



WELCOME

Introduction to Ham Radio

Space Camp 2022

David D Lee 04-12-22
W5OC

What is Ham Radio



first of all

Ham Radio is...

- enriching, fascinating, fun, educational, practical, humbling, challenging, valuable, lifelong

The word "HAM" started back in 1908
the station CALL of the first amateur wireless station
operated by members of the Harvard Radio Club.

Hyman, Albert

Almy, Bob

Murray, Poogie



3 Million Ham Radios operators worldwide

Nutshell:

- It's a hobby,
- Public service,
- Personal security,
- Social network
- Experimental environment
- Outreach
- Language



Rich history contributing directly with human space exploration

- 2 way ham communications with Crew on Space Shuttle Missions
- 2 way ham communications with Crew on International Space Station

SAREX

(Shuttle Amateur Radio Experiments)

First communication using Ham Radio from Space to Earth

Owen Garriott, who has been an amateur radio operator for over 40 years, was the first astronaut to take a ham radio into space.



Education – Students from around the world talk to astronauts each week onboard the ISS through the “Amateur Radio on the International Space Station” program- a cooperative venture of NASA, the National Association for Amateur Radio, and AMSAT.

Source: ISS Program Scientist, NASA

ARISS

(Amateur Radio on the ISS)

Important and significant roles

- Ham Emergency backup communication for ISS (on a bad day)
- Ham Emergency Operations Center for many public venues



- Hams support the Homeland Security communications
- Hams support the Agency emergency communications



Public outreach and service

- ARISS support to schools/groups
- ARES support to local cities
- Safety preparedness with communications systems



When all else fails..

provide capability for yourself and your family.

Ham Radio is known to be the only means to communicate effectively when the infrastructure fails



Career Growth with hands-on operations and projects

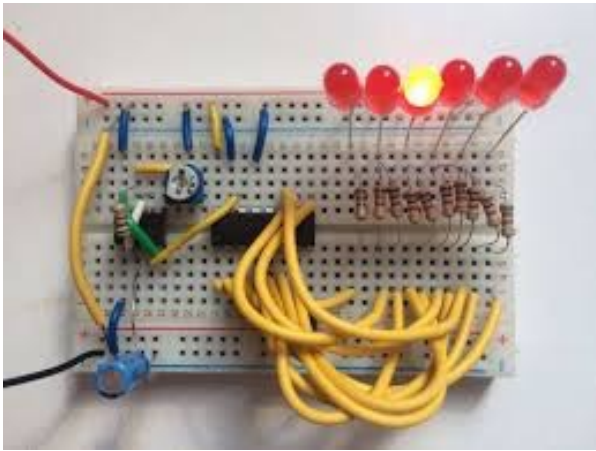
- Learn about the related aspects of ham radio with Engineering functions and other science disciplines

Typical Avionics Engineering organization	Ham Radio Activities/Projects
Command and Data Handling	Antenna rotor tracking controller Prop pitch controller design Remote command/control for external tuners and devices Software Design Radio modifications
Human Interface	New audio amplifier and distribution systems Radio remote control touch screens External tuning controls
Electronic Design and Mfg	EMI shack RFI control EEE Parts PCB designs
Wireless and Communications	Antenna design, modeling and simulation, experimentations Space communications performance WiFi remote operations Transmitter, receiver, beacon design



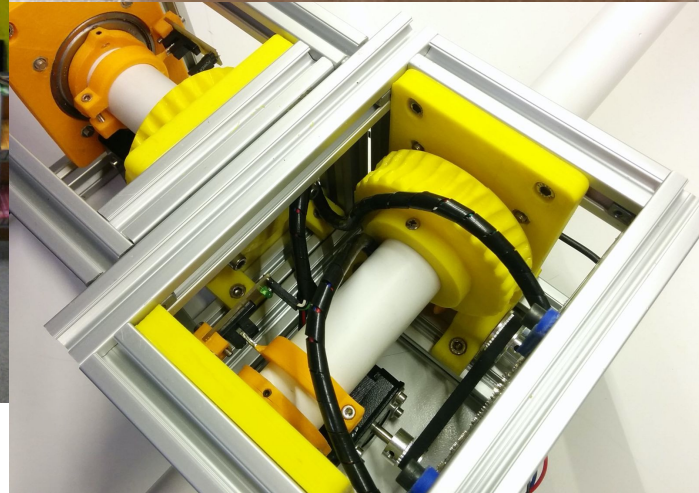
Career Growth- electronics, radio communications, avionics

- Help younger talented students with STEM and outreach



It's fun...

To build projects
antennas, radios, equipment, tools



It's fun...

To participate with On-The-Air events and contests



It's fun...

To experiment
propagation (low/high power-frequency)

To design and test
Antennas, transmitters, receivers,
equipment



It's fun...

To add a few extras to your car



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With extreme passion at times





It's fun...

To backpack/mountain top





It's fun...
To radio-bike



It's fun...

To operate
old/new/simple





It's fun...

To exchange QSL cards



PT7BZ

ELÍSIO ELVIO
P.O. BOX 88
60.001 FORTALEZA
BRAZIL

LOC - HI - 06 - SG 5BDXCC 5BWAS

FORTELEZA DX GROUP
FOR DX
MEMBER
CQ Z.11

TO RADIO

GB2COS
Date UTC Band RST 2X
02-Jan-1999 12:38 15m 59 PHO

new prefix

Pse QSL for DIPLOMA, Thanks QSO, 73's, Eli.

RST 2WAY

Columbia
STS-2

LAUNCHED: NOVEMBER 12, 1981
CREW: JOE ENGLE & RICHARD TRULY
www.kk3q.net

W5RRR
Johnson Space Center
Houston, Texas

Isle of Tiree - Scotland

CQ Zone: 14 - ITU Zone: 27

Black Country DX & Contest Group

MS00XE

IOTA: EU-008 - SCOTIA: DI-10 - Loc: IO66ml - WAB: NL94 - IOSA: NH 04

LUBEC MAINE

Easternmost station in the USA

West Quoddy Lighthouse

SUPERSTATION REMOTE

KA2HTV

73, DR. DAVE

OPERATING REMOTE FROM W1/LUBEC, MAINE



Woman, Tennis Pro Turned Ham Radio Operator
 (Original Caption) 1924- Edith I. Rotch, of Boston, whose championship tennis is still a memory for tennis fans to chat over, has developed into a "radio champion" sufficiently expert to obtain a transmitting license to operate on high wave lengths.



Ham Radio Talks Coast To Coast
 This amateur radio operator has been able to communicate on the ten meter band coast to coast, Upper Montclair, New Jersey, circa 1929. The ten meter frequency had been considered of no value in the past. Here is Charles Atwater with his receiving set. (Photo by Underwood Archives/Getty Images)



- **There's something for everyone**
 - HW/SW development
 - Participate in Public Service, simulations, ops
 - Research, experimenting, testing
 - Managing/coordinating projects
 - Public relations, writing articles and press releases
- **A life adventure for...**

Everyone: doctors, students, kids, politicians, truck drivers, movie stars, missionaries, teachers, neighbors, friends...



Adventure



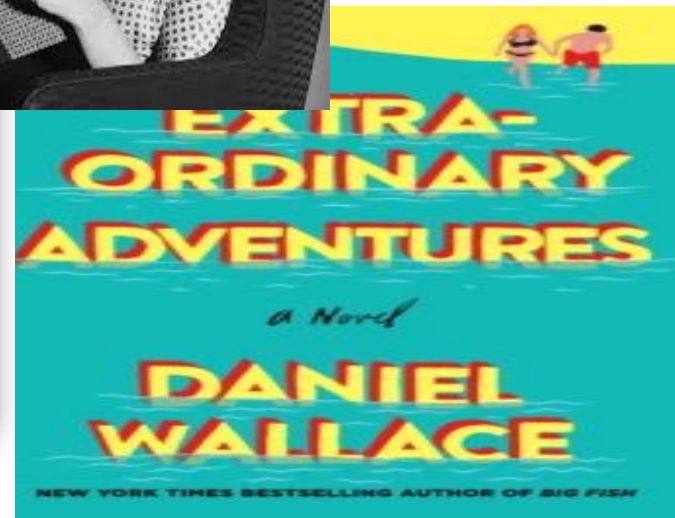
1. Get your FCC (Federal Communications Commission) License
2. Join a student radio group.. Or ask for a sponsor

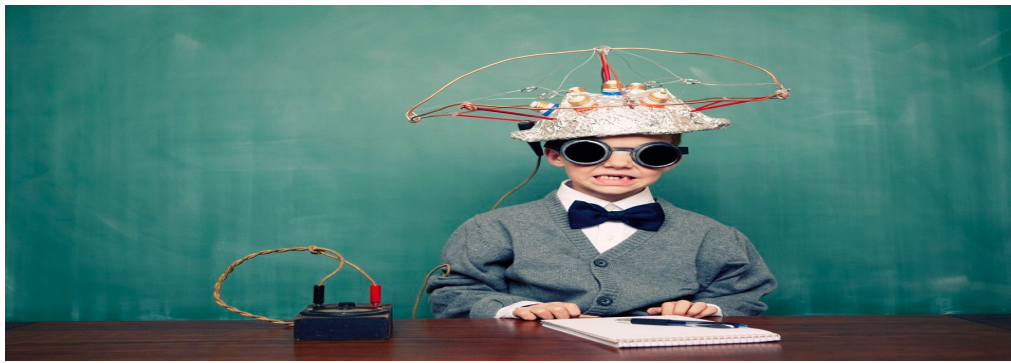
UNITED STATES OF AMERICA FEDERAL COMMUNICATIONS COMMISSION			
AMATEUR RADIO LICENSE			
W5LUS			
ZHANG, LIDE 17839 BENCHMARK DR DALLAS, TX 75252			
FCC Registration Number (FRN): 0026445957			
Special Conditions / Endorsements			
NONE			
Grant Date	Effective Date	Print Date	Expiration Date
06-27-2017	08-24-2017	08-25-2017	06-27-2027
File Number	Operator Privileges		Station Privileges
0007904131	Amateur Extra		PRIMARY
THIS LICENSE IS NOT TRANSFERABLE			
<i>Lide Zhang</i> _____ (Licensee's Signature)			
FCC 660 - May 2007			

To get your license

- Consider participating in many virtual license training classes
 - Or on your own
 - Or a possible one day crash course

There are different classes/tutorials to help get your radio license quickly





- [module 1](#) – Welcome to Amateur Radio:
- [module 2](#) – Radio Waves and Signals:
- [module 3](#) – Modulation & Bandwidth:
- [module 4](#) – Electricity:
- [module 5](#) – Ohm's Law, Power and the Metric System:
- [module 6](#) – Electronic Components:
- [module 7](#) – Types of Radio Circuits:
- [module 8](#) – Propagation:
- [module 9](#) – Antennas and Feed Lines:
- [module 10](#) – Practical Antenna Systems:
- [module 11](#) – Basic Amateur Radio Station Equipment:
- [module 12](#) – Power Supplies and RF Interference:
- [module 13](#) – Communicating with Other Hams
- [module 14](#) – Communicating with Other Hams – Part 2:
- [module 15](#) – License Regulations and License Privileges:
- [module 16](#) – Call Signs and Operating Regulations
- [module 17](#) – Call Signs and Operating Regulations – Part 2:
- [module 18](#) – Safety and Amateur Radio:
- Practice Technician test

Online self-study works.
e.g. hamstudy.org



FROM THE HARVARD ART MUSEUMS
STUDENT BOARD:

CRAM @ THE HAM

LATE NIGHT STUDY SESSION

May 8 2019 | 7-11 PM
Wednesday
Harvard Art Museums
32 Quincy St.



HAM RADIO SCHOOL.COM

THE GUY IN THE

GENERAL LICENSE COURSE

HF Radio Vacuum Tube
Parallel Circuit

By Stu Turner W0STU
Bob Wirtz K0NR, Technical Editor

Complete preparation for FCC element 3 Amateur Radio License.
Covers all 464 General Class exam questions, July 2015 - June 2019.
Logically organized building-block approach in easy-to-digest sections.
Balance of depth with simplicity for real understanding of ham radio.
Free accompanying online quizzes & learning media, section-by-section.

Don't just memorize... **Really get it!**

- Licensing exams are held every 2nd Saturday of the month at the Gilruth Inspiration Room 9:00AM
- License exam fee is \$35.00.



Typical Events

1. Field Day June
2. Radio support for 5K runners
 - Safety and Health day run
 - Lunar Rendezvous run
3. Safety and Health day fairs booth
 - Demo and show 'n tell
4. Operations Contests
5. Raising a 80' tower
6. Outreach to Girl/Boy Scouts



- More Events



1. ARISS
2. T-hunt/radio games
3. Moon bounce
4. Emergency Ops Center operations
5. Parks On The Air
6. Special event anniversaries outreach
7. VHF Rover

- Other Activities



1. Antenna building
2. Licensing classes
3. Electronics 101/ soldering
4. Resume writing and career mentoring
5. Radio Mentoring
6. Tours
7. Contests
8. Dxpediton (Galveston Island?)
9. Digital communications
10. Digital hand helds
11. Repeater upgrades
12. Morse code
13. Traffic handling (w/ digital modes)
15. new antennas/tower systems
16. Outreach
17. Balloon payload/track



In conclusion

- If you have interest.. Amateur (Ham) Radio provides:
- A means to communicate during a disaster:
 - for you and your family
 - To help other
 - Public Service

A group of others who have a natural curiosity for science

Meeting interesting and very nurturing people

Networking:

professional connections into the STEM world

peers

Helps w/ student resume

Scholarship opportunities!

Fun and lifelong learning

- **Experimenting:**
- Weak signals bouncing off the moon
- Monitoring deep space satellites (Venus/Mars)
- Solar activity
- Long wave propagation
- New NASA Gateway communications
- Antennas, transmitters, receivers, modes

- **Peeps**
- Nobel prize winners, movie stars, musicians, etc
- University professors, surgeons, lawyers, engineers, writers

- **Helping**
- Kids
- Outreach
- Community
- Public Service

- **Family**
- Radio capability during disasters

A person wearing a dark blue suit and a light-colored shirt is holding a rectangular, cream-colored sign with both hands. The sign is held horizontally in front of their chest. The word "QUESTIONS?" is printed on the sign in a bold, dark blue, sans-serif font. The background is a plain, light gray wall.

QUESTIONS?



**This is Yvette
“One girl in the world”**

Hungarian-American
astronomer and world traveler.

“So you people don’t know this, but I actually live a life of secret celebrity. The issue is to quote my brother it’s in a hobby that’s probably up there with accordion playing so you’ve never heard about it.

In short I have been an amateur (Ham) radio operator since the age of 16, and because there’s a greater gender disparity than a physics department and I happen to be good at operating- think I set a new record for the Great Lakes region in our last contest good- most people who hear me on the air immediately know “the YL [young lady] from W8EDU,” the callsign of the Case Western Reserve University station. (I have my own callsign too of course, KB3HTS.) Or maybe they looked up [amateur radio operator on Wikipedia, whatever.](#)

Anyway so what is Ham radio anyway (is it kosher?) and why do I like it? In short, you take an exam and get a callsign and get on the air and talk to people- Hams are the ones who will get on the air when disaster strikes and all other communications are knocked out, so you’d better be nice to us. What I always loved most about it though is the broadcasting- I know lots of people must think the Internet got rid of the intrigue of talking to people in faraway lands (and to be fair for many it did), but there’s definitely a romantic magic to getting your station on the air and knowing anyone from San Francisco to Swaziland might call back over the cackle of static. For someone who loves to travel, there’s something amazing about knowing my voice has traveled to every US state and Canadian province and nations spread over five continents, even if the rest of me never did. I’ve talked to people in war zones and remote Atlantic islands, people sailing from California to Hawaii and even heard the astronauts chattering above. How could the Internet replace *that*?

Anyway, I’m wrapping this up now because I’m heading off to see the USA-Ghana game in a sec and then going out for the biggest Ham radio contest of the year- 24 hours simulating emergency conditions, which means generator power and temporary antennas (and believe you me, when the tornadoes sweep through our area people are glad someone knows how to do this). Wish us luck”