Kepler Exoplanet Analysis

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***Abstract*— mother Earth is inhabited by 7.8 billion people as of March 2020. These staggering numbers cannot be overlooked. We have about 50 years' worth of resources after which we will be faced with serious problems. This alarming situation we are in calls for exoplanet research. It seems ridiculous to suggest that Earth might be the only planet in the whole universe capable of supporting life. The search for extrasolar planets has become a subject of intense scientific investigation over the years with a hope to find habitable planets in other galaxies. Determined to solve this problem, we have chosen to solve it based on data available from NASA's Kepler Mission.**

Keywords- exoplanets, kepler mission, habitability

I. INTRODUCTION

One of the most profound and thought-provoking questions that humanity has ever asked is, "Are we alone in the universe?" Philosophers have asked this question for thousands of years, but we are the first generation with tools at our fingertips to be able to answer this question with scientific observations.

With the rate at which our population is our population is likely to become too large to be supported by Earth. One might argue that these things won't happen for a long time so we don't need to worry about it right now. Counter to that, one can argue that we don't know how long it will take to overcome the formidable challenges and make the necessary scientific discoveries and that it may not happen if we don't work on these things now.

Exoplanet research is not as simple as pointing a telescope upward and looking for a planet that waves back. Scientists must gather many observations and carefully analyze their data before they can be even somewhat sure that they've discovered new worlds.

ground. But telescopes don't capture photos of planets with nametags. Instead, telescopes designed for the transit method show us how brightly thousands of stars are shining over time.

To find a planet, scientists need to get data from telescopes, whether those telescopes are in space or on the

If the star's light lessens by the same amount on a regular basis, for example every 10 days, this may indicate a planet with an orbital period of 10 days. The standard requirement for planet candidates is at least two transits, i.e. two equal dips in brightness from the same star.

Not all dips in a star's brightness are caused by transiting planets. There may be another object such as a companion star, a group of asteroids, a cloud of dust or a failed star called a brown dwarf, that makes a regular trip around the target star. There could also be something funky going on with the telescope's behavior, how it delivered the data, or other 'artifacts' in data that just aren't planets. Scientists must rule out all non-planet options to the best of their ability before moving forward.

With such a complicated procedure involved in exoplanet research and resources depleting at an exponential rate, it becomes important to use the computational power that we have today to analyze the data that is available and make sense of it in an effort to expedite the speed of research.

One such mission that aimed at exoplanet research is the Kepler mission run by NASA. It

has sent back the biggest bounty of confirmed exoplanets of any telescope, more than 2,600 to date. The data that was collected as part of this mission was made available for the public.

Scientists have uncovered the presence of exoplanets with the help of people like us. For instance, exoplanet K2-138 was discovered through citizen scientists in Kepler's K2 mission data.

Based on surveys so far, scientists calculate that almost every star in the Milky Way should have at least one planet. That makes billions more, waiting to be found. Motivated by the it, we have decided to pick it up as the topic of our project.