Writing a good ISSCC paper

Tips on how to increase the chances of paper acceptance

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Sit back and relax

Enjoy the presentation

Overview

- Background of the ISSCC
- Early considerations
- General guidelines for writing an ISSCC paper
- Specific suggestions
- Common reasons for paper rejection
- Additional Information (appendix):
  - Suggestions per technical area
  - ISSCC Technical Areas Description

ISSCC – its Vision

ISSCC is the foremost global forum for presentation of advances in

Solid-State Circuits

and

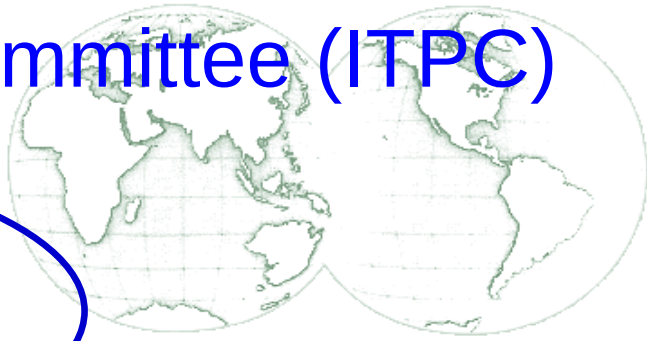
Systems-on-a-Chip.

Reviewers ensure the high standards of the ISSCC

- Your paper will be carefully read by **Expert Reviewers** (up to 15 per paper) who are very familiar with the state-of-the-art.
- You need to convince these reviewers that your work is better than (or at least as good as) what others have done.



International Technical Program Committee (ITPC) structure



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ITPC (178 members)

10 subcommittees:

- 1. Analog
- 2. Data Converters
- 3. Digital
- 4. Imagers, Medical, MEMS & Displays
- 5. Memory
- 6. RF
- 7. Signal Processing
- 8. Technology Directions
- 9. Wireless Communications
- 10. Wireline Communications

International Technical Program Committee (ITPC)
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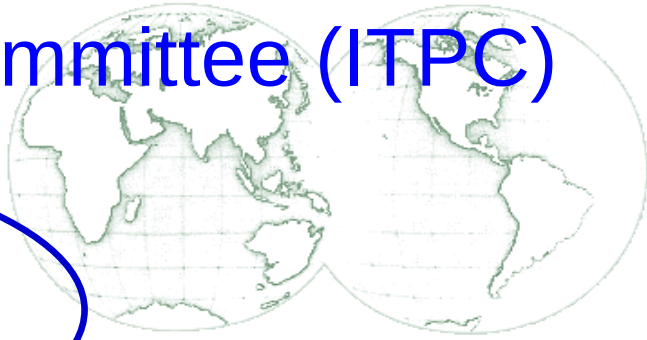

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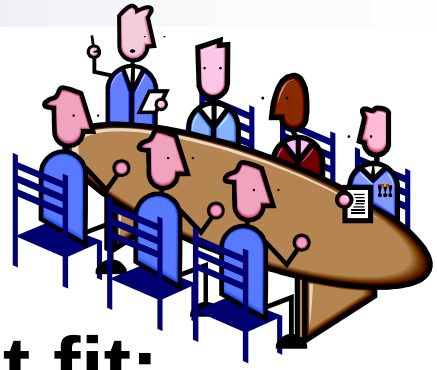
Early Checklist

- ☑ Does my paper advance previous work or does it introduce a new concept?
- ☑ Does my paper have hardware: has a chip been fabricated and tested?
- ☑ Does the topic of my paper fit into the scope of the ISSCC (Is it circuit-oriented) ?
- ☑ In which subcommittee does my paper fit ?
- ☒ Have parts of my paper been published before?

ISSCC Subcommittees



Indicate in which area your paper best fit:

- 1. Analog
- 2. Data Converters
- 3. Digital
- 4. Imagers, Medical, MEMS & Displays
- 5. Memory
- 6. RF
- 7. Signal Processing
- 8. Technology Directions
- 9. Wireless Communications
- 10. Wireline Communications

Before you begin writing, ask yourself:

- What results do I want to communicate ?
- How does my work improve on previously published work ?
- Who are the key players in this area ?
- What are the latest references ?

References are important!

- Know the latest key references related to your work:
  - Use ISSCC references whenever possible.
  - Use IEEE Journal references as next best.
  - Do not use old references, except to emphasize the time scale of the problem.
- The use of good references tells the reviewers that you are aware of the latest developments in the field.
- Refer to all references in the text of the paper, and comment briefly on each.
- Do not refer to only your own work.
- Use about 4 to 6 references.

Two Key Prerequisites

- **First and foremost is the technical quality of the work**
  - Must be original and innovative!
  - Should advance state-of-the-art!
  - Must fit into the ISSCC topic areas!

- **Write-up of the paper**
  - The paper must convince the reviewers of the quality of the work.
  - The paper must be clearly written.
  - Have the paper proof-read by a fluent-English speaker to check the English.
  - Have the paper read by a colleague to check the technical quality and completeness (preferably somebody from the ISSCC Technical Program Committee).

General Guidelines on writing an ISSCC paper

Beginning to Write:

- Start writing the **Conclusions!**
  - This forces you to think about what you want to say.
  - Be quantitative in the **Conclusions**: Summarize the important measured results, giving numerical data; relate them to earlier work.
- Once the conclusions are written, **backfill** the paper.
- Be explicit and concrete: Quantify the results.
- Put your results in context: Compare them to results of others (refer explicitly to the references).

Introducing the topic

- **Opening or Introduction**: This should make it clear to the expert reviewer that you know your area and what others have done
  - Discuss the state-of-the-art in terms of what others have done recently. Make use of references.
  - What is the problem you want to solve?
  - Capture the different approaches to solving the problem and show which of these approaches you have picked and why.
  - Continue with explaining your approach …

Writing the main part of the paper

- You have only 7200 characters (or about 1100 words)!
- Use this limited space carefully!
- Plan in advance (like a system architecture):
  - List 2-to-3 innovative aspects.
  - Explain the importance of these aspects in terms of new design, performance achievements, how it advances the state-of-the-art.

Writing the main part of the paper (continued)

- **Body of the paper**: This should focus on the key ideas and build up the paper incrementally.
  - Use a figure or diagram to show your approach.
  - Preferably, show circuit schematics and explain how the circuit works and what is new about it.
  - Show measurement results:
    - If needed, summarize results in a table format.
    - If appropriate, provide a Figure-of-Merit to prove that your work advances the state-of-the-art.

Writing the main part of the paper (continued)

- **Compare** your results with those of others:
  - Be straightforward in the comparison.
  - Do not ignore bad results; discuss and explain any shortcomings, rather than ignoring them.
  - Compare your results with a paper that uses a similar test technique, and which deals with a similar system. Preferably, compare to a previous ISSCC paper

Concluding the paper

- Highlight the results.
- The final or pre-final paragraph should list all important measured results, give the reviewers a complete picture of your system and convince them of the technical accuracy of your results.
- Mention how your results advance the state-of-the-art.

Note on 3 “Extra Figures”

- With the submission, you may include an extra three figures:
  - Can be used to give a brief analysis or derivation
  - Can provide Figures of Merit to compare your work to others
  - Can provide some additional explanation of the system
- These extra figures should not be an integral part of the write-up (since they will not be included in the published paper). They only serve the purpose of helping the reviewers understand and evaluate your paper.

Specific suggestions

Paper submission

Title of the paper

- Title: should give a good idea of the paper's contents and highlights. Do NOT make the title too broad or general, since it may appear to be a marketing paper.
  - Eg, when your paper talks about Cache and how the Cache is built, do NOT use a title like "High-speed processors", but use a title like "*A fast Cache for a High-Speed Processor*"
  - Or, use a title like "*An 800mW 10Gb/s Ethernet Transceiver in 0.13µm CMOS*", and NOT: "A novel, high-speed transceiver"

Body of the paper: DON'Ts

- Don't repeat too much of the abstract.
- Don't present much theory; Refer to other sources of such material in a reference.
- Don't give too many equations; This is not a Ph.D. thesis, and hence only relevant equations should be stated, if any. If an equation is used, you must explain the equation. Don't make assumptions. Everyone has a different way of interpreting such information.
- Don't write a tutorial-type paper. ISSCC papers must be very concise and innovative.

Technical content: innovation is key

- Highlight the INNOVATION in your paper, early on. Innovation can include one or more of the following:
  - Scalability, circuit or architecture innovation, implementation of a new system approach, use of a new technology, as well as best-performance reported.
- Address the innovation aspect clearly:
  - What is new
  - Accuracy of the proposed approach, circuit, or system
  - Solutions to the problem
  - Feasibility of implementation
  - Comparison with previously proposed techniques
- Show at least one important circuit diagram.

More on content

- When showing a circuit or diagram:
  - Explain what is new about it (give an explanation beyond that of a data sheet)
  - Explain its operation. Do not expect the reviewer to dissect it. Help the reviewer to understand its operation. But, be concise and brief.
  - What are the advantages, what are the shortcomings?
- Replace words like “Fastest”, “Smallest,” “Lowest power consumption”, etc, by quantitative and accurate comparisons with earlier work.
- Make sure you mention each reference. Include also pending publications at conferences or in journals that appear before ISSCC (see also pre-publication policy)

Results are key

The paper should:

- Include a die photo, and give the chip size and technology used.
- Include measurements of the fabricated chip, I-V curves, power, etc. Be precise and quantitative.
- Compare measured results against stated requirements, and to prior art.
- Include a summary table of the design that highlights the specification and performance metrics.

Common reasons for paper rejection

Do NOT submit

- A paper that gives only simulations and has no silicon implementation and test results.
- A paper with only modeling and/or equations: submit these to ISCAS, ICCAD or DAC.
- A paper that is outside the scope of ISSCC topics.
- Work that has been published somewhere else.

Common reasons for paper rejection

- A lack of clear evidence of what is novel in the work, and the extent to which it advances the state-of-the-art.
  - Successful submissions contain specific new results with sufficient detail and data to be understood, with schematics and measured results for key circuits, when appropriate.
- Wrong conference, or pre-publication.

Pre-publication

- If a substantial part of a paper has been published before the upcoming ISSCC, the paper **will not be accepted**. This is the case when:
  - Disclosure of the innovative circuitry, architectures, algorithms, etc, occurs in articles, data sheets, trade journals, or other conferences.
  - Any detailed disclosure of innovative technical ideas on the World-Wide Web before the paper presentation at the Conference will be considered pre-publication.

Pre-publication policy

However, a paper may be acceptable in cases where:

- The chip has been sampled, entered production, and/or appeared in a publication that addressed only the marketing or applications aspects of the product.
- Disclosure consisting only of abbreviated data sheets that provide only specifications, a feature list, and a coarse block diagram.
- The work has been presented at a workshop or niche conference with limited attendance and **no** published proceedings or press coverage.

Pre-publication material

- If any material related to your ISSCC submission will have been published prior to the Conference, copies of these prior publications should be submitted.
- Such material includes data sheets, press releases, papers or abstracts submitted or accepted at another conference or in a journal appearing before the Conference, and any other forms of publication such as Web presentations.

Pre-publication policy (continued)

- After your paper has been accepted, **DO NOT** publish any details or summaries on the web, press releases or any other articles before the conference!

In Summary

- It is all about:
  - Innovation!
  - Advancing State-of-the-Art!
  - Technical quality of the results!
  - Results clearly explained!

Disclaimer

These slides provide only suggestions and guidelines intended to improve the quality of your paper submission. There is no guarantee that a paper, however closely conforming to these suggestions and guidelines, will be accepted.

Acknowledgements for insightful suggestions

- Qiuting Huang
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- Willy Sansen
- Albert Theuwissen
- Chorng-Kuang Wang

ISSCC resources

- http://www.isscc.org/isscc
- Members of the Regional committees
- Members of the Technical Program Committee

Thank you for your attention

See in at the next ISSCC

Additional Information

Appendix

Specifics for paper submission

- See: http://www.isscc.org/isscc
- **Abstract**
  - Maximum of 325 characters
  - Be factual, and provide as complete and quantitative a description as possible, including specific concrete performance data.
- **Manuscript**
  - Between 5200 and 7200 characters (exclusive of references)
  - Include references to recent previously-published work.
  - At most 6 figures (in addition to a die-photo, if appropriate). Figures 2a and 2b count as two figures! Tables count as figures, and are labeled, as figures.
- If needed, you can include an additional 3 items (Table/Figs):
  - items allow you to give some supplementary information to help the reviewer.
  - items will not be part of the write-up of the final digest paper.

Specific Suggestions by Application Area

Specific suggestions by application: Memory

- SRAM
  - Talk about the bit-cell; give details such as size, Static Noise Margin (SNM), I_{read}, etc.
- Technology issues: If a design is in an advanced technology, such as 65nm, discuss some of the common concerns such as the effect of process variation, robustness of the design, how to work at minimum V_{dd}, etc.

Specific suggestions by application: Data Converters

Include a Figure of Merit (FOM):

- Option 1: (SNDR (*not* in *dB)**Bandwidth)/Power

  Key issues:

  - At what frequency is SNDR (Signal-to-Noise and Distortion ratio) measured?
  - What is the *effective* bandwidth (less than Nyquist)
  - What is included in the power?

- Option 2: (if SNDR is in dB)

  - ($10^{\wedge(SNDR/10)}$* Bandwidth)/Power ,
  - or in LOG terms (dB): SNDR + $10*\log_{10}$(BW/Power)

Specific suggestions by application: Wireless

- Measured results versus standard or stated requirements and comparison to prior art, if applicable.
- Technology used (eg, 0.18µm CMOS, SiGe).
- Die Size and Die photo.
- Supply voltage and power.
- At least one important circuit-level diagram and associated description.
- Architectural explanation beyond data sheet.
- Innovation that includes one or more of the following:
  - Scalability, novel circuit, novel architecture, implementation of new system approach, new standard solution, new technology, best-in-class performance.

Specific suggestions by application: Digital

- Comparisons with best-known prior methods (delay, jitter, etc.)
- Details of power consumption, frequency, area, operating voltage.
- Details including statistics on: circuit-usage statistics, power, delay (per block), clock skew, etc.
- For processors: frequency in FO4 delays, power breakdowns, die photo.

Topics covered by each of the 10 technical subcommittees

ISSCC Topics

Innovative and original papers in subject areas including:

- **ANALOG** – Analog circuits &subsystems, including baseband amplifiers, dc-to-dc converters, continuous-time & discrete-time filters, comparators, multipliers, voltage references, power-control circuits, non-linear analog circuits, op-amps, switched-capacitor circuits, synthesizers, and PLLs.
- **RF** – Circuits & sub-circuits for RF/IF/baseband, including: active antennas (including MIMO), IF amplifiers, millimeter-wave circuits (MMDS, 60GHz), modulators, and demodulators, narrowband RF, power amplifiers, power detectors, receiver & transmitter front-end circuits, ultra-wideband & RF switches**.**
- **DATA CONVERTERS** – Nyquist-rate and oversampling A/D and D/A converters, and sample-and-hold circuits.
- **DIGITAL** – design, fabrication, and test of digital VLSI systems; microprocessors, network processors, and chipsets; I/O and inter-chip communication; intra-chip communication; reconfigurable logic-array circuits; digital clock-synthesis circuits & architectures; high-performance & low-power logic-micro-architecture & circuit techniques; high-speed digital circuits; power reduction & management methods for digital VLSI, and implementation methodologies for digital VLSI.

ISSCC Topics (continued)

- **IMAGERS, MEMS, MEDICAL & DISPLAY** – image sensors and companion chips; smart sensors; MEMS for analog and RF; MEMS for sensor-and-instrumentation applications, integrated sensors & transducers; sensor-interface circuits; biosensors; microarrays & lab-on-a-chip; sensors for medical applications; circuitry & MEMS technologies that enable bio-medical & environmental applications; display drivers, controllers, and companion chips; thin-film-transistor interface circuits; organic LED & liquid-crystal-display interface circuits; flat-panel & projection displays; and circuits for print heads.
- **MEMORY** – static, dynamic, non-volatile, and read-only memory; circuit-design techniques, system architectures, I/O interfaces, and array organizations; magnetic & ferro-electric memory designs & architectures; data storage & multi-bit-cell-based memory designs; embedded memory architectures, cache-memory systems, multi-port memory, & CAM designs; emerging memory technologies; nano-crystal, phase-change, & 3D memories; high-speed low-power & low-voltage memory designs; yield-enhancement redundancy & ECC techniques; and memory testing & built-in self-test.

ISSCC Topics (continued)

- **SIGNAL PROCESSING** – digital signal processors; reconfigurable signal-processing circuits; low-power signal-processing circuits; baseband communication processing architectures; cryptographic- & security-processing circuits; analog signal-processing circuits; magnetic & optical-storage circuits; multimedia processors, image processing/compression architectures, audio-and-voice-processing/compression architectures, and graphics processors.
- **TECHNOLOGY DIRECTIONS** – advanced circuit technologies and techniques; ultra-low-voltage & sub-threshold logic design; molecular-, organic-, and nano-electronics; flexible substrates & printable electronics; 3D-integration and novel packaging technologies; compound-semiconductor, superconductive, and micro-photonic technologies & circuits; energy sources & energy harvesting; emerging applications such as bio-medical & ambient-intelligence; emerging wireless applications & circuits; 3D RF & mixed-signal circuits; RFID; advanced signal-processing & microprocessor architectures; design for manufacturability; analog & optical processors, non-transistor-based analog & digital circuits, and their system architectures; advanced memory technologies: spintronics; quantum storage.

ISSCC Topics (continued)

- **WIRELESS** – receivers/transmitters/transceivers for wireless systems including (but not limited to) WLAN, WPAN, WMAN, GPS, DVB/DMB, Bluetooth UWB, GSM/EDGE/CDMA/UMTS/3G/4G base stations and handsets, TV/radio/satellite.
- **WIRELINE** – receivers/transmitters/transceivers for wireline systems including (but not limited to) LAN, WAN, FDDI, Ethernet, token ring, fiber channel, SONET, SDH, PON, ATM, ISDN, xDSL, cable-modem; optical/electrical data links and backplane transceivers, power-line/phone-line home networks, subscriber-line circuits and modems. Wireline transceiver building blocks like AGC, oscillators, line-drivers and hybrids.