

Design and Construction of a Low Cost Antenna which Receives UHF TV Signals

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Antennas play a major role in transmitting and receiving signals starting from microwaves to low frequency radio waves. Out of many types of antennas, Television Antennas (TV antennas) are the type of antenna widely used in day to day life. Television antennas are specifically designed for the reception of over the air broadcast television signals, which are transmitted at frequencies from about 41 MHz to 250 MHz in the VHF band, and 470 MHz to 960 MHz in the UHF band. There are various types of antennas available nowadays, such as Wire antennas, Aperture antennas, Microstrip antennas, Array antennas, Reflector antennas and Lens antennas. The particular type of antenna selected for a certain application depends upon system requirements. Although TV antennas have been dramatically developed over the last few decades, still there are major problems in receiving good TV signals. Here, we present the construction and design of a low cost antenna with a high gain reception in order to receive analog and digital TV signals.

We constructed a new design of the TV antenna to receive signals in the frequency range 400 MHz to 1000 MHz (UHF) with high gain with a combination of a log-periodic dipole array with a bowtie corner reflector. Instead of normal straight dipoles, improved V-shaped dipoles which receive multi-channels made of Aluminium beams with diameter 0.32 cm were used in the dipole array. The '4NEC2 Antenna Modeler and Optimizer' software were used to select different parameters to optimize performances of the antenna. The reflector was designed in order to reflect electromagnetic waves back in to the dipoles of the antenna.

The maximum gain of the constructed antenna was found to be around 14 dB in the frequency range from 650 MHz to 700 MHz. The calculated average gain in the frequency range 400 - 1000 MHz was about 9 dB. Reported average gain in the same frequency range of the commercially available Corner reflector Antenna is less than 8 dB. Radiation patterns of the tested design for different frequencies were obtained using the 4NEC2 antenna modeller software. Because of the radiation pattern with the high gain side lobes, the user does not need to rotate the antenna like other antennas to capture TV channels. This antenna can be made at home easily at a very low cost.