



The Radio Amateur Satellite Corporation



AMSAT[®] Education and You!

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Vice President for Educational
Relations

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Acknowledgements

Mark Hammond, N8MH

Joe Spier, K6WAO

Dale Hunzeker, KJ6VUC

Mark Spencer, WA8SME



Why is education important to us?

- When *AMSAT*[®] was first formed in the District of Columbia in 1969 it was **founded as an educational organization.**
- Education is a part of our mission and vision!



Why is education important to us?

- *AMSAT*[®] is a non-profit volunteer organization which designs, builds and operates experimental satellites and **promotes space education**. We **work in partnership with** government, industry, **educational institutions** and fellow amateur radio societies. We encourage technical and scientific innovation, and promote the training and development of skilled satellite and ground system designers and operators.



Why is education important to us?

- Our Vision is to deploy satellite systems with the goal of providing wide area and continuous coverage. *AMSAT*[®] will continue active participation in human space missions and support a stream of LEO satellites **developed in cooperation with the educational community** and other amateur satellite groups.



Why is education important to us?

- Education has quickly become critical for our ride to space
- LOTS of educational tie-ins from K-16
 - » K-12 STEM education=CRITICAL
 - » University CubeSat missions
- *AMSAT*[®] Fox-1, Fox-2, etc.
- Fund Raising
- Membership Recruitment

Educational Outreach Activities

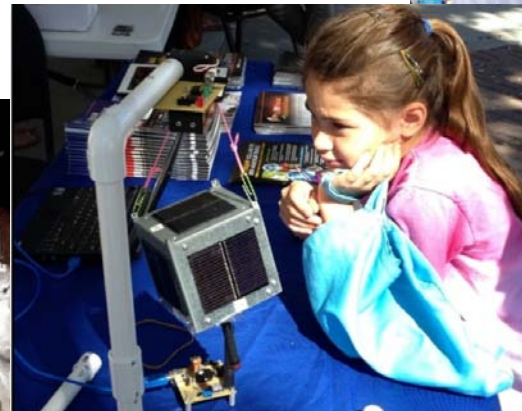
- PACIFICON Convention
 - » ARISS Contact via telebridge 13 Oct 2012
 - Joe Spier, K6WAO
 - Astronaut Dr. Lee Morin present
 - » ARRL Youth Forum activity
 - Fox-1 Cubesat paper models with EMike McCardel, KC8YLD
 - Cubesat simulator demonstration with Dale Hunzeker, KJ6VUC
 - » Live portable satellite QSOs
 - with Tom Deeble, KA6SIP





Educational Outreach Activities

- **AMSAT[®] Presence Monrovia Science Expo**
 - » Led by Dale Hunzeker, KJ6VUC in Cooperation with Pasadena Radio Club
 - » ISS Video Downlink
 - » Satellite Communications Demos
 - » Cubesat Simulator





Educational Outreach Activities

- Amateur Memorial Radio Club K4AMG Chesapeake VA
 - » CUBE SAT Presentations:
 - STEM Technology teachers Chesapeake Schools 200 +
 - Western Tidewater Amateur Radio Club 30
 - Society of Broadcast Engineers Chapter 54 at the WHRO Studios 30
 - Virginia Beach Amateur Radio Club 30
 - Virginia Beach Hamfest Forum and table 75
 - Chesapeake Center for Science and Technology High School VO TECH, 8 students



Immediate Challenges

- Fox-1
 - » Get word out to schools and communities
 - » Engage teachers and offer your assistance
 - » Learn from FUNcube
 - » Develop Activities and Lessons (See: Spence's Presentations)

- ARRL Centennial Celebration
 - » Thursday Learning Sessions
 - » *AMSAT*[®] Forum
 - » Satellite Contact Demonstrations
 - » Possible ARISS Contact





Immediate Challenges

- Communicate and Publicize Our Activities
 - » *AMSAT*[®] Journal journal@amsat.org
 - » ANS ans-editor@amsat.org
 - » AMSAT-EDU and AMSAT-BB amsat-edu@amsat.org
 - » AMSAT.ORG Web Site
 - » AMSAT Social Media Pages
 - Facebook
 - iGoogle
 - Twitter
 - » Local, Regional, National
 - Publications
 - Media
 - Social Media



Start Close to Home

- Better Communication and Cooperation Amongst the *AMSAT*[®] Departments and Membership
- Reach Out to Our Children and Grand Children and Engage their Teachers, and Youth Leaders
- Demo and Display at Hamfests, Conventions and Club Meetings.
- Get to Know Your Area Coordinator
 - » Sit in on the Field Ops Breakfast - Sunday morning



Area Coordinators Support

- Area Coordinators can help you with ideas & materials



AMSAT-UK

- Funcube-1 satellite

- » Focus is STEM education
 - Radio, electronics, physics, orbital mechanics
- » ~300mW telemetry mode, in sunlight for schools to easily collect telemetry, science data
- » Transponder 1W peak, on during eclipse
- » Material science experiment (David G0MRF led)
 - Part of curriculum, needs vacuum; rarely works in classroom, so do it in space!



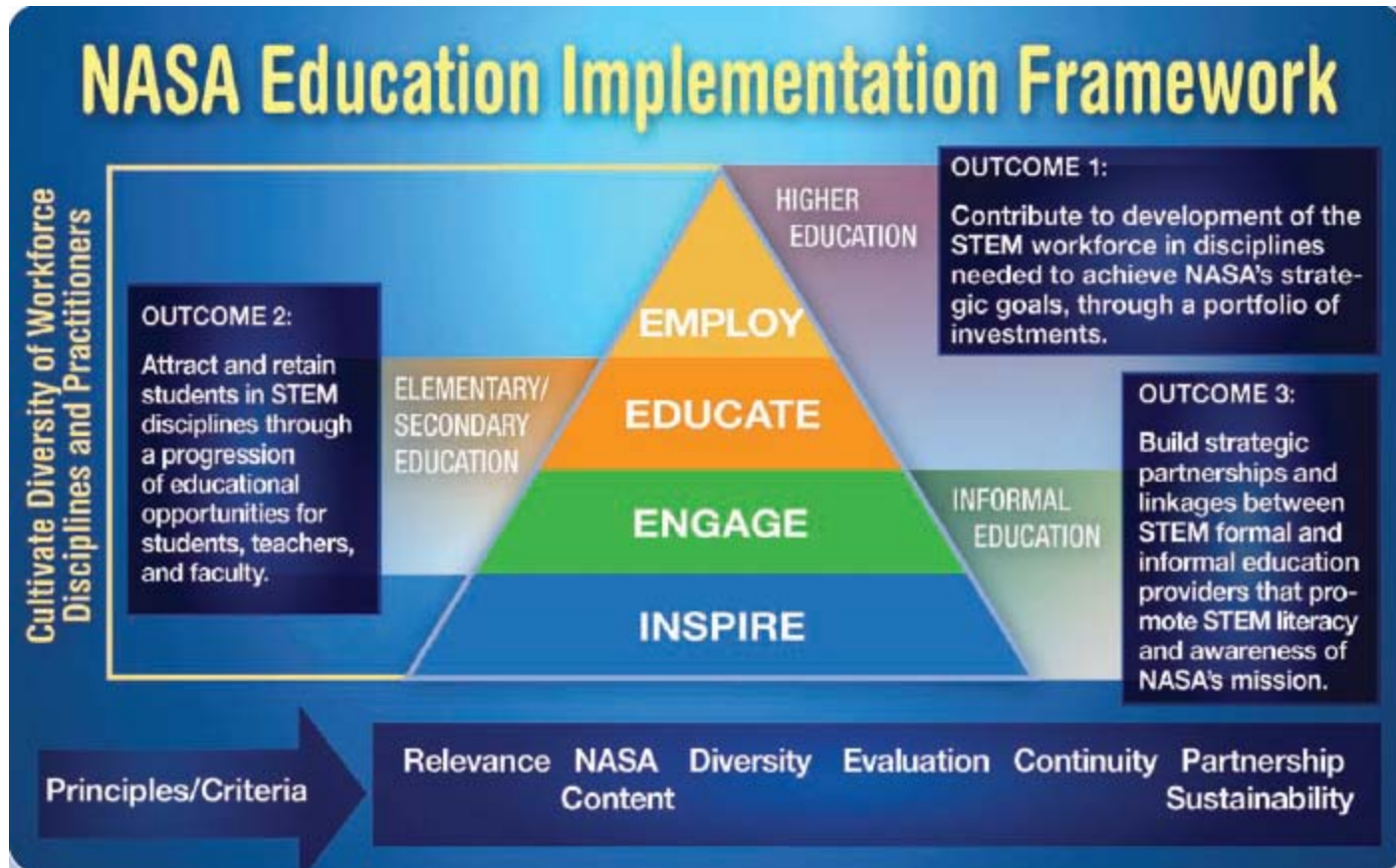


Making Alliances

- Academic Partnerships with
 - » Penn State (MEMS gyro) on Fox-1a,b
 - » R.I.T. on Fox-1a,b (MPPT)
 - » Virginia Tech on Fox-1a (special payload)
 - » Vanderbilt with Fox-1a,b (radiation science)
- Educational Partnerships between
AMSAT, AMSAT and NASA



Pyramid of Learning

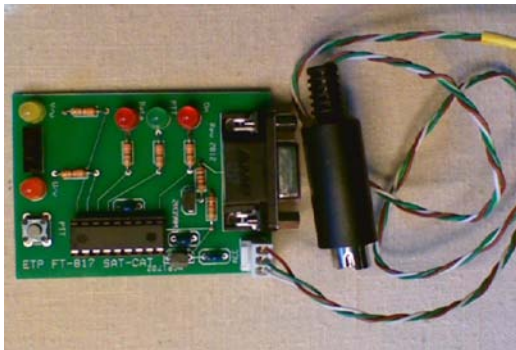
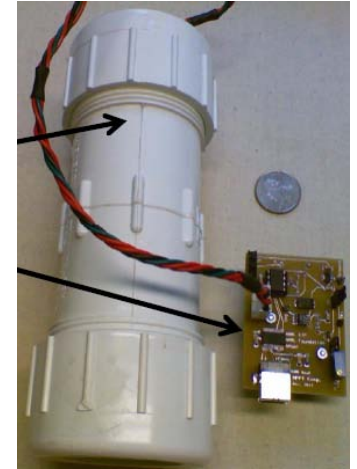
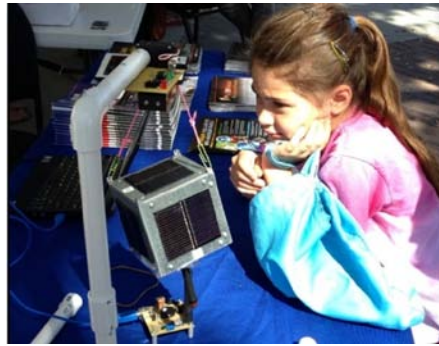
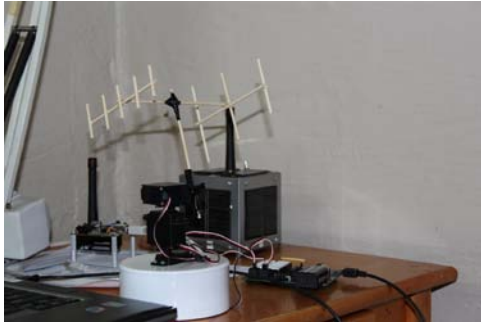




Educational Activities Through ARRL-ETP

- Tracking simulator & Cubesat simulator
- MAREA- the Mars-lander ARISS Robotics Exploration Activity
- Yaesu FT-817 Sat CAT controller
- WRAPS – Wobbler, RadFx, Antenna Pointing System
- Wobbler Simulator
- MPPT Sim – Maximum Power Point Tracking

Educational Tools





What are some *AMSAT*[®] Education needs? HELP WANTED

- Web content person for *AMSAT*[®]'s education web pages
 - » Maintain calendar of amateur radio youth events
- Archivist/publicist of satellite educational activities (photos, stories for Journal, press, videos)
- Web researcher to “mine,” collect, and organize existing lesson plans/ideas that may prove useful



What are some specific educational needs?

HELP WANTED

- K-12 educators that can write lesson plans/ideas using satellite telemetry, etc. related to science, technology, engineering, and math (STEM).
 - » ARISS, Fox related lesson plans
- Mentors and ground station operators (with equipment!) for ARISS contacts
- Assemblers to Construct Simulators for Distribution (Loaning)



What can *you* do to help?

- Join *AMSAT*® (Encourage others to Join)
- Join / Promote the AMSAT-EDU mailing list (www.amsat.org for details/instructions)
- Volunteer for a specific task! kc8yld@amsat.org
- Educators: We need lesson plans/ideas related to satellites, EPT Simulators and amateur radio
- Educators: sign up for ARRL Teacher's Institute program!



What can *you* do to help?

- Contact family members, friends that are educators introduce them get them involved with satellite operations
- Look for opportunities to engage youth, and document it (photos, articles, press)
- Give a demo at a local club meeting / event
- Become active in ARISS: mentors and ground station operators (with equipment!) are needed



Other *AMSAT*[®] Items



Questions, Comments, Suggestions, Input?

- Contact me: E.Mike McCardel, kc8yld@amsat.org



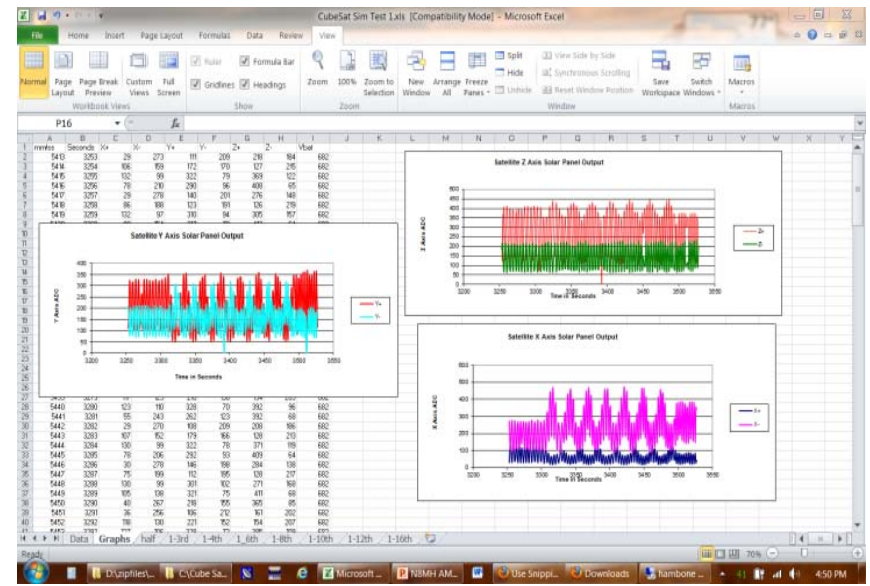


Other Educational Activities

- WRAPS - Wobbler, RadFx, Antenna Pointing System
- WRAPS Design Goals
 - » Battery operated, portable satellite antenna rotor system
 - » Affordable alternative to the Yaesu G5500
 - » Reproducible using commercial-off-the-shelf parts, minimum mechanical work, common hand tools only
 - » For work with ARROW or Elk hand held antennas
 - » **Target audience: Schools to access Fox1A and Fox1B telemetry**; Portable satellite operator
 - » Fulfill a Bucket List goal

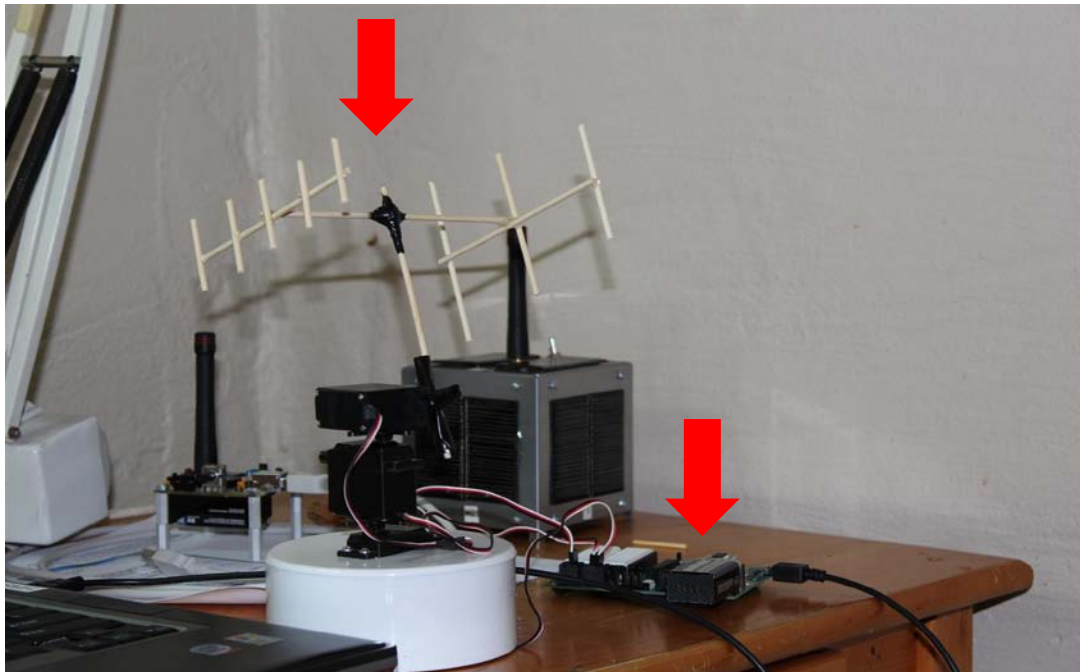
Other Educational Activities

- Cubesat simulator
 - » 2009 Sept/Oct and Nov/Dec issues of AMSAT[®] Journal
 - » ARRL ETP website



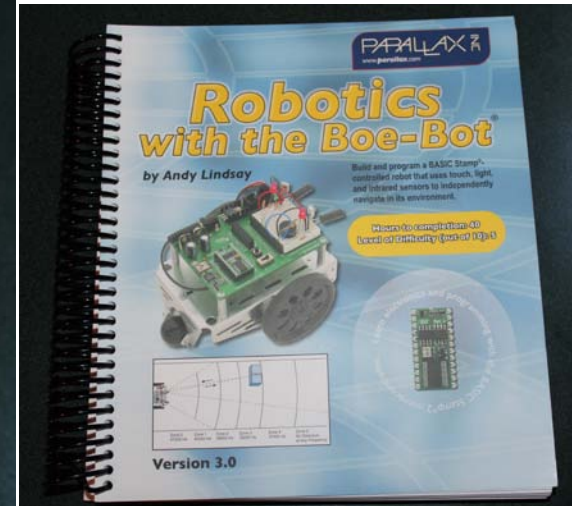
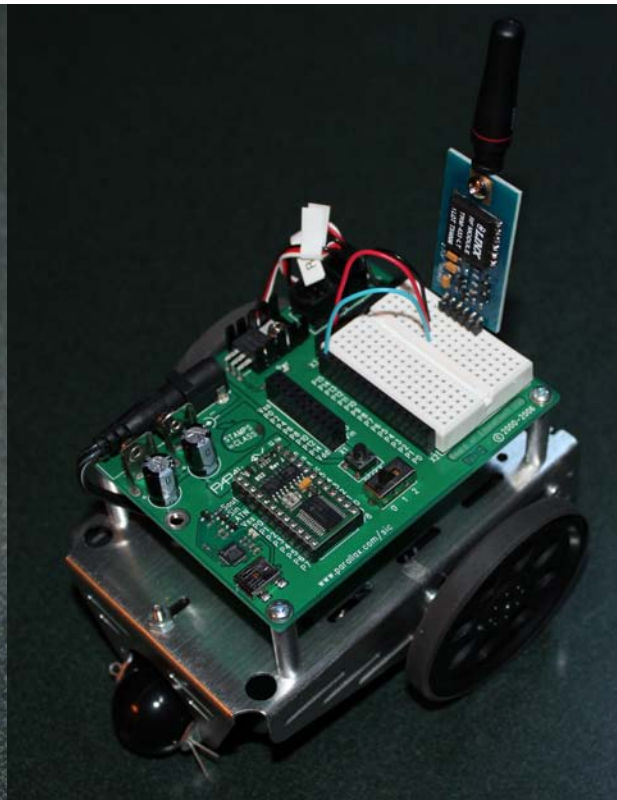
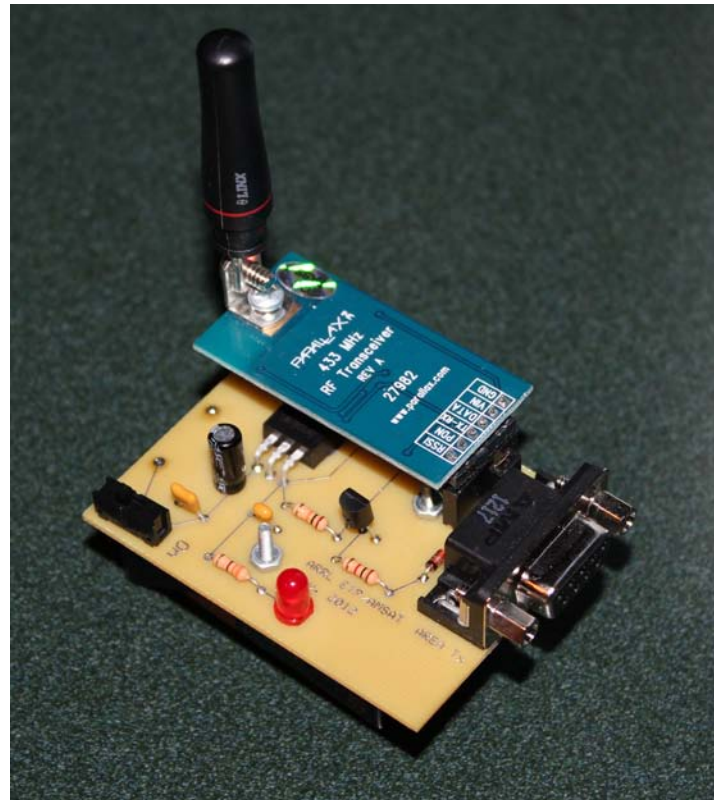
Other Educational Activities

- Tracking simulator-360 azimuth, 180 elevation
 - » Parallax Basic Stamp 2, three servos
 - » Driven by SatPC32, etc. (using EasyComm protocol)
 - » ARRL ETP website



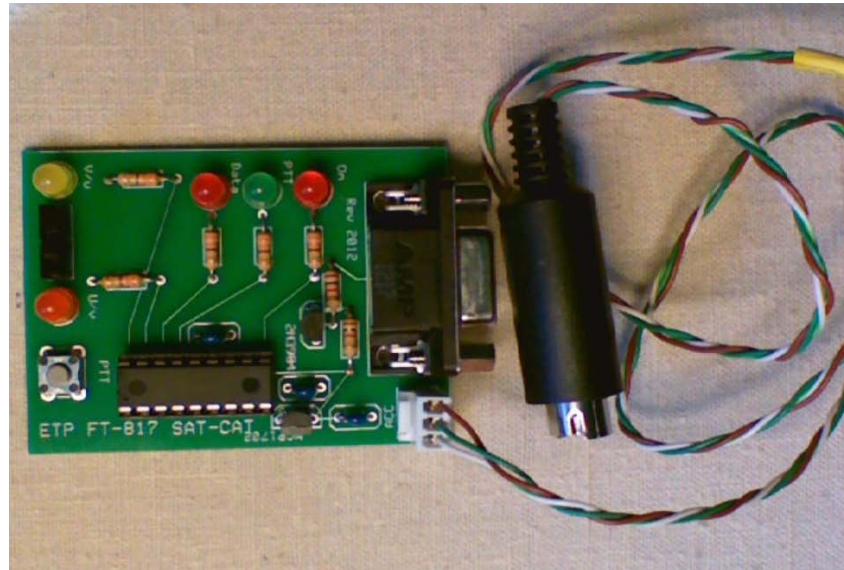
Other Educational Activities

- MAREA- the Mars-lander ARISS Robotics Exploration Activity



Other Educational Activities

- FT-817 SAT-CAT interface by WA8SME & ARRL-ETP
- October 2012 issue of ARRL's *QST* magazine
 - Pages 40-43
- Facilitate SSB contacts on linear mode satellites (like AO-7, FO-29, VO-52) using single FT-817 radio and SatPC32

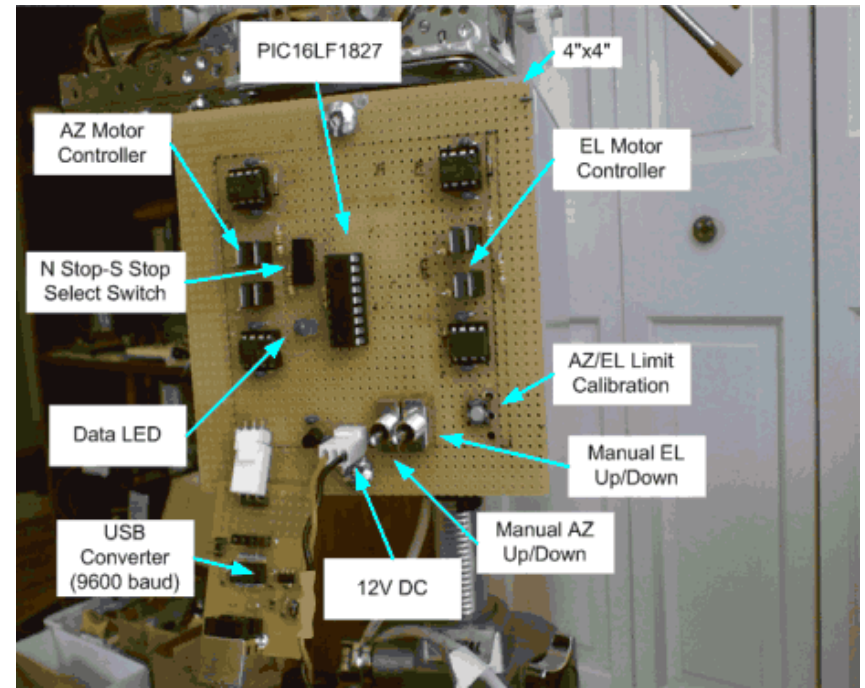
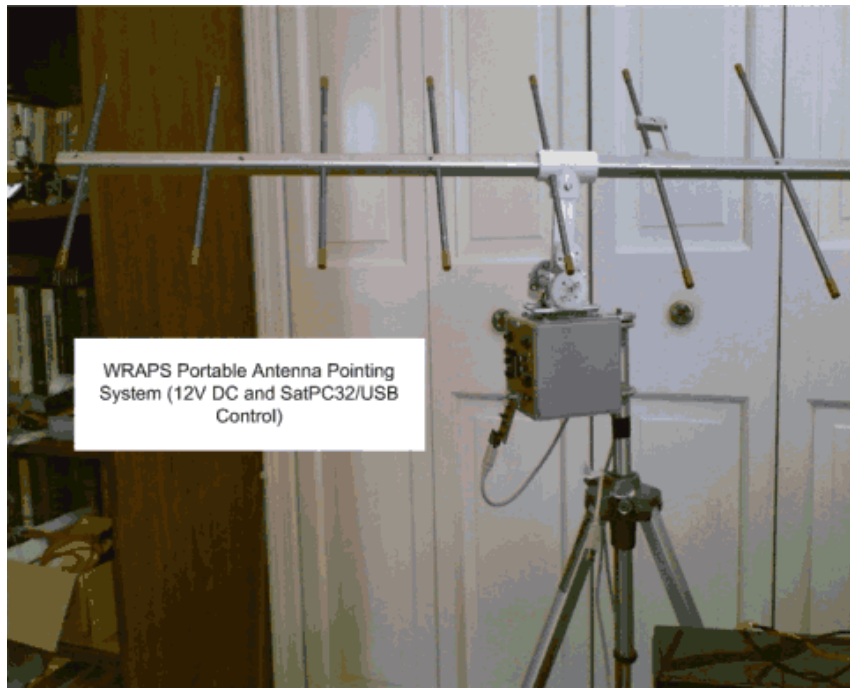


Other Educational Activities

- Wobbler Simulator - Fox-1 Attitude Determination Simulator



WRAPS - Wobbler, RadFx, Antenna Pointing System



Other Educational Activities

- MPPT Simulator – Maximum Power Point Tracking

MPPT in Operation

