



# A PRACTICAL OVERVIEW

## VALENCIA (FALL 2024)

**Where Should/Could AI be Used and Where it  
Should/Could not be Used**

***A View from the Education and Research Perspective***

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<https://www.iaria.org/fellows/PetreDiniAtAGlance.pdf>



# LAST FOUR DECADES\* - A LONG JOURNEY

**Basis:** Expert Systems, Fuzzy logic, Tutoring Systems, Lisp, Prolog, Fifth Generation, Rule-based & Policy-based Systems, etc.

**Experiments:** On generated data (limited real-world)

**Concepts:** Petri Nets, Convolutional Networks, Neural Networks, ...

**Evolution:** Speed, storage, computation-power, ... > growing slightly

**Silos:** Speech/image/patterns recognition, recursive-learning, hardware, agile software, ... more than 800 O-O dev methods, ...

**Surprise:** long term patterns, cat vs fox, data accuracy (& volatility), human-in-the-loop.. (same issues)

**New Spectra:** gen-AI, LLMs, ML, Datasets, Enforced Recursive Learning

**New Technologies:** IoT, Drones, Data-Centers, Cloud, DPU, IPU, 5G/6G, etc.

**Good:** gen-AI, very good at *the secretary level* (quicker, overarching): 'great summarization'; it is dependent on input data (coverage, real-time, etc.)

**Damaging AI:** too many 'experts' regretting fathering AI

too many scarecrows (humanity will disappear, self-deciding robots, killer-robots, etc.)

market: hallucinations, unintended consequences, over/under-fitting

**Q:** How can we get the best out of it?



# AI – Mile ZERO



In the back row from left to right are Oliver Selfridge, Nathaniel Rochester, Marvin Minsky, and John McCarthy. In front on the left is Ray Solomonoff; on the right, Claude Shannon. The identity of the person between Solomonoff and Shannon remained a mystery for some time. THE MINSKY FAMILY

Summer of 1956 at Dartmouth College in Hanover, New Hampshire, USA  
These men had a shared vision for the potential of AI. They believed that it was possible to create machines that **could think and reason like humans**, and they propose a workshop to explore this possibility.

Meet the brilliant minds of *John McCarthy*, *Marvin Minsky*, Herbert Simon, Oliver Selfridge, Nathaniel Rochester, Ray Solomonoff, Trenchard More, and Claude Shannon who kickstarted the AI revolution.

<https://medium.com/@nickyverd/the-first-ever-ai-conference-tracing-the-evolution-and-the-history-of-ai-82347f93a89f>

## The Proposal

“We propose that a two-month, ten-man study of artificial intelligence be carried out during the summer of 1956 at Dartmouth College in Hanover, New Hampshire”

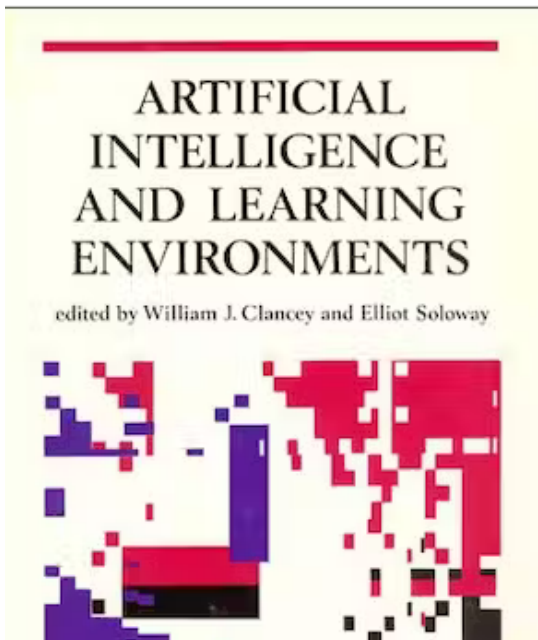
The written proposal to the [Rockefeller Foundation](#) was formulated by McCarthy at Dartmouth and Minsky, then at Harvard. They brought their proposal to the two senior faculty, [Claude Shannon](#) at Bell Labs and [Nathaniel Rochester](#) at IBM and got their support (Crevier, 1993). The proposal went as follows (McCarthy et al, 1955, reprinted in AI Magazine Volume 27, Number 4 pp. 12–14):



Trenchard More, John McCarthy,  
Marvin Minsky, Oliver Selfridge,  
Ray Solomonoff



# AI – Mile ZERO – my appendix



From: Special Issues of Artificial Intelligence

## Artificial Intelligence and Learning Environments

Edited by William J. Clancey and Elliot Soloway

168 pp., 6 x 9 in,  
Paperback  
ISBN: 9780262530903  
Published: September 27, 1990  
Publisher: The MIT Press

**Missing** (I don't know the reason)  
**Elliot Soloway**: University of Michigan  
- AI (Intelligent) Tutoring Systems  
- Learning/cognition at children level  
**Noam Chomsky**: MIT  
- Modern linguistics  
- Analytic philosophy  
*and*  
- One of the founders of the field of *cognitive science*



The New York Times

<https://www.nytimes.com> > 2023/03/08 > noam-chomsk...

### Opinion | Noam Chomsky: The False Promise of ChatGPT ✓

Mar 8, 2023 — As an AI, I am a **machine learning** model that has been trained on large amounts of text data, and I don't have personal experiences or feelings.

[www.youtube.com](https://www.youtube.com) > watch

### Noam Chomsky - Advances in AI: ChatGPT | Human Brain



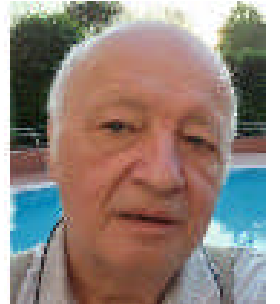
Considered as the father of modern linguistics, **Noam Chomsky** talks about recent advances in natural language processing, **artificial** ...

YouTube · Teacher Development Webinars · Jan 26, 2023



# PETRE

- Petre: 1980/90
  - Fuzzy-based resource allocation, Automatic knowledge incorporation, CAD/CAM Expert Systems,
  - Real-time embedded systems, Space/time thinking and processing, Multi-layers context-based meaning
- Petre: 1992: The First ITC Conference (Montreal), tutoring systems, self-adaptable Q&A professor-student systems (advanced Chatbots)
- Petre: 1997 Dartmouth, Mobile Intelligent Agents (Intelligent Grasshopping Polling)
- Petre: 1997-2000: Nomadic code, Mobile agents, (Grasshopper EU project)
- Petre: 2000-2010: Autonomous systems, Policy-driven systems, Intelligent systems (Patents, ITU, TMF, IEEE)
  - Capturing emerging properties, Variable pooling frequency, Self-adaptable decision polices, Reflexive-policies (Digital-Twins)
  - Routers embedded-AI (temporal logic in Syslog processing, policy-driven signal processing)
- AI-driven Selection of Content Servers based on Current Server Availability (dynamic availability, heuristics, real-time)
- Petre: 2010 - now (active observer and critic, as you might see)



At large: <http://www.iaria.org/fellows/PetreDini.pdf>





# SUDDENLY - A PLANETARY STORM



## King Charles: AI risks require urgency and unity

King enters debate on AI as UK holds summit and announces global declaration on managing threats.



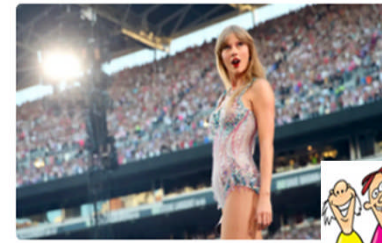
Elon Musk ahead of his meeting with UK PM Rishi Sunak



## US announces 'strongest action yet' on AI safety

The measures have been issued less than 48 hours before the UK hosts an AI safety summit.

US vice-president to say short-term problems with technology as pressing as existential ones, before UK summit  
UK politics live - latest updates



Security game-changer for concerts, sporting events that will get you inside faster



Is AI a blessing or a curse? Barcode developer says 'it could go either way'



Germany invests millions into AI military metaverse' that could never change combat



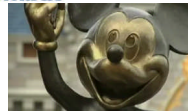
Apple CEO sings AI's praises on rare visit to Capitol Hill



AI has already surpassed human capabilities in several domains - which jobs are next?

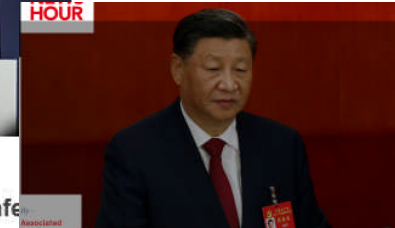


Disrupted LinkedIn hits 1 billion members, adds AI features for job seekers



Kamala Harris will reveal that 30 countries have agreed to sign a US-sponsored declaration for the use of AI by militaries. Photograph: Manuel Balce Ceneta/AP

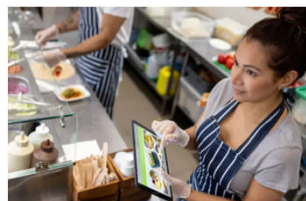
Society & Equity  
US to launch its own AI safety institute



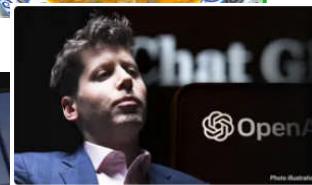
China warns of artificial intelligence risks, calls for increased national security measures



Terrible things in store if Washington doesn't act on AI race, tech ethicist warns



The military metaverse enables pilots to have more frequent training against relevant targets. Robinson said. (Dad)



CEO warns of 'very strange outcomes' from new tech with 'superhuman' skills







# LET US NOT FOUL OURSELVES

Let us set the record straight (*as Nov 17, 2024!*)

**Inventions** (~1% on purpose, 99% unintended discovery);

On former, I know a very few, indeed!

Basis is: 'understanding' and 'inserting' a new acquired information in the right place of the existing knowledge.

Mostly, **incidental action**, followed by experience, failures, experiments again, improvements, acceptance, improvements, etc.

Let us think at:

- Fire
- Matches
- Tires (cars, bicycles, ...)
- C Vitamin
- Stickers
- Wheels
- Bicycles

- 
- Music (i) (mind expression, even silent)
  - Music instruments (ii) (100% invention) for sharing 'interior thinking'
- 

<https://www.the-sun.com/tech/9508495/chatgpt-ceo-ai-superhuman-persuasion-skills-strange-outcomes/>  
<https://www.foxnews.com/us/chatgpt-chief-warns-superhuman-skills-ai-developop>



## AI Scarecrow

### Oracle of Delphi

Delphi was an ancient religious sanctuary dedicated to the Greek god Apollo. Developed in the 8th century B.C., the sanctuary was home to the Oracle of Delphi and the priestess Pythia, who was famed throughout the ancient world for divining the future and was consulted before all major undertakings.



**CEO warns of 'very strange outcomes' from new tech with 'superhuman' skills**

## Cutting through the Hype

(towards AI - so-called Literacy!)

Fathering AI

AI Experts

AI Analysis

AI Ethicists

AI-based producers

AI Beneficiary

AI culture, AI Literacy

AI skeptics

AI charlatans

AI Governments summit

AI (-self) governance

AI governance

Corporate self-guaranty entitlement

Corporate **self-explainability duty**  
(see: [Oracle of Delphi](#))

Corporate self-safety checking

True AI Enthusiasts and Supporters

Professors trying to get various flavors of scientific help in their teaching endeavor: CENTRIC, ICSEA, CYBER, etc.)



# AI IS A DREAM - STRONG EVIDENCE

**AI** does not exist in itself! (Ignorance, Arrogance, or Charlatanism)

**AI** is a parable, an umbrella, a target, a catalyzer, a Morgan the Fairy, an Accelerator, a distant dream, a fight for perfection, to reach the humans' intelligence capabilities.

Steam-engines, pencils, wind propellers, there were ALL steps of inventions towards AI (**EXPERIMENTS** are imperative)

- a. Can you imagine any AI entity thinking at **a pencil**, by itself, finding needed materials, shipping them, building the process, building the machinery, finding the glue, the powder, and having it in various types (more than 600 activities)
- b. Same question on simply **building a wind propeller pallet, a church, or proposing a recipe**. *(each item takes a human collective thinking approach; felling feedback: joy/madness, bad/good, painful/healing, yukky/yummy!)*
- c. One may think at **ANYTHING** and the above statement holds; and this, because *everything* involves **brain activity**.

As dreams are not easy to be achieved, humans invented **satisfactory levels**, for their own comfort (as life is short, we should be proud of something, 😊); mainly, the famous 'one step at a time'. 😞 currently, we are at the very beginning of the first step!

There are:

- 5 Levels of Capability Maturity Models (software), as there were/are well too many software failures
- 5 Levels for automation on Driverless Cars, as well to many failures and challenges (to claim one step ahead)
- 3 Levels of Chargers for Electric Cars

and ..... **surprise**

- (at least) 4 levels of AI capabilities, as of April 14, 2023; some, name 7, already; <https://builtin.com/artificial-intelligence/types-of-artificial-intelligence>

**Generative-AI** is the very first (still, sloppy achievement) and at a very low level of AI-dream (that is as much as we can, now).





# DATA/INFORMATION/KNOWLEDGE

## Knowledge and Information of any kind

- > ~ 99% undetected/not check-able false information (on purpose coalitions, or simple fake, or science fiction)
- and
- > ~1% accessible, fact-checked information
- >>> any inference might lead to biased, unproved, and unanimously (falsely) trusted facts/conclusions

**Danger of too much pre-processing:** of Data compression/fusion/pre-processing

**Inquiry:** How much data processing is enough (see 99.999% *service availability*)

**ROI on Costs:** Data Quality **Assurance** (profiling, cleansing, validation, auditing, etc.) + **Energy**

**Lack of Academic Curricula** and advanced **Education on AI-fluency**

**Note:** 99% vs 1% is my pessimistic estimation.

You can cite me, as there is no proof either way!

99,999% was AT&T customer SLA agreement on service availability, by the year 2000

However, a tiny fraction (~ 7%) of Syslog messages were possible to be processed in the NOCs (Network Operation Centers)



# AI - LOOKING BEHIND AND AHEAD!

## For everybody's comfort

Humanity will not be replaced by artificial entities as

- There are no personalized memory(ies)
- There is no instant personalized thinking
- There is no visibility on any personal past activity
- There are no feelings of fear, emotions (eventually mimicking by instructions/learning)

Do not fear and do not have compassion on those thousands that regret fathering AI, because there were very few of them; most of the tens of thousands vocal ones truly were and are not.

*These two pictures: 2023 – March, Wilmington DE, MedExpress Lab Poster and Vitaly's input from the College of Healthcare Information Management Executives, April 1995, (Canada) triggered my initiative for documentation and for preparing this open discussion.*



## Lessons learned

- *Technologies were developed in a silos with great success*
- *Last 30 years of achievements allowed comprehensive results*
- *Awareness*
- *Education*
- *Societal services*



- Why there are not much progress in Healthcare AI?



Vitaly Herasevich



# IGNITING EVENTS

## A. IEEE Webinar (email to members)

- (i) Theme: **Selecting your next oscilloscope; Why digital triggering matters?** White Paper by ROHDE&SCHWARTZ  
[https://www.rohde-schwarz.com/us/knowledge-center/webinars/oscilloscope-webinars\\_253039.html](https://www.rohde-schwarz.com/us/knowledge-center/webinars/oscilloscope-webinars_253039.html)
- (ii) ChatGTP Q: I ask the same question, I refined for brands of portable oscilloscopes, then refine for 'hysteresis' control, other functions, etc.

## B. IEEE Spectrum (Sept '23)

**Preparing IEEE for 2050 and Beyond** (by Kathy Pretz)  
“... how the information is curated and delivered will change  
> .. Initial vetting will be partially/fully automated

- > Proceedings will be a compendium of articles, algorithms, videos, and other media
- > Use of AI, Virtual Reality, Digital Twins.... practically, a virtual models of our real-world

- Physical presence (personal experience) is in jeopardy via Virtualization
- Personalized feedback (peer-reviews, classes) with human touch will be history with Generative-AI

➤ **The narrative will be deliberately controversial!**

as

➤ **Digitization and Generative-AI are raising challenging dilemmas**



# Case Study #1: OSCILLOSCOPE i

## What are the criteria for selecting my next oscilloscope, considering Digital achievements?

1. **Bandwidth:** This determines the maximum frequency you can accurately measure. As a rule of thumb, choose an oscilloscope with a bandwidth of at least five times the highest frequency you plan to measure.
2. **Sample Rate:** This determines how frequently the oscilloscope takes a reading of the signal. A higher sample rate ensures accurate representation of the waveform. Aim for a sample rate that is at least 2-5 times the bandwidth.
3. **Memory Depth:** This determines how long the oscilloscope can capture a waveform at its maximum sample rate. A larger memory depth allows you to capture longer duration waveforms without reducing the sample rate.
4. **Number of Channels:** Basic oscilloscopes come with 2 channels, but higher-end models may have 4, 8, or even more. The number of channels you'll need depends on the complexity of the signals and systems you're analyzing.
5. **Resolution and Accuracy:** This refers to the number of bits in the analog-to-digital converter (ADC). A higher number of bits provides more detail and accuracy. Most general-purpose oscilloscopes are 8-bit, but for more precise measurements, you might look for 12-bit or 16-bit oscilloscopes.
6. **Triggering Capabilities:** Advanced triggering options can be invaluable when trying to isolate specific events or conditions in a signal.
7. **Display:** Look for a clear, high-resolution display with good contrast. A larger screen can make it easier to see details and multiple waveforms simultaneously.
8. **Connectivity:** Consider the available ports like USB, Ethernet, HDMI, etc. These can be essential for data transfer, remote control, or connecting to other instruments.
9. **Software and Analysis Tools:** Modern DSOs often come with sophisticated software that can perform FFT analysis, serial data decoding, and many other advanced functions. Depending on your needs, these features can be crucial.
10. **Portability and Form Factor:** If you require an oscilloscope for fieldwork, consider a handheld or portable unit. Otherwise, benchtop models might offer more features for a similar price.
11. **Price:** As with any tool, there's a balance between features and cost. Decide on a budget but try not to compromise on the crucial features you need.
12. **Upgradeability:** Some modern oscilloscopes allow for software and hardware upgrades. This can be beneficial if your needs change in the future.
13. **Brand and Reliability:** Well-established brands often offer better reliability, support, and community resources. It's also easier to find reviews and tutorials for popular models.
14. **Special Features:** Depending on your specific needs, consider features like:
  - Touchscreen interface
  - Built-in function generator
  - Protocol analysis (like SPI, I2C, UART decoding)
  - Integrated digital logic analyzer channels for mixed-signal analysis





# OSCILLOSCOPE ii

## What are the most known portable oscilloscope brands?

1. **Tektronix:** One of the most well-known oscilloscope brands, Tektronix offers a range of portable options. Their TPS2000B series, for instance, is battery-operated and built for fieldwork.
  2. **Keysight (formerly Agilent):** Another titan in the oscilloscope world, Keysight has handheld oscilloscopes in their lineup that are known for their quality and performance.
  3. **Fluke:** Primarily known for their multimeters, Fluke also produces portable oscilloscopes, often combining the functions of a multimeter and oscilloscope into one handheld device.
  4. **Rigol:** A more recent player in the market, Rigol offers a range of oscilloscopes, including portable models, that are often praised for their value for money.
  5. **GW Instek:** This brand offers a range of electronic test and measurement instruments, including some portable oscilloscopes.
  6. **Siglent:** Another newer brand gaining traction for providing good value, Siglent offers various oscilloscopes, including handheld models.
  7. **Hantek:** Known for more budget-friendly options, Hantek provides a range of oscilloscopes, including portable and USB variants.
  8. **Owon:** This brand offers a selection of portable oscilloscopes, including tablet-like designs with large screens.
  9. **Micsig:** Micsig is known for their tablet oscilloscopes, which combine a large touch screen with portability.
  10. **Pico Technology:** While they primarily produce PC-based oscilloscopes, their compact designs can be quite portable when paired with a laptop or tablet.
- When selecting a portable oscilloscope, it's essential to consider the specifications (like bandwidth, sample rate, and memory depth) against the portability features (like battery life, size, and ruggedness). Depending on the specific needs, users might also want to check if the portable oscilloscope can double as a multimeter or has other combined functions.



# OSCILLOSCOPE iii

## How to use the hysteresis control with a portable oscilloscope?

### 1. Setup the Oscilloscope:

1. Connect your probe to the input signal.
2. Adjust the vertical and horizontal scales to display the signal of interest properly.

### 2. Select the Trigger Menu:

1. On most oscilloscopes, there's a trigger section, often on the side of the screen or as a dedicated button. Press this button or navigate to the trigger settings using the menu.

### 3. Choose Trigger Type and Source:

1. Select the type of trigger (e.g., edge trigger, pulse width trigger) that best matches your signal of interest.
2. Select the source channel (the channel you've connected your probe to).

### 4. Adjust Trigger Level:

1. Set the trigger level (usually with a dedicated knob) to the voltage level where you want the oscilloscope to start capturing the waveform.

### 5. Enable and Adjust Hysteresis:

1. Not all oscilloscopes will have a dedicated hysteresis control, and some might refer to it with a different term (e.g., "noise reject" or "trigger holdoff"). If your oscilloscope does have hysteresis control, it might be within an "advanced" or "more settings" section of the trigger menu.
2. Adjust the hysteresis level or window size. Increasing it will mean the signal has to move further away from the trigger point (outside the hysteresis window) before returning and causing a trigger. This action can help avoid false triggering from noise.

### 6. Observe and Fine-Tune:

1. With hysteresis applied, observe your waveform. It should be more stable and less prone to erratic triggering.
2. Adjust the hysteresis and trigger level settings as needed to get a stable display.

### 7. Save Settings (if necessary):

1. If your oscilloscope allows you to save profiles or settings, consider saving your current setup for easy access later, especially if you work with similar signals frequently.

- Remember, each oscilloscope model and brand might have a slightly different user interface, so it's essential to refer to the user manual or on-screen hints for model-specific instructions. If your portable oscilloscope doesn't have a dedicated hysteresis setting, look for other features or options that help stabilize triggering in the presence of noise.



# OSCILLOSCOPE - Conclusion

## Case study #1 | Puzzled, yet Informed

### Oscilloscope

**Petre** (background: electronics, measurements, signal processing, practicing, ...)

**Students** receiving info from ChatGPT on “What are the criteria for selecting my next oscilloscope, considering Digital achievements?”

**Output:** Background is assumed

Practicing is assumed

Learning from experience is assumed

**Curriculum** proposal: Hybrid teaching

Basics: provided by professors (selectively, tuned to students' background, feedback loop, etc.)

Practicing: in a real lab (currently, a lot of videos, showing practices, but not self-practicing)

Validation of knowledge (boosting self-confidence)

Reading materials (ChatGPT)

Finding unclear topics (ChatGPT)



# Case Study #2: RESEARCH i

## Automatic handling editorial, punctuation and English for research papers

1. **Grammarly:** Perhaps one of the most widely-known tools, Grammarly uses AI to detect grammar, punctuation, and style errors. They also offer suggestions to enhance clarity and ensure the text adheres to a particular style (e.g., formal, academic). The basic version is free, but there's also a premium version that offers more in-depth analysis.
2. **ProWritingAid:** Similar to Grammarly, ProWritingAid offers grammar checking and style suggestions. It also integrates with various platforms like Microsoft Word and Google Docs. The tool provides a free version with limited features and a paid version with comprehensive feedback.
3. **Writefull:** Designed specifically for academic writing, Writefull compares your sentences against databases of published research papers to provide context-based suggestions. It can also help rephrase sentences to sound more academic.
4. **Editage:** While not entirely AI-based, Editage offers English language editing services for academic papers, and they might employ AI tools to assist human editors. This is a paid service.
5. **Scribendi:** Similar to Editage, Scribendi offers both AI-driven and human editorial services to enhance the quality of academic and other forms of writing.
6. **PaperRater:** This is an AI-driven tool that offers grammar and spelling checks, plagiarism detection, and writing suggestions. It's designed to cater to students, but researchers can benefit from it as well.
7. **Slick Write:** It's a free online tool that checks for grammar errors, stylistic mistakes, and provides feedback on the structure of your writing. It's suitable for academic papers.
8. **LanguageTool:** An open-source proofreading software that checks text in several languages, including English. It detects grammar, punctuation, and style issues.
9. **DeepGrammar:** An AI-powered grammar checker that can be used for various types of writings, including research papers.
10. **TextRanch:** While not purely AI-based, TextRanch uses a combination of AI and real human editors to provide feedback and corrections on English writing.





# RESEARCH ii

## Is human-based peer-reviewing scientific evaluation process going to be replaced by AI-based peer-reviews: what are the pros and the cons, in terms of educations?

### Pros of AI-Based Peer-Reviews:

1. **Speed:** AI can process information much faster than humans. This could significantly speed up the peer-review process, allowing for faster publication and dissemination of knowledge.
2. **Consistency:** An AI system could apply consistent standards and checks across all papers, potentially reducing reviewer bias or oversight that might occur in human reviews.
3. **Bias Reduction:** If programmed correctly, AI might reduce some forms of human bias, such as unconscious bias related to the author's gender, nationality, or institutional affiliation.
4. **Language and Grammar Check:** AI can excel at catching grammatical errors, inconsistencies in formatting, or even issues with citations.
5. **Plagiarism Detection:** AI tools can scan vast databases of published works to detect potential instances of plagiarism or self-plagiarism.
6. **Focus on Content:** With AI handling the format, citation, and basic quality checks, human reviewers could focus on evaluating the content, novelty, and significance of the paper more deeply.

### Cons of AI-Based Peer-Reviews:

1. **Lack of Nuance:** Human reviewers not only assess the technical aspects of a paper but also consider its novelty, relevance, and context within the broader field. AI may struggle with these nuanced evaluations.
2. **Potential for Overlooking Innovation:** Truly groundbreaking papers might present ideas that deviate from the norm. AI trained on existing literature might flag these as outliers or errors, potentially stifering innovation.
3. **Technical Limitations:** Current AI models, even advanced ones, still have limitations in understanding complex concepts, especially in interdisciplinary research.
4. **Bias Perpetuation:** If not trained with diverse and representative data, AI systems can perpetuate and amplify existing biases, leading to skewed evaluations.
5. **Loss of Mentorship and Learning:** For many early-career researchers, the peer-review process offers an opportunity to learn and engage with the broader academic community. If AI takes over this role, this aspect of professional growth might be lost.
6. **Reliability Concerns:** Like any system, AI models can have bugs or vulnerabilities. If an error or bias slips into the AI reviewing system, it could consistently produce flawed reviews.
7. **Economic Concerns:** The development, maintenance, and continuous updating of AI-based reviewing systems require resources. Not all journals or institutions might have access to these resources, leading to disparities.



# RESEARCH iii

## Hybrid approach (suggested), as mitigation

### 1. Up-to-date Information:

1. **Limitation:** AI models like mine are not continuously updated. Thus, after a certain point, they are unaware of the very latest developments in any given field. This is a significant disadvantage for assessing the state-of-the-art in fast-evolving areas.
2. **Mitigation:** The AI system can be periodically retrained with data from the latest publications or integrated with databases that have real-time updates on research publications. Another approach is to allow the AI to "query" or search contemporary databases as part of the review process, but this requires ongoing database access and might raise concerns about proprietary or paywalled data.

### 2. Deep Understanding and Context:

1. **Limitation:** While AI can understand patterns and even complex relationships in data, true comprehension or "deep understanding" remains a challenge. An AI might miss nuances, context, or implications that a human expert would catch.
2. **Mitigation:** Using AI as an assistant to human reviewers rather than a replacement. The AI could handle more straightforward tasks or initial screenings, and human experts could tackle more complex evaluations, aided by AI-generated insights.

### 3. Suggesting Missing Pieces:

1. **Limitation:** AI can suggest gaps based on known data, but it can't anticipate or speculate about truly novel concepts or methods outside its training data.
2. **Mitigation:** Pair AI with expert systems or domain-specific models that have deeper, albeit narrower, knowledge. These systems could provide more specialized recommendations or insights.

### 4. Bias and Fairness:

1. **Limitation:** If the data the AI was trained on is biased, the AI's reviews will likely be biased too.
2. **Mitigation:** Ongoing efforts to ensure the fairness and objectivity of AI models can be prioritized. Regular auditing and bias-checking can also help.

### 5. Interdisciplinary Knowledge:

1. **Limitation:** Some research is interdisciplinary, and understanding its significance might require knowledge from multiple domains.
2. **Mitigation:** Multi-model or ensemble approaches, where several AI models, each specialized in different domains, collaborate on a review.

### 6. Personal Touch and Networking:

1. **Limitation:** Human reviewers often provide mentorship, guidance, and networking opportunities for authors, especially newcomers. An AI doesn't offer these personal touches.
2. **Mitigation:** Hybrid models where humans and AIs collaborate can ensure that the peer-review process remains personal and supportive.



# RESEARCH iv

## Borrowing&interpreting vs plagiarism (theft) detection tools

1. **Turnitin:** One of the most well-known anti-plagiarism tools, Turnitin is widely used by academic institutions. While it isn't cheap for individual use, it can be affordable on an institutional level, given its comprehensive features and extensive database.
2. **Copyscape:** Mainly used to detect online plagiarism, Copyscape offers both free and premium versions. The premium version is pay-as-you-go and quite affordable.
3. **PlagScan:** This tool offers a pricing model that depends on the number of pages you wish to check. They also provide discounted rates for educational institutions.
4. **Plagspotter:** It's an online duplicate content checking and monitoring tool. You can check individual pages for free or use their bulk checking feature for a fee.
5. **PaperRater:** In addition to grammar and writing suggestions, PaperRater offers plagiarism detection. They have a free version with limited features and a premium version that's reasonably priced.
6. **Plagiarisma:** This is a free tool that supports over 190+ languages and can check content against a wide variety of sources, including the web, books, and academic journals.
7. **DupliChecker:** This is a completely free tool, but it has a limit on the number of checks you can perform in a day.
8. **Plagium:** Plagium lets you do occasional short searches for free, but for more in-depth searches, there's a small fee based on the text's length.
9. **SmallSEOTools Plagiarism Checker:** This is another free tool that allows you to check content for plagiarism. It's simple to use and doesn't require registration.
10. **Quetext:** Quetext offers both free and pro versions. The free version is quite limited, but the pro version, which offers a deep search feature and detailed reports, is competitively priced.



# RESEARCH - Conclusion

## Case study #2 | Puzzled, yet Informed

### Scientific contributions

**Petre** (background: teaching, writing, learning, self-criticizing, asking for peers, reviewing, failures, accept/reject, ...)

**Students** receiving info from ChatGPT on “exact research topics”, no failures, no arguments-against, no base for understanding a particular statement

**Output:** Students remain ignorant (not knowing ‘why’) [theme itself, state-of-the-art, critical thinking on open issues, etc.]

Students lose ability to write by themselves, self confidence, gradual improvements, self-critical

Students do not acquire the ability to identify mistakes and to confidently evaluate others’ work

#### Education:

Next professors might be less gifted with adapting to different levels of student understanding (see: Tutoring Systems)

Tooling effort is used for catching culprits instead of massive education and enforced punitive rules.

**Approach** proposal: Hybrid scientific education/evaluation/creation + explicit and mandatory ethics rules

Automated tools should complement, not replace, the researcher's own judgment and understanding of their work. Especially in academic contexts, nuanced and context-specific decisions about language and phrasing are crucial. It's always a good idea to have a human with expertise in the subject area review the paper in addition to using AI-based tools.

A collaboration between AI tools and human reviewers and new scientific thinkers seems to be the most promising way forward, capitalizing on the strengths of both (volume and speed + human thinking)

Anti-plagiarism tools are essential for educators, students, and writers to ensure the originality of content. Yet, they should be not needed, if education on fairness is enforced and punishment for wrong doers is enforced, too.





# QUESTIONS under SCRUTINY

- **Theme questions:**
  - Is education/research getting out of human essence?
  - Who is going to infuse the human skills to students and young researchers from now on?
  - Are we baffled, and finally, unable to deny the wrong we perceive because of the trend and hype (political correctness)?
- **#1** Will (free or commercial) AI-based tools for handling editorial, punctuation and English be the basis for research?
- **#2** Is human-based peer-reviewing process going to be replaced by AI-based peer-reviews, and teacher guidance by a set of narratives via generative-AI?
- **#3** Are we hypocrite with double-blind review vs one-side blind review process when accepting unexplainable guidelines based on generative-AI? (see: AI explainability)
- **#4** Is AI-based feedback going to replace our education system (classes, research, projects)?
- **#5** Are classes, professors already 'obsolete' and only still being maintained in the picture by 'empathy'?



**QUO VADIS?**

**STAGE IS YOURS**

**Share your thoughts, experience, position**

**Caveat**

**We could be right, or completely wrong!**



# OSCILLOSCOPE -Back-up slides

## Back-up materials

Oscilloscope /ə'silə,skōp/

vs.

Spectrum Analyzer /'spektrəm 'anl,īzər/

(Tektronix)

<https://www.youtube.com/watch?v=NBJCv0ONPnw>

Note:

It seems easier while 'only reading'  
The very first achievement is to find the right button



# Webinars – Oscilloscope-a

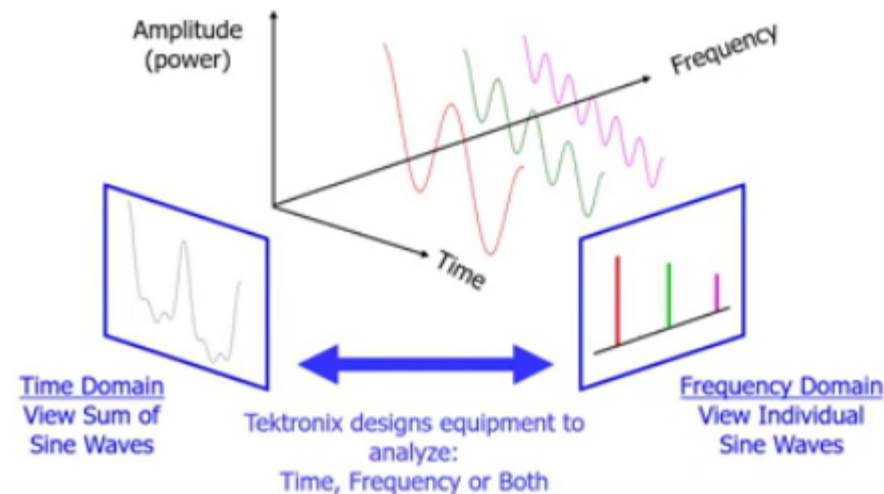
<https://www.youtube.com/watch?v=NBJCv0ONPnw>

## • Spectrum Analyzers vs Oscilloscopes Webinar with Tektronix

**Tektronix**  
Spectrum Analyzers vs. Oscilloscopes  
Keith R. Tinsley  
Performance Marketing  
Application Engineer

Presented by **testforce**

### Electromagnetics Signals: ... in 3 Dimensions

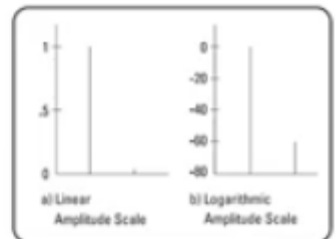


### Important Terms *Log Scale*

- Scopes use a linear scale, usually Volts / div
- Spectrum analyzers use a log scale in dBx (more on 'x' on the next slide)
- What's a dB?
  - dB is an expression of the ratio between two numbers
  - 0dB is a ratio of 1 to 1
  - 10dB is a ratio of 10:1
  - 20dB is a ratio of 100:1
  - 30dB is a ratio of 1000:1
- Why use a log scale instead of a linear scale?
  - Enables the viewing of very small signals on the same scale as very large signals (high dynamic range)

$$\text{dB} = 10 \log (P_2 / P_1)$$

where  $P_1$  and  $P_2$  are power in Watts



### Electromagnetics Signals: ... aka Radio Freq. (RF)

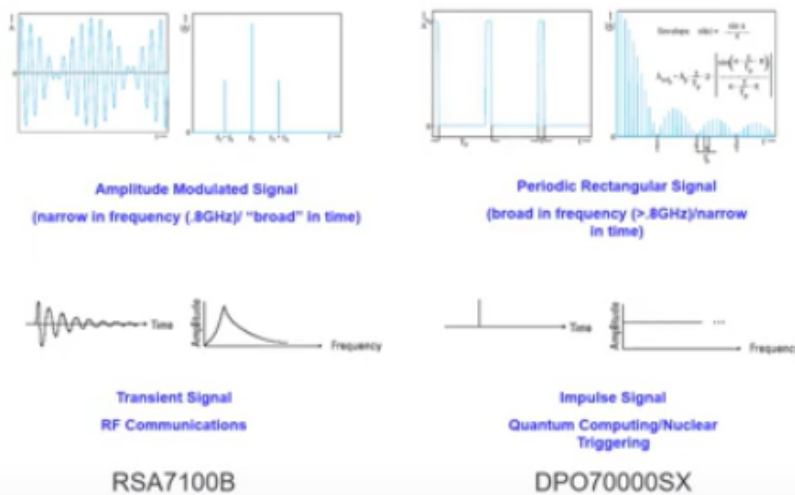




# Webinars – Oscilloscope-b

- <https://www.youtube.com/watch?v=NBjCv0ONPnw>

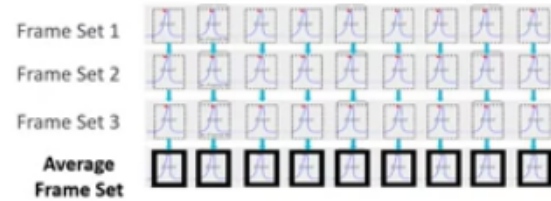
## Different Equipment for Different Task/Measurements



## Why choose the DPO? A: FastFrame Averaging

### "VERTICAL AVERAGING OF MULTIPLE FRAME SETS"

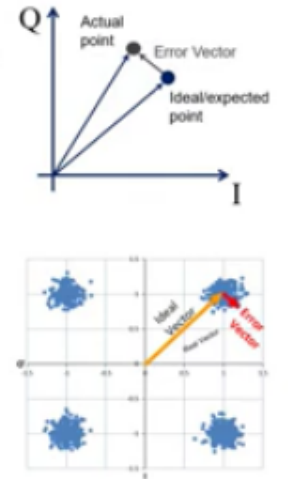
- Example application: Study processes reactions on a step-by-step basis



- The Average Frame Set is produced by the acquisition system hardware, making very efficient.
- "Orthogonal Averaging" is now a standard feature on 70k scopes. Requires ver 10.8 or later firmware
- Note: Constituent Frame Sets are not available in this mode; only the "Average Frame Set" is available for analysis

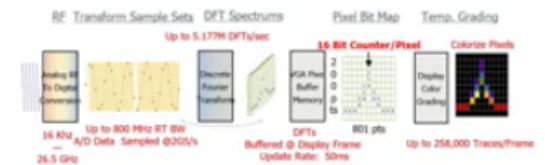
## 5G: Modulation Quality (high SFDR case, RSA7100B)

- Modulation Quality: ensure that the information contained in the signal can withstand transmission over a complex RF environment
- Indirect test of TX's Linearity
- Different types of Modulation Quality measurements:
  - Error Vector Magnitude (EVM) – used for digital signals
  - Modulation Error Rate (MER): used for digital signals, can be derived from EVM
- Requires that the Spectrum Analyzer has the ability to demodulate the signal
  - General purpose good
  - Growing list of Wireless Standards support



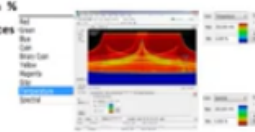
## RSA7100B: The DPX™ Transform Engine

### REAL-TIME DISPLAY PROCESSING



#### Bit Map Spectral Density/Colorization

- Pixel Spectral Density calculated in %
    - Pixel Counter Hits / Total Traces SD(%)
    - Called "Signal Frequency of Occurrence"
  - Colorization Scales
    - Temperature – Red Assigned to Highest SD(%)
- 2 Axis = Colorized Spectral Density



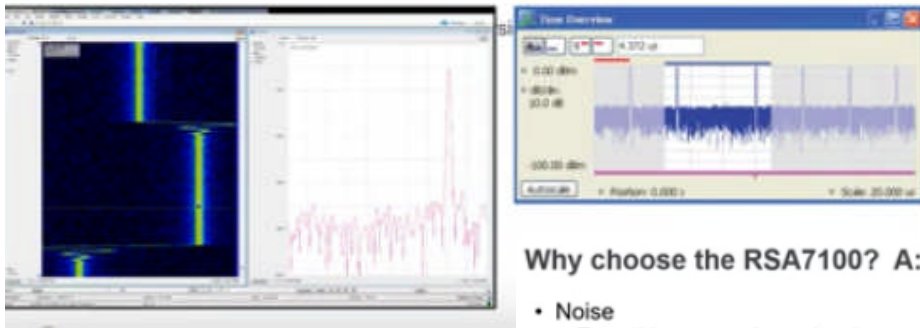


# Webinars – Oscilloscope-c

- <https://www.youtube.com/watch?v=NBjCv0ONPnw>

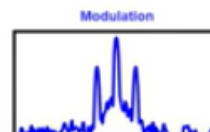
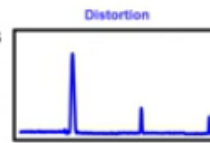
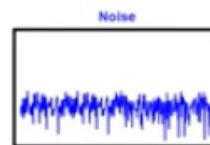
## RSA7100B: Time/Freq. Domain Correlation

- Different from DPO70000SX: only available over 1 RF channel
- View signal in RF time domain
  - Amplitude vs. Time: RF envelope with Measurement Filtering to better see signals
- Correlate with Spectrum, Spectrogram for  $f_c < 26.5\text{GHz}$

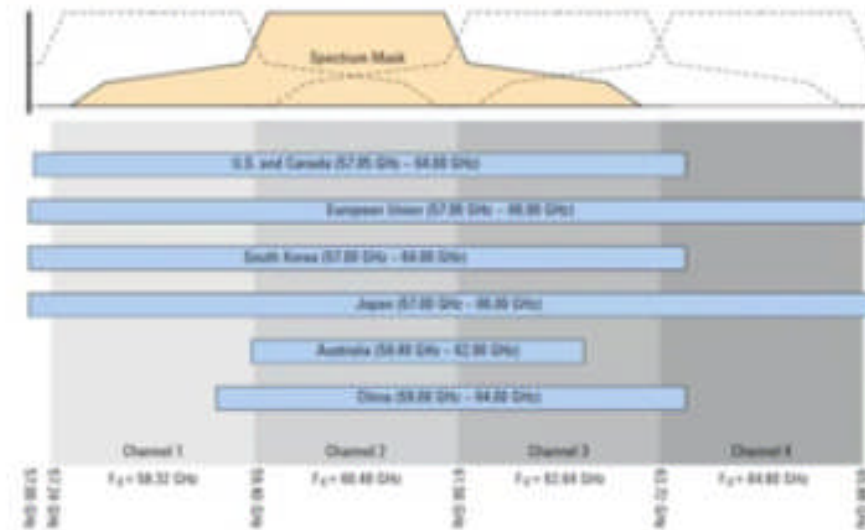


Why choose the RSA7100? A: Greater SFDR is important

- Noise
  - Everything generates noise, how much does it impact the overall design?
  - Where else is noise coming from? (EMI)
  - Signal to noise measurements
- Distortion
  - What appears to be a clean sine wave on an oscilloscope may have harmonic components that aren't readily obvious in the time domain but they are easily seen in the frequency domain
- Communications
  - Modern wireless communication techniques are inherently frequency domain oriented
  - Allocated frequency bands
  - Defined communication channels
  - Need to confirm aspects such as occupied bandwidth, modulation quality, etc.



## 5G: 802.11ad Landscape WORLDWIDE CHANNEL ALLOCATION



New FCC recommendation to extend the 802.11AD Band up to 72.6 GHz (early 2018) – adding 3 new channels: Channel 5 centered at 66.96 GHz & Channel 6 centered at 69.12 GHz Channel 7 centered at 71.28 GHz

- 4 channels in the 57 GHz to 66 GHz ISM band
- Channel bandwidth is 2.16 GHz [DSP filtering + DPO70000SX]