS). Rolling crest factor. Interesting for Compressor improvement. Look also at M-Noise (Meyer Sound).

Amplifier Reproduction - analysis of the reproduced signal, power supply dependency (may produce a particular sustained voltage, but could also produce much larger voltage for a very short term).

Re.3: AI & ML in Signal Processing

A new TC on AI&ML has been constituted at this AES Convention.

We should to cooperate with this committee to find common denominator and extend each other. To get good results ML algorithms need also properly defined audio signal features and thus help of advanced signal processing knowledge.

ML for Audio Signals in Python – Gerald S proposed a tutorial about signal processing blocks as neural networks, like an audio autoencoder (similar to a sub-band audio coder), or an RNN as learned IIR filter and such.

It would be desirable to build out a series of presentations in the future that build on each other.

Today AI & ML in audio are mostly used for signal classification and retrieval. However, traditional topics in signal processing could be also advantageous supported by these new technologies: intelligent compressor, equalizer, optimal instrument placing in a complex mix, reverberation adjustment, etc.

General information: each TC is expected to do a webinar every 18 months

Meeting ended around 11:05 [ET]