Surya Tilak Project Ram Lalla

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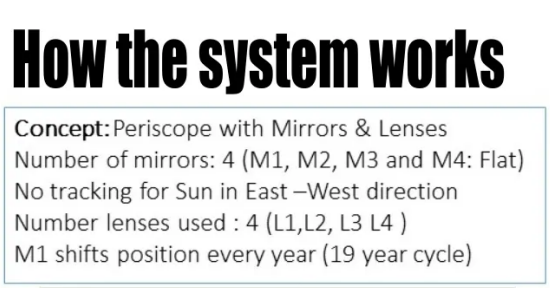
Why in News?

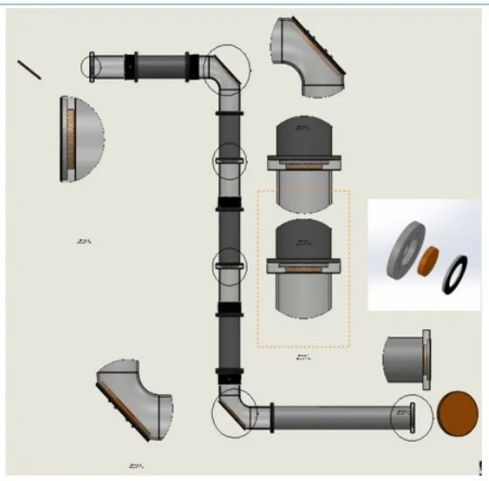
The **Surya Tilak Project**, a remarkable endeavour, recently unfolded at **Ayodhya**, bringing sunlight to the forehead of **Sri Ram Lalla.**

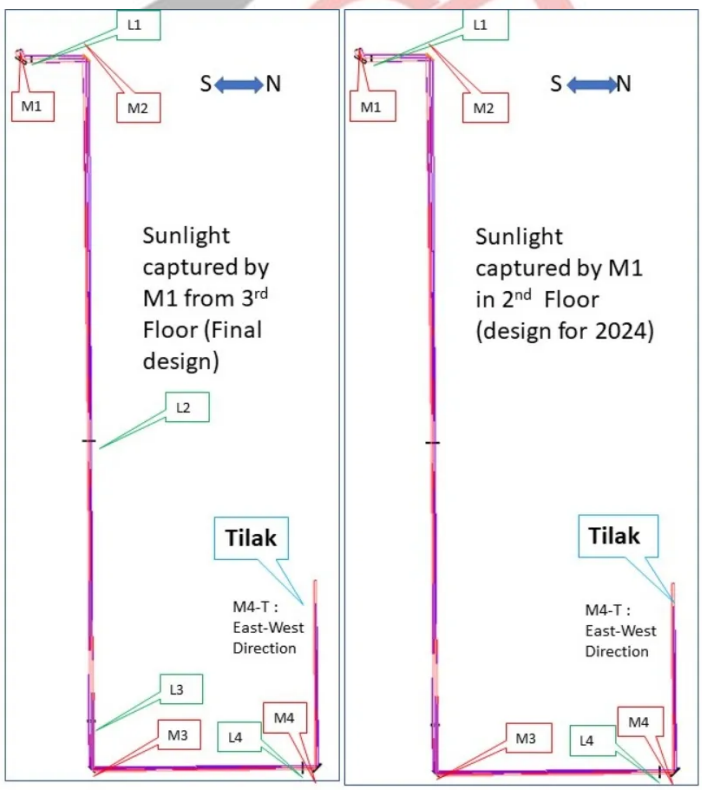
What is the Surya Tilak Project?

- **About:**
  - The Surya Tilak Project represents a unique fusion of technology and tradition, meticulously engineered to **illuminate the forehead of Lord Ram's idol** with a precise **beam of sunlight** during the revered festival of **Ram Navami.**
  - The **Indian Institute of Astrophysics (IIA)** under the Department of Science and Technology was crucial in the Surya Tilak Project at Ayodhya.
- **Calculation and Positioning**
  - The IIA team carried out the calculation of the sun's position, design, and optimisation of the optical system for the Surya Tilak Project.

    - The Ram Navami date varies each year following the **Gregorian calendar due to its solar nature,** while the **Hindu calendar is lunar-based.**
        - The Gregorian calendar is based on **Earth's revolution around the Sun**, making it a solar calendar with roughly **365 days in a year,** whereas the **Hindu calendar is based on the Moon's revolution** around Earth, making it a **lunar calendar** with roughly **354 days in a year.**
- **Design and Implementation:**
    - The Surya Tilak Project's core is its **opto-mechanical system,** seamlessly **integrating optical and mechanical components** for precise sunlight manipulation.
        - This opto-mechanical system, similar to a **periscope** (apparatus consisting of a tube attached to a set of mirrors or prisms, by which an observer can see things that are otherwise out of sight), uses a 19-gear system to make yearly adjustments for the sun's position.
        - Every year, **one gear tooth is manually turned to adjust** the angle of the pickup mirror.
            - The number 19 corresponds to the **Metonic cycle**, which lasts **19 years and resets the system for the Moon's phases** to recur on the same days of the solar year.
    - The Surya Tilak with 4 mirrors and 2 lenses was executed, with IIA technical experts participating in testing, assembly, integration, and validation at the site.
    - The implementation of the optomechanical system at the site was done by **Central Building Research Institute (CBRI):** Council of Scientific & Industrial Research (CSIR).







- **Future Implementation**
    - The final design of the Surya Tilak with 4 mirrors and 4 lenses will be implemented once the full temple is constructed, with the mechanism designed to accommodate a shift in the calendar date of Ram Navami.
- **Maintenance and Challenges:**
    - An annual shift of the first mirror must be performed manually before Ram Navami every year, and the mechanism **will not work in the absence of sunlight due to clouds or rain.**

Indian Institute of Astrophysics (IIA)

- The IIA, established in 1786 in Madras and later moved to Kodaikanal in 1899, became the **autonomous Indian Institute of Astrophysics in 1971.**
    - Its headquarters are now in **Bengaluru.**
- The institute is funded by the **Department of Science and Technology** and is a leading research and education institution in **astronomy and physics.**
- Its main observing facilities are located at **Kodaikanal, Kavalur, Gauribidanur, and Hanle.**
- The institute's activities include observational solar and atmospheric physics, nighttime astronomy with several telescopes, and the development of instruments.

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