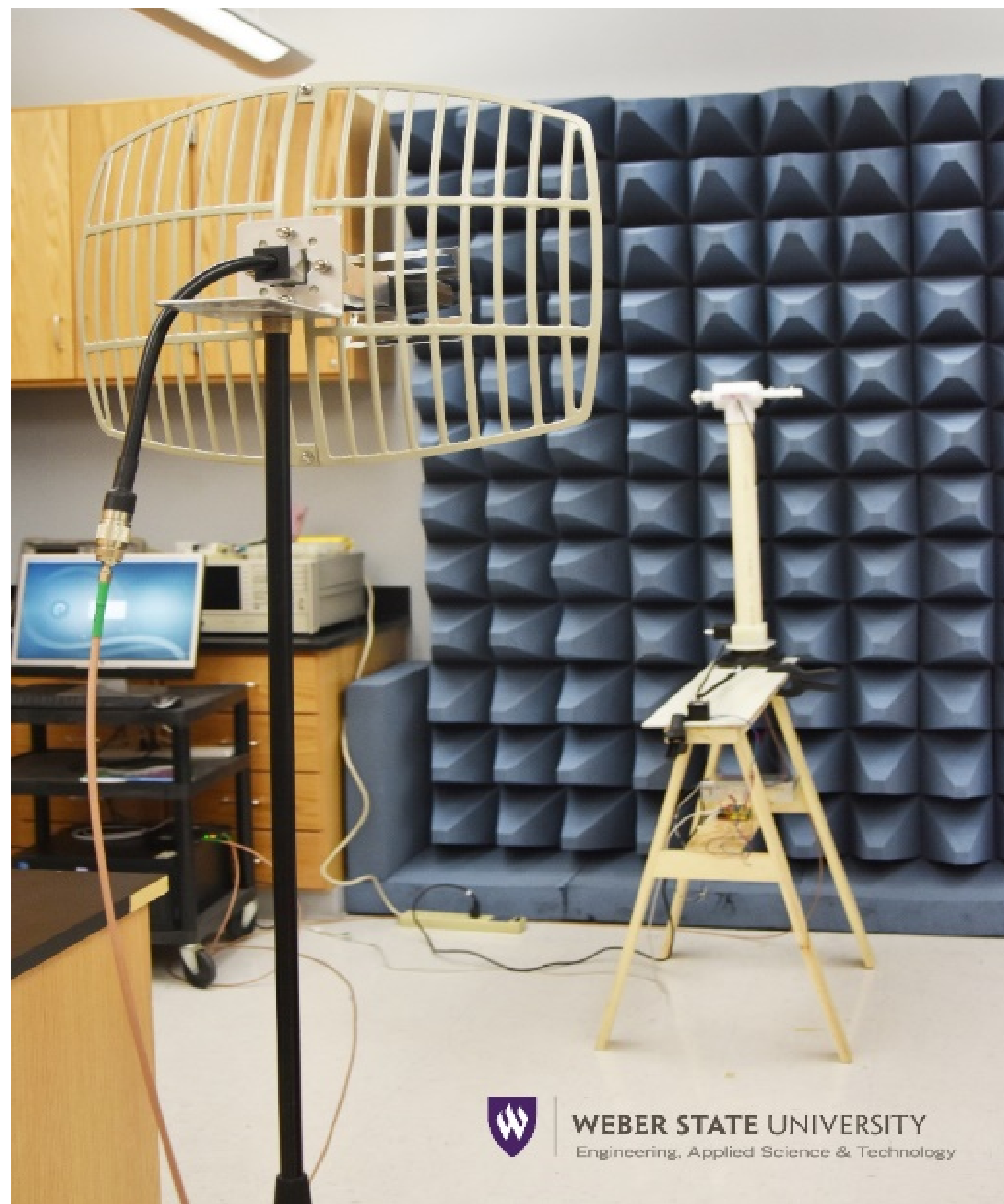




**WEBER STATE
UNIVERSITY**

College of Applied
Science & Technology



 **WEBER STATE UNIVERSITY**
Engineering, Applied Science & Technology



Open Source Antenna Pattern Measurement System

Weber State University-Engineering, Applied Science and Technology

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- Shelby Chatlin - BSMET, Dustin Birch – MET faculty

Objective:

WSU Applied Engineering Project to increase Radio Frequency (RF) measurement capability for student laboratories and senior projects.

Integrate a software-defined-radio (SDR) to a portable, motor-controlled antenna positioning system.

Low-cost HackRF transmit/receive

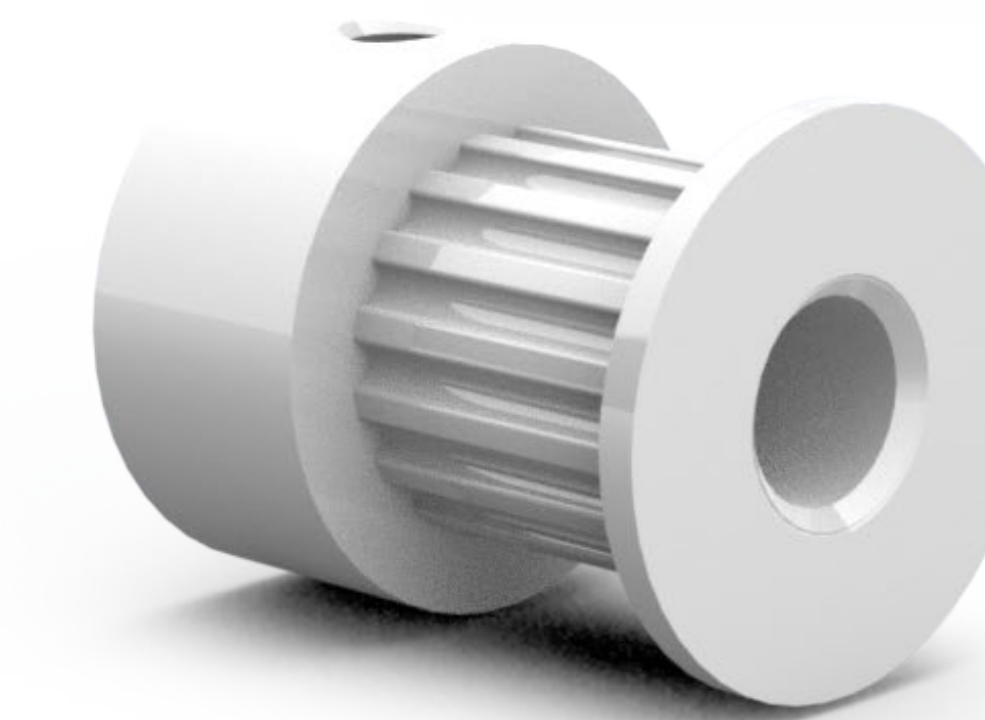
- 30 MHz < f < 6 GHz
- ‘fast’ sampling rates

Mechanical Improvements

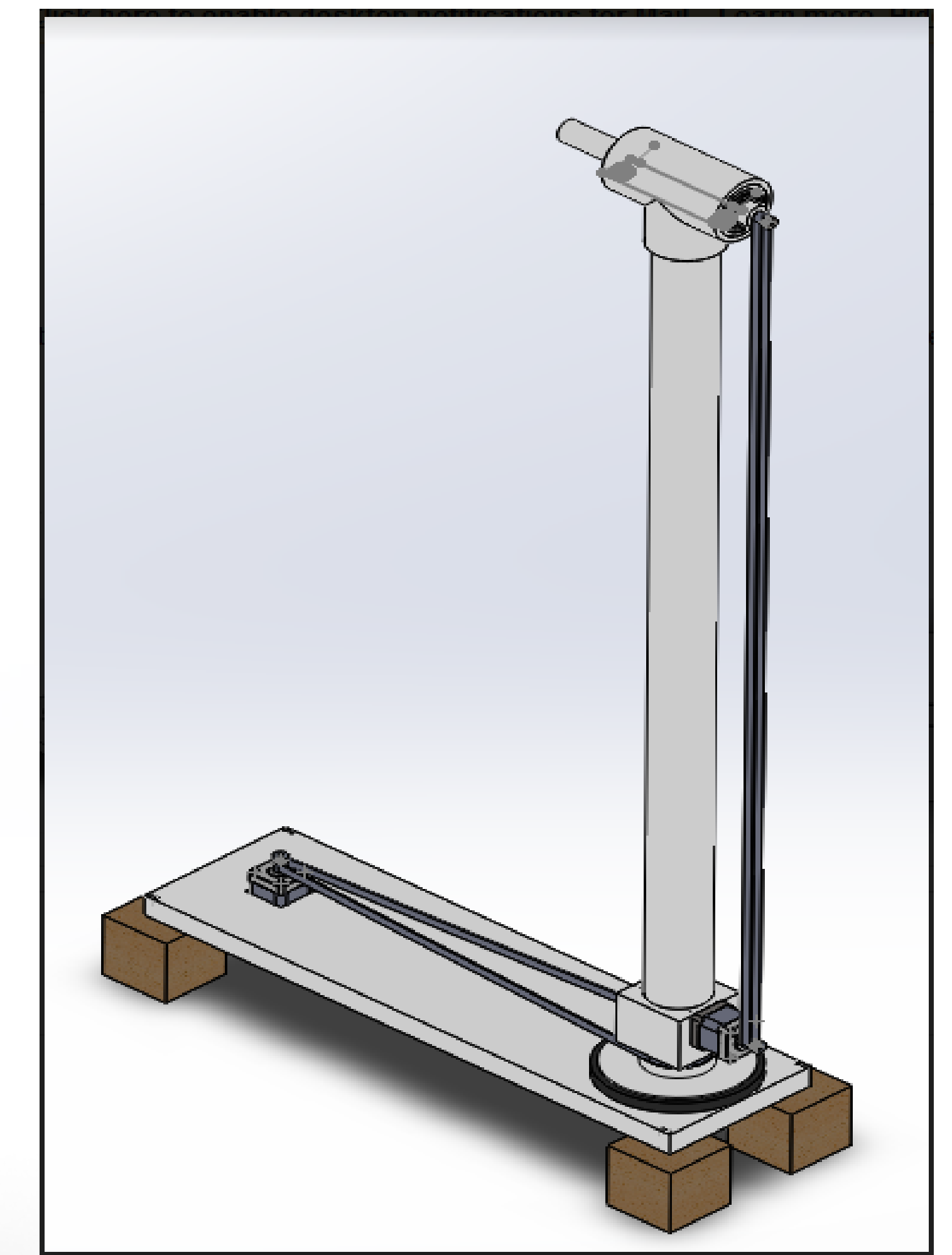
- 3-D Printer fabricated parts (Plastic Printed)
- Plastic Pipes (Commercial PVC)
- Synchronous Belts (Commercial off-the-shelf hardware: 3-D Printer Parts)
- Open-source software controlled stepper motors for position control

Acknowledgements:

- Utah NASA Space Grant Consortium
- George and Beth Lowe Innovative Teaching Grant
- MOOG Aircraft Group

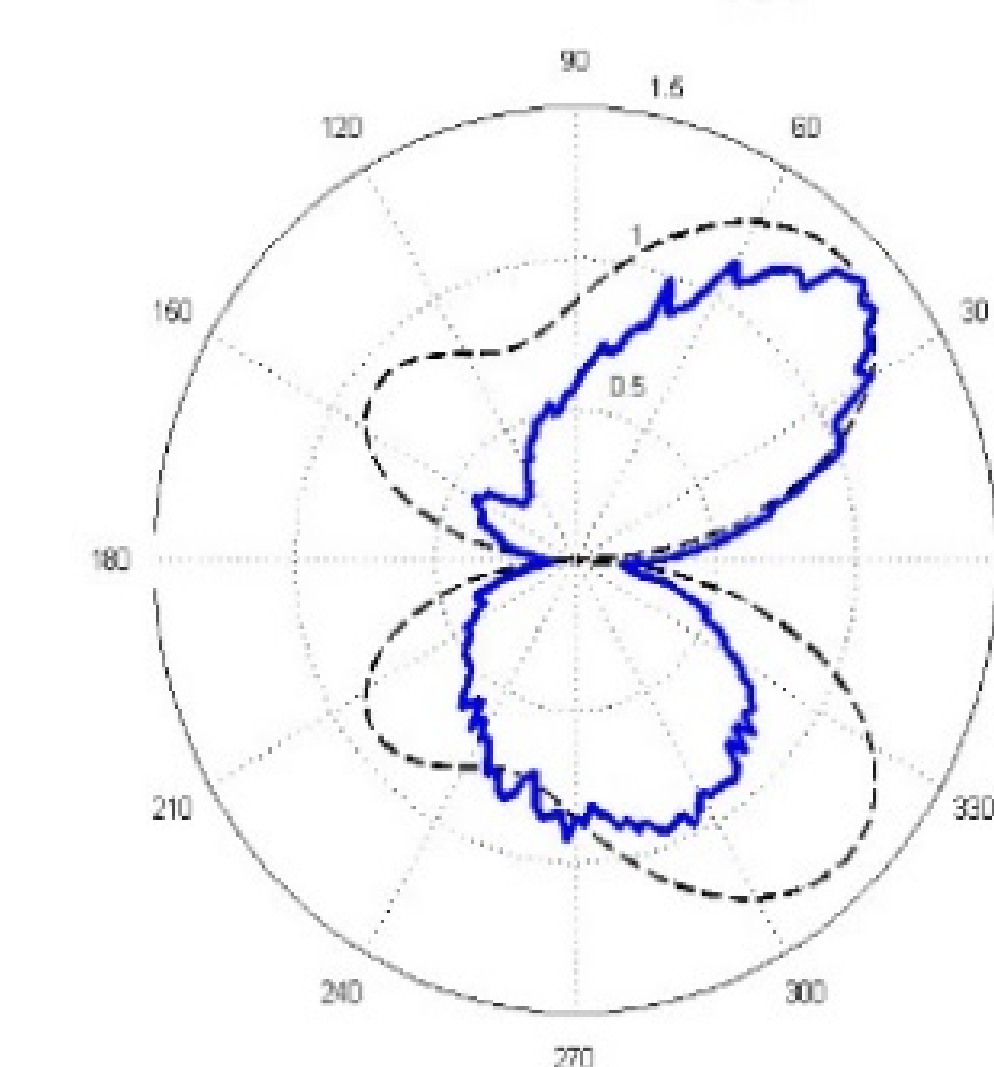


Rapid Prototyped
Synchronous Gears

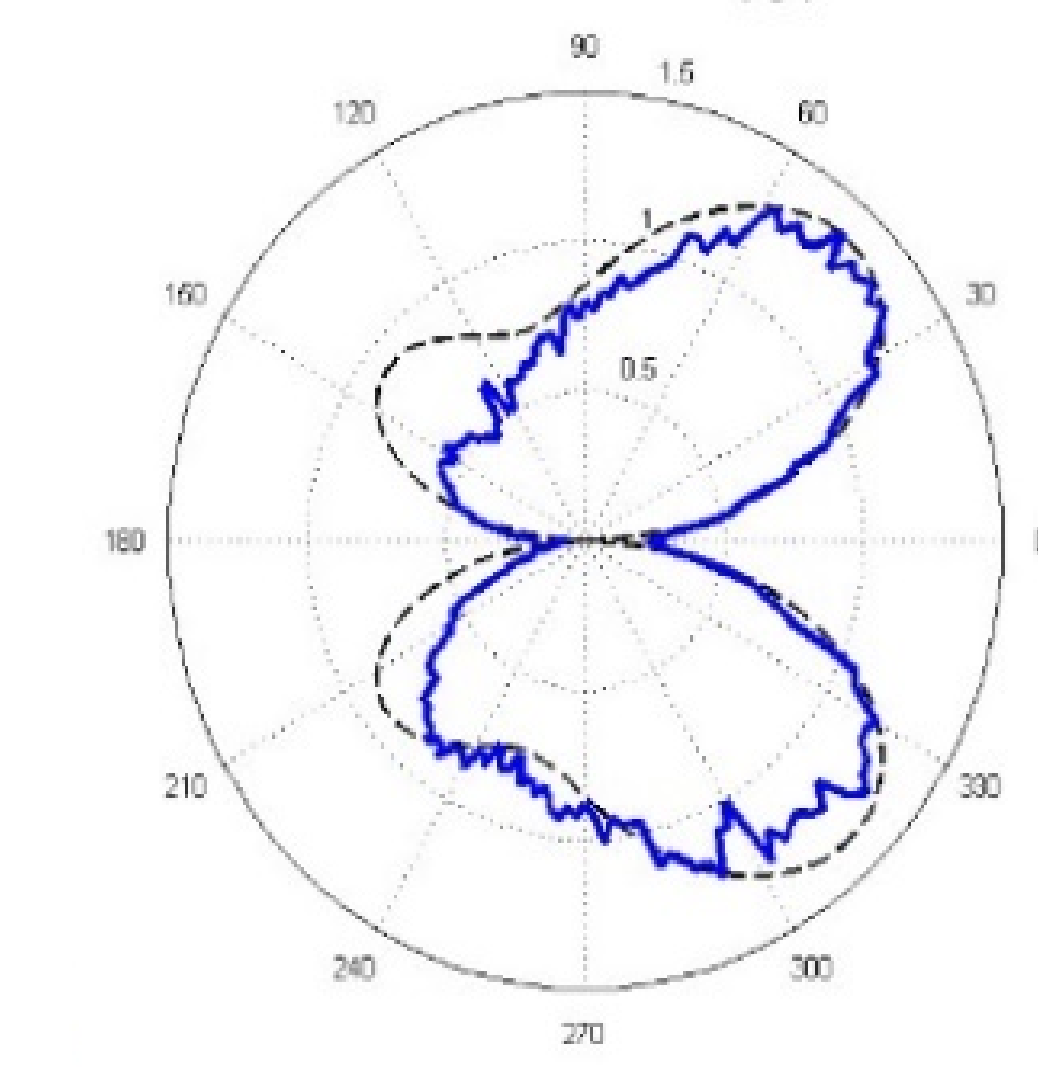


Antenna Pattern
Measurement System
CAD Assembly

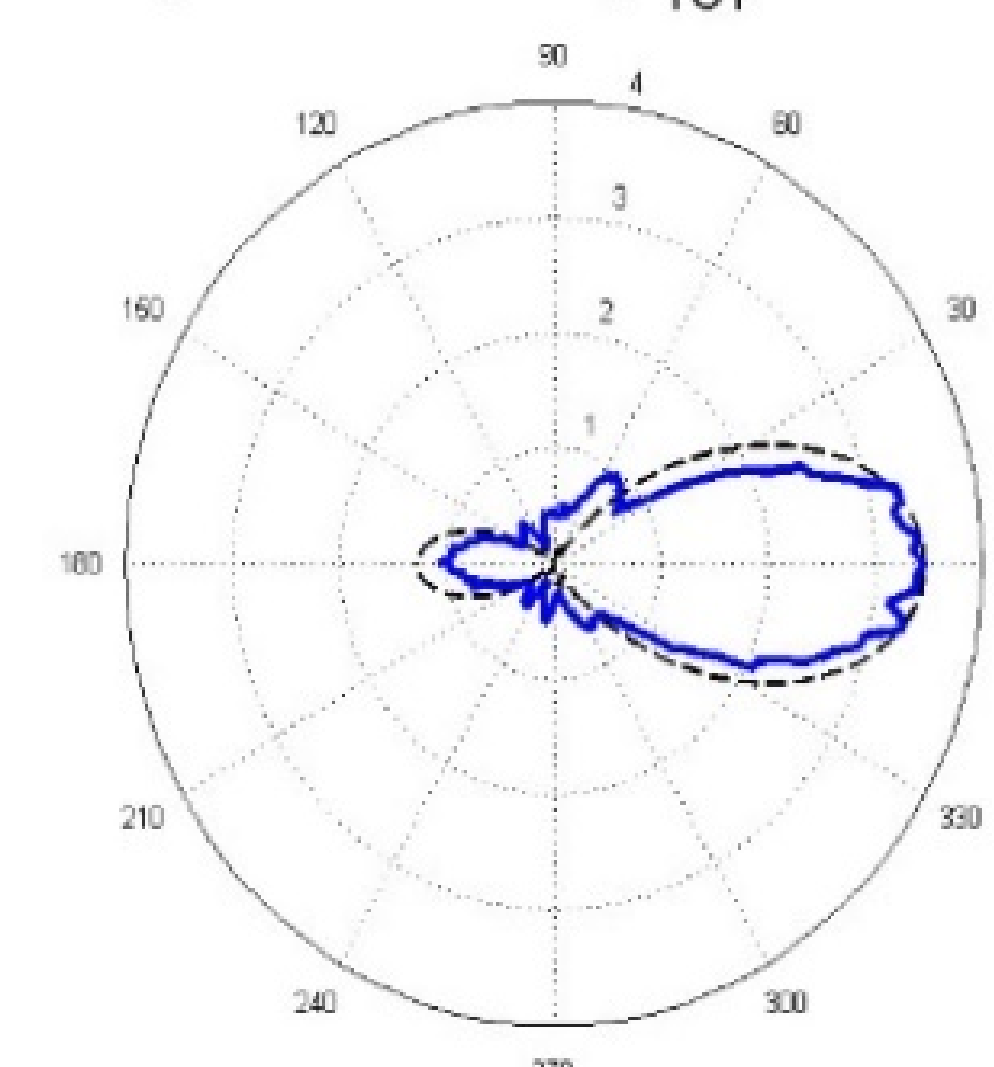
QWMP-1 scaled to $\text{Max}(G_{\text{TOT}}) = 1.3813$



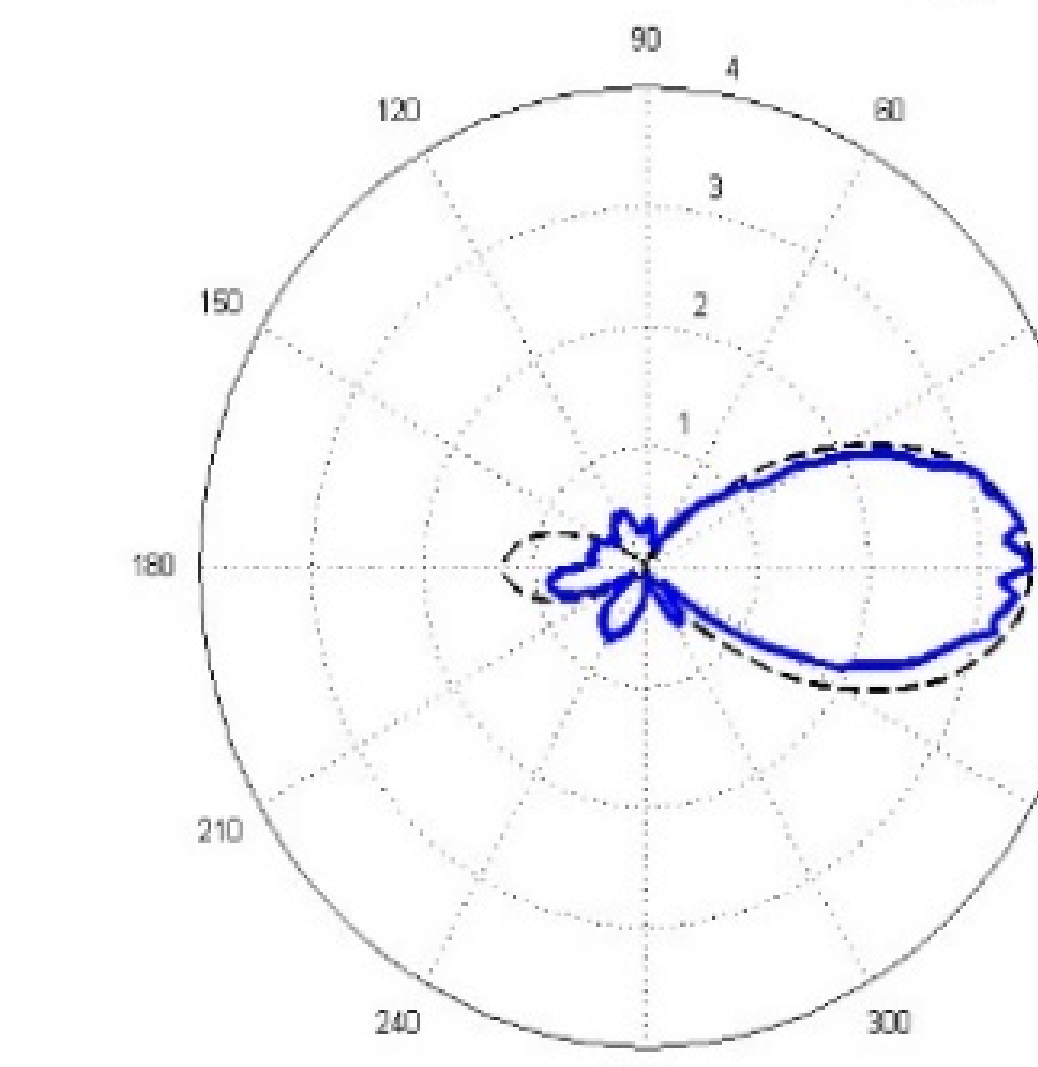
QWMP-2 scaled to $\text{Max}(G_{\text{TOT}}) = 1.3813$



Yagi-1 scaled to $\text{Max}(G_{\text{TOT}}) = 3.4629$



Measured Pattern Scaled to $\text{Max}(G_{\text{TOT}}) = 3.4629$



---FEKO
—Measured

Simulated versus Measured Radiation patterns. Simulations performed using FEKO software. Two omnidirectional (monopole), and two directional (Yagi) antennas are shown for comparison.