A crucial element lost in the context of a neurodegenerative disease is the possibility to freely explore and interact with the world around us. The work presented in this paper is focused on developing a brain-controlled Assistive Device (AD) to aid individuals in exploring the world around them with the help of a computer and their thoughts. By using the potential of a noninvasive Steady-State Visual Evoked Potential (SSVEP)-based Brain Computer Interface (BCI) system, the users can control a flying robot (also known as UAV or drone) in 3D physical space. From a video stream received from a video camera mounted on the drone, users can experience a degree of freedom while controlling the drone in 3D. The system proposed in this study uses a consumer-oriented headset, known as Emotiv Epoch in order to record the electroencephalogram (EEG) data. The system was tested on ten able-bodied subjects where four distinctive SSVEPs (5.3 Hz, 7 Hz, 9.4 Hz and 13.5 Hz) were detected and used as control signals for actuating the drone. A highly customizable visual interface was developed in order to elicit each SSVEP. The data recorded was filtered with an 8th order Butterworth bandpass filter and a fast Fourier transform (FFT) spectral analysis of the signal was applied in order to detect and classify each SSVEP. The proposed BCI system resulted in an average Information Transfer Rate (ITR) of 10 bits/min and a Positive Predictive Value (PPV) of 92.5%. The final conducted tests have demonstrated that the system proposed in this paper can easily control a drone in 3D space.