ABSTRACT

The application of the unmanned aerial vehicle has covered various sectors of life such as monitoring areas after natural disasters, shipping services, anticipating forest fires, supplying food and medicine, monitoring border areas, reconnaissance and enemy attacks, mapping vacant land, and etc. The communication system, which uses the first person view method, is a crucial component in the application of unmanned aerial vehicle. The unmanned aerial vehicle employs a first person view communication system to conduct real-time monitoring. The frequency of the first person view communication system is usually 2.4 or 5.8 GHz. Flexible movement in all directions, long distances, wide coverage areas, and good visual quality are some of the challenges of using first person view communication systems on unmanned aerial vehicle.

Several scientific studies have been conducted to overcome these challenges by developing various types of patch and wire antennas that operate at frequencies of 2.4 or 5.8 GHz. Because 5.8 GHz is one of the most widely used operating frequencies in the latest technology of first person view communication systems, the planar wheel skew antenna operates at that frequency. When compared to patch antennas, wire antennas have the advantage of air circulation and are easier to install. After further evaluation, the ideal antenna for the unmanned aerial vehicle's first person view communication system has the following characteristics: light weight, air gap, omnidirectional radiation pattern, circular or elliptical polarization, and good gain. The skew planar wheel antenna was chosen to be studied because of these characteristics.

Simulations were carried out on the skew planar wheel antenna which has 3, 4, 6 and 8 elements. Meanwhile, fabrication, measurement and comparative analysis were carried out on the skew planar wheel antenna with the best number of elements based on the parameter values. This antenna is designed using CST Studio Suite 2019 to have VSWR ≤ 2, return loss $\leq$ -10 dB, bandwidth $\geq$ 100 MHz to covering outdoor access point band from 5.725 to 5.825 GHz, omnidirectional radiation pattern and elliptical polarization. The antenna optimization is done by modifying each dimension using parameter sweep technique.

Keywords: skew planar wheel, cloverleaf, first person view, unmanned aerial vehicle, parameter sweep technique.