A Mathematically Driven Physical Analysis into Exoplanet Detection Confirmation Surveys Using Bayesian Inferential Statistics, Machine Learning/Linear Algebra Sklearn and TensorFlow Techniques, the BATMAN Python Programming Library, 3D Printing Techniques, and a Custom-made Python Processing Pipeline for Image Analysis and Lightcurve Detection

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By using orbital period, spectrophotometry, and bayesian inferential tests, we examined the orbital periods and photometry of one exoplanet in the HD star system: 189733 b. Through the construction of a high caliber exoplanet transit detection tracker we analyzed the data constituted of the Raw Science images that we obtained from a DSLR camera. We developed a K2-optimized photometric computational processing pipeline to correct the raw science images for bias, dark, and, flat features. Using the Lightkurve and BATMAN Python programming library we converted our data to light curves. The transit data was taken from multiple high precision research studies, such as the NASA exoplanet database, which were then converted to a graph portraying the dip in the host star's luminosity and imminent flux with respect to time. Linear Algebra-based Machine learning models were developed alongside Chi-square tests using tensor-flow and sklearn models to examine the likelihood that observation was due to mere chance. We hypothesized that the creation of a DSLR camera exoplanet detector would produce results remarkably indistinguishable to other high-precision research studies optimized by advanced stellar photometric and radial velocity data acquisition. The results of our studies were statistically significant and supported our hypothesis. Ultimately we were able to confirm the existence of an exoplanet in nearly millions of records in TESS data. Our data proves the possibility of detecting new exoplanets (hot Jupiters and super-earths), 0 - 0.5 AU from their host star in a randomized cluster sample using an extremely cost-efficient exoplanet detector.