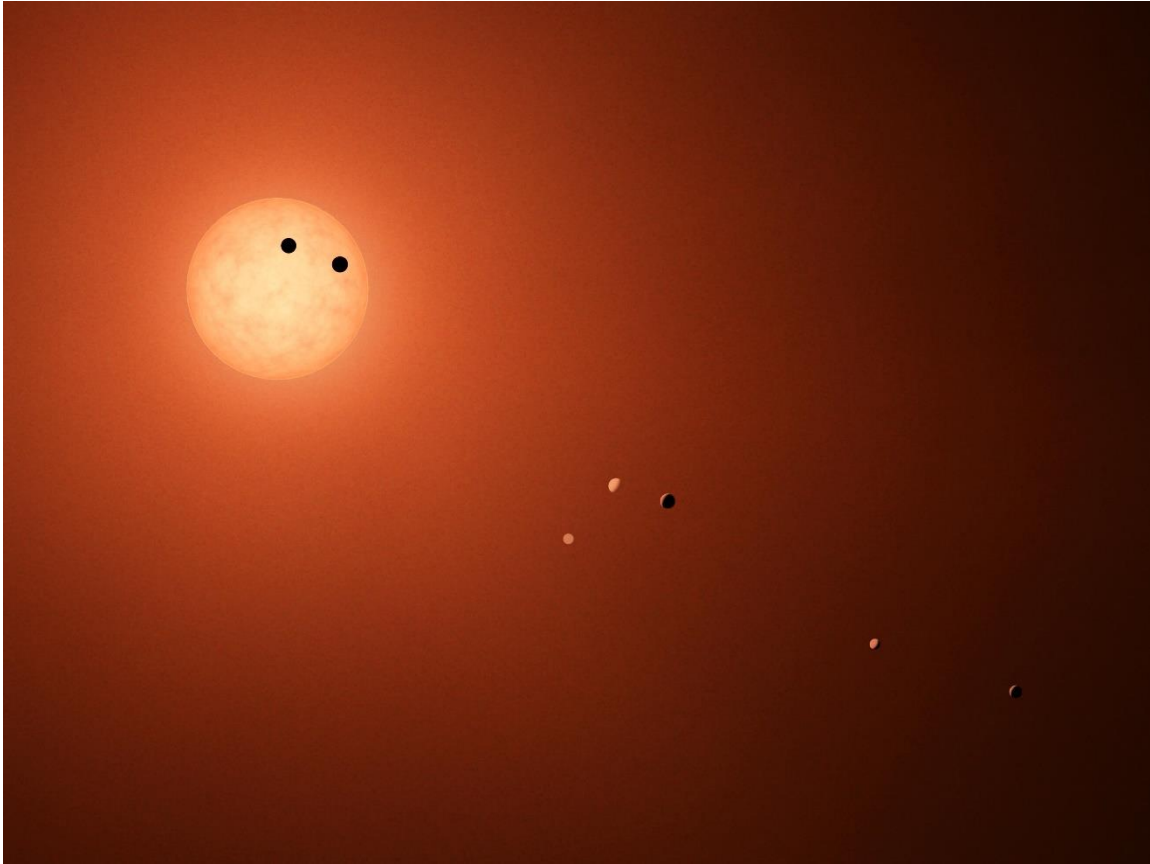


# CASE STUDY

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*Artist's impression of TRAPPIST-1 being transited by two of its seven known planets (CREDITS: WIKIPEDIA)*

Since eternity, humankind has been bugged by the question “Are we alone?”. Curiosity and efforts have led to major breakthroughs in the field. Now our latest telescopes are scanning the sky for signs of extra-terrestrial life and one of the methods is to search for potential habitable star systems planets in the vast sea of stars. The conditions prevalent on the earth are assumed to be ‘necessary’ for life, the most important one being the presence of liquid water. As of now 3,483 exoplanets have been confirmed but the quest is on for the first contact.

As of now various techniques are employed to detect and confirm such planetary systems. In 2015, astronomers discovered 3 earth sized planets orbiting around the dwarf star TRAPPIST-1 using transit photometry. Subsequently, a total of seven such planets were confirmed of which three were supposed to be in the habitable zone.

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# PROBLEM STATEMENT:

1. The current arsenal of astronomers for detecting exoplanets.
2. The major discoveries and 'wow' moments in exoplanets search.
3. The various techniques employed in detection of exoplanets. Stress upon the most efficient ones that have contributed the exoplanet catalogue.
4. Transit Photometry [in detail].
  - a. Main sequence of information that can be inferred about the host star and the planets.
  - b. Disadvantages of this method over other techniques.
5. 'Goldilocks' Zone around stars, the parameters considered while predicting existence of such zones.
6. Elaborate on the TRAPPIST-1 system. Then address the following points in brief:
  - a. Unique features of this star system.
  - b. Atmosphere of the planets resembling Earth like features.
  - c. TRAPPIST-1 star as compared to our Sun and its radiation.
  - d. Most life supporting planet amongst these and why?
  - e. Incorporation of other laws of Physics and techniques used to infer about TRAPPIST-1.
7. What does the discovery conclude for us?
8. What is Fermi's paradox? If some alien life signs are confirmed, however less chances, what is the best method to contact them?
9. What is your view regarding this area of research; provided the fact that even the nearest of these systems are improbable to reach by the current edge of engineering and technology? Should we invest in this area with regard to this point?
10. Mention other such attempts and their major discoveries besides the TRAPPIST that are contributing to this area. Which other star systems are highly supposed to support life, mention few in contrast to TRAPPIST-1.

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## RULES AND REGULATIONS:

- Team Size: The maximum permissible number of members in a participating team is **4**. However, they need not belong to the same institute/college/university.
- The presentation for the final round will be in PowerPoint (PPT, PPTX) format. (Please note carefully).
- The diagrams should be neat and clearly labelled and images must be given credit.
- The plagiarism in content shall not be accepted and the entry shall be cancelled.

## JUDGING PARAMETERS:

- The event consists of 100 points with initial abstract consisting of **30** points and presentation **70** points.
- The presentation time shall be 15 minutes.
- The teams have to wrap up the presentation within the given limits. A warning bell shall be issued one minute before the end of 15 minutes.
- Participants are required to apply their astronomy knowledge to suggest possible improvements in the methods described earlier in their case study of detection of exoplanets.

- Extra marks will be awarded for the teams answering to the on spot questions as well as for posing questions to other teams (Only valid questions posed will be awarded marks, for remaining questions there is a chance of negative marking as well).
  - The judgement will be given on the overall richness of the content of the case and the presentation.
  - The decision of the judges will be the final.
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## NATIONAL STUDENT'S SPACE CHALLENGE 2017