RADIO-ACTIVE!

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Santa Cruz County
Amateur Radio Emergency Service

AI: A new frontier for amateur radio

The world of Amateur Radio, or "ham radio," has always embraced innovation. From spark gap transmitters to digital modes and Software Defined Radios, hams have consistently pushed the boundaries of communication. Now, Artificial Intelligence (AI) is emerging as a powerful tool poised to revolutionize many aspects of our beloved hobby.

One of the most immediate benefits of AI in ham radio is its ability to enhance signal processing and reduce noise. AI algorithms can be trained to analyze received signals in real-time, identifying and filtering out unwanted noise, interference, and distortion. This can significantly improve the clarity and intelligibility of communications, especially in crowded frequency bands or during poor propagation conditions. Imagine clearer voice signals and more reliably decoded digital transmissions, even when facing challenging conditions.

Predicting radio wave propagation has always been a key part of ham radio. AI can improve the accuracy of propagation models by analyzing vast quantities of historical data and current environmental factors. This leads to more reliable forecasts for optimal frequencies, time windows, and conditions for long-distance communication (DX). Machine learning models can continuously learn from past propagation data, improving accuracy over time.

AI can also streamline various ham radio operations and enable greater automation. This includes:

- Automated logbook management: AI can automate the process of recording contacts (QSOs), filling in details like time, frequency, and mode, and generating reports for awards or contests.
- Station automation: AI could manage antenna adjustments, optimize transmission settings, and monitor signal conditions remotely, making remote operation more efficient and accessible.

For new operators, AI can act as a virtual mentor, offering interactive lessons, quizzes, and on-demand assistance with radio theory, operating techniques, and regulations.

The future of AI in ham radio holds exciting possibilities. From enhancing the core experience of communication to assisting with learning and experimentation, AI is poised to become a valuable partner for amateur radio operators. Embracing this new technology can open up a world of new possibilities for enhancing efficiency, expanding capabilities, and ultimately, having more fun with our fascinating hobby.

Inside this issue

Santa Cruz County ARES Purpose

- The Amateur Radio Emergency Service (ARES) consists of licensed amateurs who have voluntarily registered their qualifications and equipment with their local ARES leadership for communications duty in the public service when disaster strikes
- We are not fire fighters or police or sheriff's officers. We are volunteers who care about our communities by using our emergency communication skills.
- Before volunteering in an emergency we first take care of ourselves, our family, and our home.
- We value every member's contributions, irrespective of license class, years of experience, or the price tag of equipment.

Ham Radio's Motto

"When all else fails – ham radio works". That is because, when all the normal communication systems stop working, Ham Radio is still in operation, helping people, conveying messages, and sometimes, even saving lives.

Can AI work without the Internet?

In the wake of natural disasters, cyberattacks, or infrastructure failures, traditional communication networks often collapse. That's when ARES step in—providing resilient, decentralized communication. But how can AI support ARES when there's no internet?

The answer lies in offline AI, edge computing, and local deployment—technologies that allow AI to function independently of cloud services. Offline AI refers to machine learning models and algorithms that are pre-trained and stored locally on devices such as laptops, Raspberry Pi units, or embedded systems. These models can perform tasks without needing to connect to the internet or external servers. AI can clean up noisy transmissions using local digital signal processing by enhancing weak signals, filtering out static and interference and decode Morse code or digital modes. This improves clarity and reduces operator fatigue during long emergency shifts.

AI models can transcribe voice messages into text, prioritize messages based on urgency and detect keywords like "medical," "fire," or "evacuation". All of this can be done locally, helping operators manage high volumes of traffic efficiently.

Offline AI tools can translate messages between languages, convert speech to text for hearing-impaired operators and read incoming messages aloud for visually impaired users. These features make ARES more inclusive and effective in diverse communities.

AI can be embedded in portable repeaters, mobile command units and mesh network nodes. These systems can autonomously manage traffic, detect anomalies, and optimize routing—all without cloud connectivity. ARES often uses mesh networks and packet radio to share data locally. AI can analyze traffic patterns, detect congestion or interference or recommend alternate routing paths. This keeps communication flowing even in isolated or disaster-struck areas.

Offline AI enhances security and resilience with no dependence on vulnerable cloud infrastructure and reduced risk of cyberattacks. It has consistent performance in remote or hostile environments.

Need help getting these various aspects of setup? AI can give you a step by step guide including computer coding. See article on Page 4 for an example.

Report your volunteer hours!

The reported volunteer hours for July was 446 hours and August 480 hours. Total so far for year has been 4266 hours. Please remember to enter your hours on the form on https://xczcomm.com/index.php/hours-reporting/ Reporting the time you spend on ARES and ham radio activities reminds county public safety managers that we're around and ready to serve in time of need.

PACIFICON℠ is the premier amateur radio event in the Western United States. This conference will occur October 10—12 at the San Ramon Marriott hosted by the Mount Diablo Amateur Radio Club.

This is three great days of activities for one low cost:

- A full slate of outstanding Forum presentations about a wide range of amateur radio topics
- An all-day Antenna Seminar (additional fee required)
- Gordon West, WB6NOA: Author, educator, speaker and irrepressible promoter of all things ham radio
- Large Vendor and Nonprofit expo filled with exciting products and exhibits
- Events including an outdoor Swap Meet
- QRP Low Power Activities
- Youth Activities including Scouting
- Parachute Mobile contacts
- Electronics kit building and soldering instruction
- A One Day License Prep Class to prepare you to pass the amateur radio Technician license examination and get your first amateur radio license
- Two days of License Testing
- A chance to hear about and discuss important national amateur radio issues with top ARRL leaders
- A chance to win radios and other great prizes throughout the convention
- M17 digital voice mode (patent free) and MDVM talk and booths.

Resources

- Website: https://xczcomm.com/
- Reporting volunteer hours: https://xczcomm.com/index.php/hours-reporting/
- Upcoming events: https://xczcomm.com/index.php/calendar-of-events/
- Facebook page: https://www.facebook.com/ARES-of-Santa-Cruz-County-Ca-296232310799866
- Facebook group: https://www.facebook.com/groups/431308973875528
- PIO Articles: https://arrlsantaclaravalley.org/news/ or https://xczcomm.com/index.php/news/
- XCZ Comm You Tube: https://www.youtube.com/channel/UCHZH8TUSgh4SqHTPXSWolPA
- Submitting deployment documents: **send in PDF form** to EOC.ARES@santacruzca.gov
- Submitting personal information such as DSW application, personal data update, education certificates: email to EOC.ARES@santacruzca.gov

Equipment available to loan

Santa Cruz Communications Support have made FOUR kits available for loaning to allow ham operators participate in a deployment or to trial a different setup. Two kits are for a vehicle deployment and includes mobile dual-band radio, mag mount antenna, battery and kneeboard. The other two kits are for stationary outdoor deployments and includes the vehicle kit with additional supplies of a tripod antenna, lighting, and pop-up. Contact either John, N6QX, Roberta, AJ6KN, Stephen, KM6NEP or Dan, N6RJX for arraigning for check out.

Editor Comment

Articles on pages 1,2, and 4 were all created using AI. Also there are AI tools to create podcasts. Here is an example: https://drive.google.com/file/d/1jOjP-8k1GomBwus0jm4Xg39TN4dqE5lr/view?usp=sharing

Enjoy listening!

AI Suggested Steps for Radio Wave Propagation Prediction

To **predict radio wave propagation at your location using AI with your ham radio**, you can combine real-time data sources with AI-powered tools. Here's a step-by-step guide tailored for **ARES and amateur radio operators**:

1. Gather Real-Time Data with platforms that provide signal strength, frequency, mode, and location data:

- **PSK Reporter**: Tracks digital mode signals.
- **WSPR (Weak Signal Propagation Reporter)**: Ideal for HF openings.
- **RBN (Reverse Beacon Network)**: CW skimmer network.
- **DX Cluster**: Operator-submitted signal spots.

2. Use AI-Enhanced Tools such as DxPulse, a free real-time propagation map that:

- Combines data from PSK Reporter, WSPR, RBN, and DX Cluster.
- Uses **AI to estimate feasible modes** (e.g., CW, SSB) based on SNR (Signal-to-Noise Ratio).
- Auto-refreshes every 60 seconds.
- Allows filtering by **band, mode, grid square**, or **callsign**.
- Offers **band-opening alerts** and **mobile-friendly interface** for field use.→ Example: If FT8 shows +5 dB SNR, DXPulse may suggest SSB is also viable.

3. Input Your Location

- Use your **Maidenhead Grid Locator** (e.g., CM87 for Ben Lomond, CA).
- Tools like DXPulse or DXLook auto-detect your grid or let you enter it manually.

4. Train or Use AI Models (Advanced)

If you're building your own AI model:

- Collect historical propagation data (solar activity, time of day, frequency).
- Use machine learning (e.g., neural networks) to predict MUF (Maximum Usable Frequency) and band conditions.
- Integrate with SDR (Software Defined Radio) for real-time signal monitoring.

5. Visualize and Act

- Use dashboards or maps to see where bands are open.
- Switch your rig to the most promising band/mode.
- Call CQ or monitor emergency frequencies accordingly.

2025 SCC ARES Events

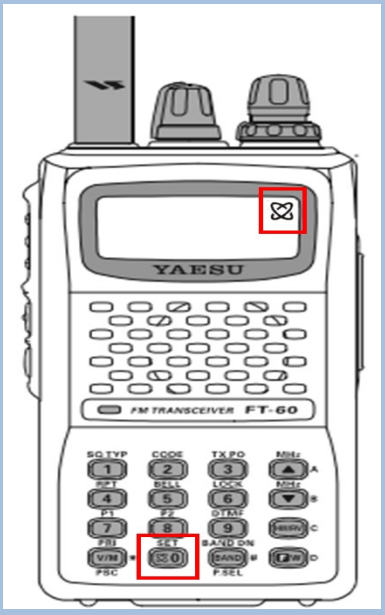
Date	Event	Approx. or confirmed date?	Description
9/21/2025	Santa Cruz Triathlon	Confirmed	Santa Cruz Triathlon is a non-profit that donates proceeds to various athletic programs in the county. ARES provides monitoring of participants positions and safety for the organizers. Sign-up: https://www.signupgenius.com/go/10C0D4DA9A822A4F4CE9-santa
October 31, 2025 (est) 1530 - 2000	Halloween Trunk or Treat 5200 Soquel Ave, Santa Cruz	Approximate	Trunk of Treat is organized by the Santa Cruz Sheriffs. ARES provides monitoring of participants along with closed road staffing and shuttle parking location.

2025 Other Radio Events for Ham Operator Participation

Date	Event	Approx. or confirmed dat	Description
Each Wednesday 10am - 12pm	Loft Coffee 2701 Cabrillo College Dr, Aptos		Gathering of general interest, sharing of ideas, getting some elmer help
2nd and 4th Saturdays of the month 10am	C.A.K.E. @ Loft Coffee 2701 Cabrillo College Dr, Aptos		C.A.K.E. = Coffee/Caffeine Assisted Knowledge Exchange. Gathering of general interest, sharing of ideas, getting some elmer help
1st Saturday of each month [6/7/25, 7/5/25, 8/2/25, 9/6/25, 10/4/25, 11/1/25, 12/6/25] 10am - 2pm	POTA	Approximate	Play radio at a scenic park near by. Not formal and any mode can be used. Emails sent prior to event to indicate the specific park. Prior parks have been Seacliff State Park and Wilder State Park

‘Disabling’ WIRES

1. Verify radio is unlocked. To unlock—Long press #6
2. Press the F/W key (lower right button) then immediately press the 0 key to enter the menu mode.
3. Rotate the Dial knob to menu 23 – INT MR.
4. Press the F/W key then rotate the Dial knob to select a memory (d1 through d9) that is empty, i.e. it contains •••••• (six dots) = no tone.
5. Press the F/W key to store the setting.
6. Rotate the Dial knob to menu 21 – I NET.
7. Press the F/W key then rotate the Dial knob to select INT.MEM.
8. Press the F/W key to store the setting.
9. Press the PTT button to exit the menu mode.



Yaesu WIRES

(A repeat article from July 2024—it is left here as a resource)

So, you bought yourself the Santa Cruz County ARES recommended Yaesu FT-60 handi-talkie. You programmed it to our frequencies. Then you start participating in Nets and events. And you try to transmit. Either you are not heard at all or the first part of your transmission is cut off. Net control asks for a repeat of the information but this time hears a DTMF tone at the beginning of your transmission. Net control or other listeners may chime in and state the station (you) has “Wires” turned on. How did that happen? *Very easily.*

Most of us have experienced this phenomenon with this radio. Yaesu’s WIRES stands for **W**ide-coverage **I**nternet **R**epeater **E**nhancement **S**ystem. It is an internet communication system that allows amateur radio repeaters to connect over Voice over IP (VoIP). WIRES uses DTMF signaling to connect, so any radio with a DTMF encoding keypad can be used to establish an internet link. When your radio sends out the DTMF tone, it simultaneously mutes your voice audio (or lowers it significantly). That’s why Net Control and the rest of the Net can’t hear you! When you are saying your call sign, the radio has muted or lowered your voice signal. Additionally, most repeaters automatically mute the audio when they hear DTMF tones, cutting off the user. The person making the transmission generally has no idea this is happening other than a small, easy to miss indication on their display.

WIRES is a feature that is well used elsewhere but has had challenges in getting a foothold in the US. According to some, the introduction of Echolink or Allstar may have influenced this.

On the FT-60R, which uses WIRES-II technology (and not the current X version), the key that is used to turn on WIRES is the “0 Set” key, located on the bottom row, second from the left (see diagram to left). Press it momentarily to turn WIRES on (or off). You might do this by accident if you want to enter Set mode and forget to first hit F/W key. You can tell WIRES is on if the small ‘atom’ symbol appears in the top right corner of the display. When participating with an event, we encourage locking your radio after setting your frequencies for the event and verifying the WIRES is not active.

If you do not plan on using this feature consider an alternative way of handling it by following the steps in the left-hand column. After performing the steps, it’s still possible to ‘activate’ the WIRES and the symbol will appear, *but it will not send tones over the air and mute your audio!*