Overview of IOTA-India activities

Atharva Pathak & IOTA-India Team.

“iota-india.in” - quick recap

IOTA-India section was born on May 3, 2019 and has been active ever since. Today, on Jul 18, 2021, we are 807 days (i.e. 2.2 years) old

The team members, individually, are active in carrying out observations of Variable Stars, Asteroid and Lunar occultations, Transient and Meteor shower observations, etc, all as a part of activities of India’s Oldest Amateur Astronomy Club: Jyotirvidya Parisanstha(JVP), established in 1944.

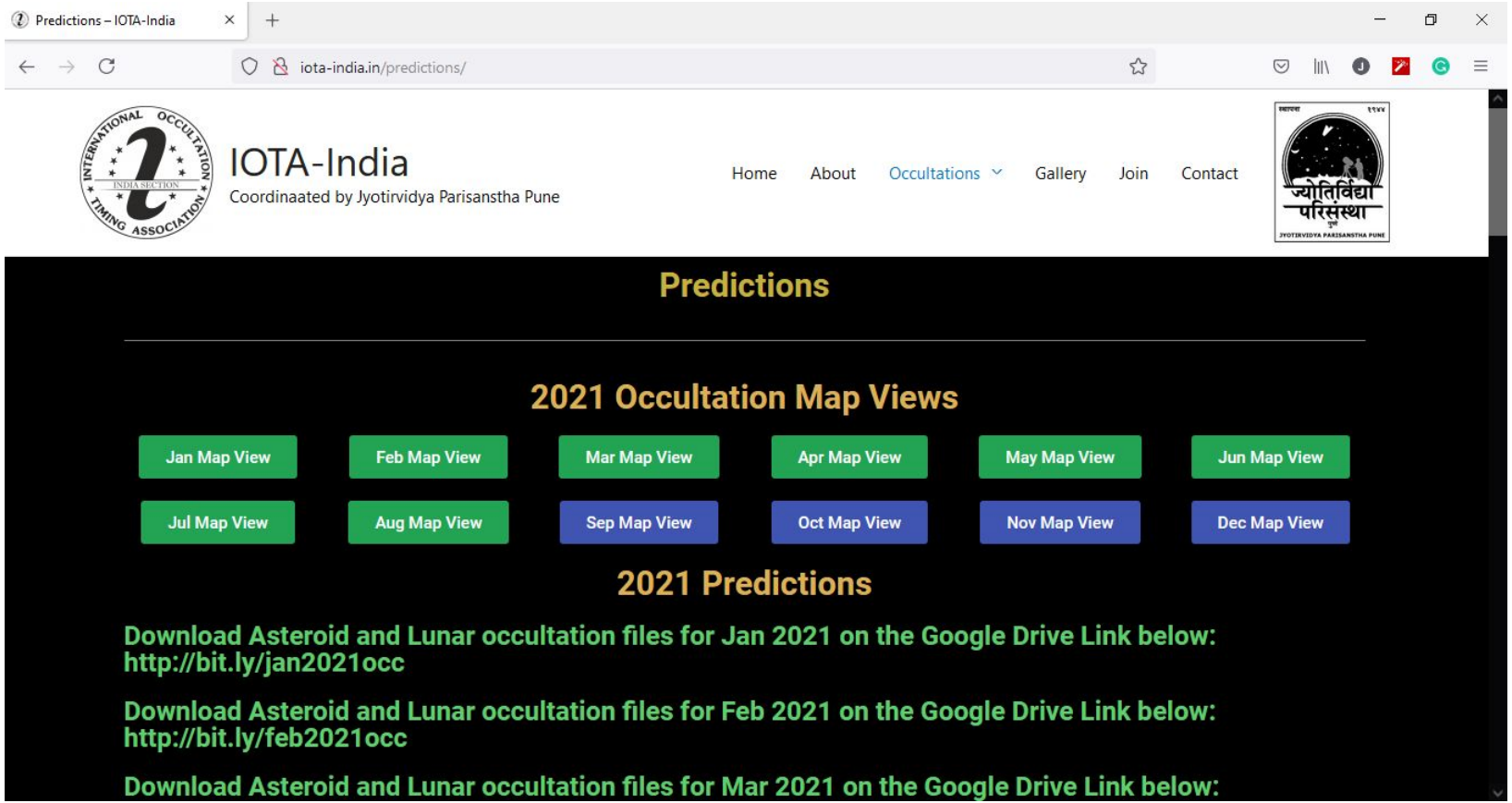
The predictions of Asteroid and Lunar occultations for upcoming month, are released 15 days before the month starts for eg. on 15 July, for month of Aug on the website under ‘Predictions’ tab.

Observations are validated and curated on the website under ‘Observations’ tab.

Links to Join the team and Contact, Gallery/News, & About sections are made available.

Observation can be reported as per IOTA format(Excel/Text) under ‘Report-Observation’ section.

Predictions for India at: http://iota-india.in/predictions/

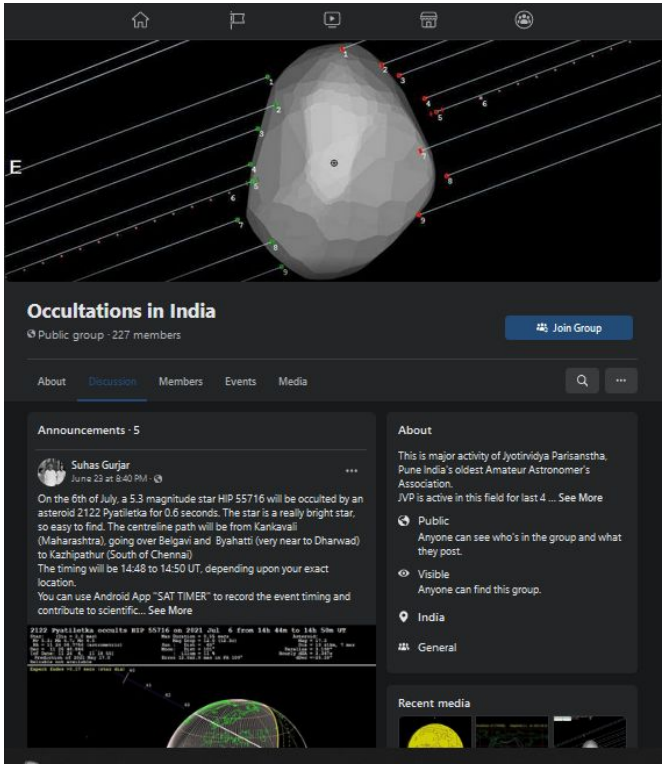


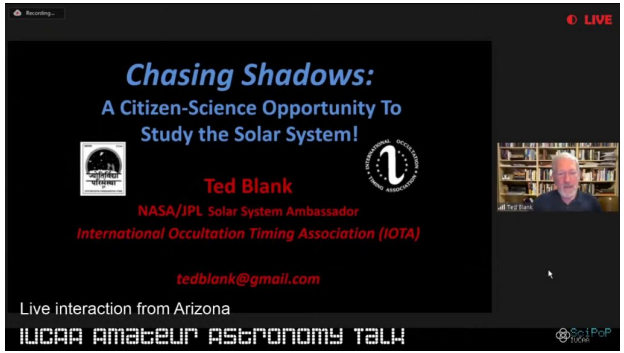
Indian Observations at: http://iota-india.in/observations/

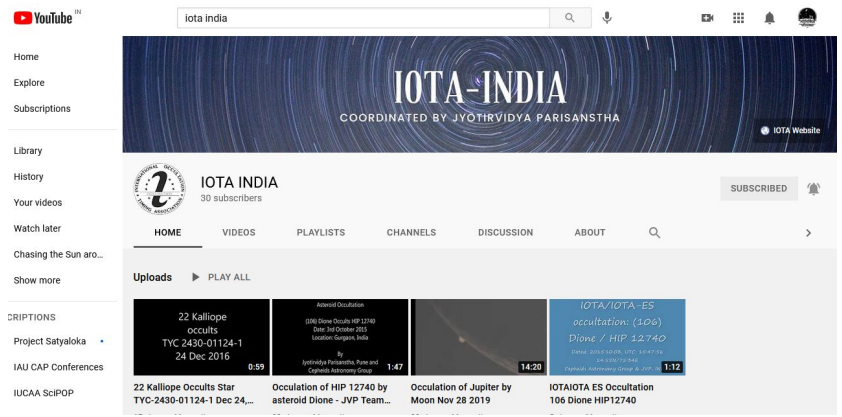
IOTA India Observations : India

No	Date(mm/dd/yyyy)	Asteroid	Star	Mag	Succesful Observations							Obs	Reduction	Date	Light Curve
					Total	Visual	Video	Photo	CCD/CMOS	Other	Affiliated Org				
16	10-26-2020	Moon	Tau-Aquarii								Individual -Suhas Gurjar	Update	-	10-26-2020	Update
15	10-26-2020	Moon	Tau-Aquarii								Individual -Yogesh Parashar	Update	-	10-26-2020	Update
14	06-06-2020	Pluto	UCAC4 340-192403	13.1	2		1		1		NA	Update	Update	06-21-2020	Update
13	04-03-2020	300 Geraldina	TYC 4951-00320-1	11.2	1			1			Akash Mitra Mandal(AMM)	Update	Update	04-03-2020	Update
12	03-15-2020	465 Alekto	UCAC4 575-013243	11.5	1	1					Akash Mitra Mandal(AMM)	Update	Update	03-15-2020	Update
11	02-02-2020	894 Erda	HIP 21575	7	3		3				Jyotirvidya Parisanstha(JVP), Akash Mitra Mandal(AMM)	Update	Update	02-20-2020	Update
10	06-08-2019	257 Silesia	UCAC4-313-225180	11.2	1		1				Akash Mitra Mandal(AMM)	Update	Update	06-18-2019	Update
9	05-22-2019	861 Aida	UCAC4-388-071980	11.2	1		1				Akash Mitra Mandal(AMM)	Update	Update	05-29-2019	Update
8	05-06-2019	791 Ani	UCAC4-400-127163	10.5	1		1				Akash Mitra Mandal(AMM)	Update	Update	05-13-2019	Update
7	03-09-2019	253P/Panstarrs	UCAC4-551-022720	9.6	1		1				Akash Mitra Mandal(AMM)	Update	-	05-13-2019	-
6	02-25-2019	120143 2003GG42	UCAC4-505-033525	12.5	1		1				Akash Mitra Mandal(AMM)	Update	Update	03-22-2019	Update
5	02-04-2019	349 Dembowska	UCAC4-529-051450	11.5	1		1				Akash Mitra Mandal(AMM)	Update	Update	03-22-2019	Update
4	12-24-2016	22 Kalliope	TYC-2430-01124-1	9.2	20	12	8				Jyotirvidya Parisanstha(JVP) et al.	Update	Update	01-03-2017	Update
3	10-03-2015	106 Dione	HIP 12740	11.5	2		2				Jyotirvidya Parisanstha(JVP) et al.	Update	Update	10-05-2015	Update
2	12-10-2014	2637 Bobrovnikoff	TYC 1766-01017-1	10.1	1			1			Jyotirvidya Parisanstha(JVP) et al.	Update	-	12-10-2014	-
1	02-04-2013	1243 Pamela	TYC 5507-01020-1	8.4	1			1			Jyotirvidya Parisanstha(JVP) et al.	Update	-	02-04-2013	-

Engagement with the Public



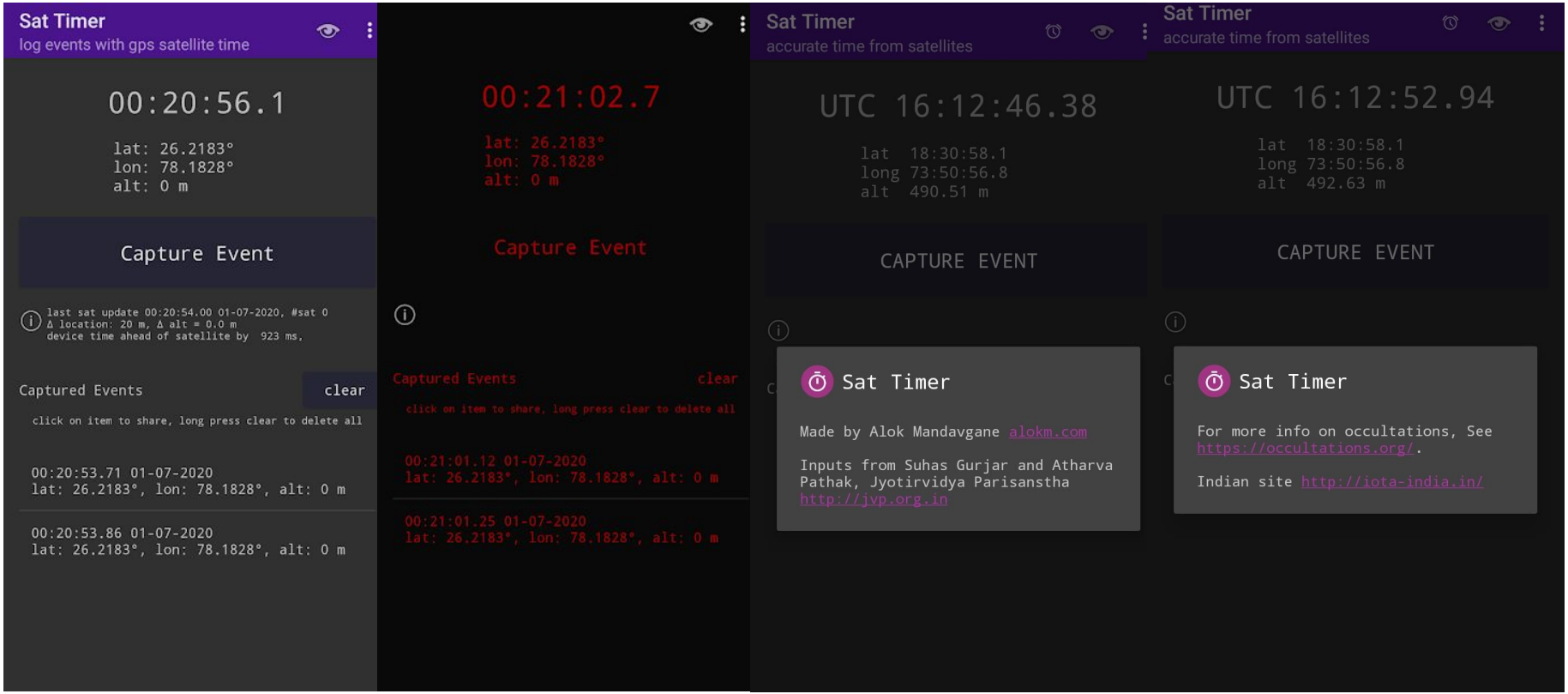




Some observation Runs and Photos

Development of “Sat Timer” App (Similar to TimeTheSat)

“TimeTheSat App does not work on certain versions of Android. That is why the New App.”



Application Developer: Alok Mandavgane

Low Cost Alternative to IOTA-VTI kit needed for India

KIT 1 - IOTA VTI V3 WITHOUT EXTERNAL GPS ANTENNA

This kit includes IOTA VTI V3 only. No external GPS antenna included. The VTI will be set to NTSC video unless the purchaser requests PAL in the PayPal comment section.

Domestic US shipping and handling will be added in shopping cart. For Canada, Mexico or Overseas shipping please add one of the extra shipping items at right.

$249.00

Add to Cart (appears below)

Around 18,000 INR

KIT 2 - IOTA VTI V3 WITH EXTERNAL GPS ANTENNA

This kit includes the IOTA VTI V3 plus the external GPS antenna. The unit will be set to NTSC video unless the purchaser requests PAL in the PayPal comment section.

Domestic US shipping and handling will be added in shopping cart. For Canada, Mexico or Overseas shipping please add one of the extra shipping items at right.

$274.00

Add to Cart (appears below)

Around 20,000 INR

COMPLETE OCCULTATION KIT WITH CAMERA, VTI AND ALL ACCESSORIES

Complete Occultation Recording Kit - see above for details. Just install the free IOTA Video Capture software on your laptop. The VTI will be set to NTSC video unless the purchaser requests PAL in the PayPal comment section.

Domestic US shipping and handling will be added in shopping cart. For Canada, Mexico or Overseas shipping please

Around 40,000 INR

$530.00

Add to Cart (appears below)

ADDITIONAL SHIPPING - CANADA AND MEXICO ONLY

For addresses in Canada or Mexico only, please add just this item to your cart to cover additional shipping costs.

$25.00

Add to Cart (appears below)

ADDITIONAL SHIPPING - OVERSEAS ONLY

For International orders other than in Canada or Mexico, please add just this item to your cart to cover additional shipping costs.

$60.00

Add to Cart (appears below)

With the delays, shipping and custom charges the cost to bring one full kit to India goes up to ~ 900USD i.e. around 70,000 INR

Future plans in mind

- Develop Low cost, portable setups, i.e. Occultation Kits in India to distribute to various school/colleges in remote areas to plan coordinated observations.
- Plan a training and demonstration session for selective five Amateur Astronomers in the country over usage of said kits/existing apps for reporting Lunar and Asteroid occultations.
- Engage in outreach and events for popularizing the Occultation observation activities to more people across varied locations in the country.
- Design University level projects for Occultation observation-analysis-reporting, and explore options for development of new apps/automated web tools.

Media/News Coverage

Pune Mirror | Sunday, May 26, 2019 | 4

THE SUNDAY READ

MANOJ DIDKAS

IOTA India's report coordinator Suhas Gurjar (extreme left) with Jyotirvidya Parisanstha members and astronomy buffs at Kasarbwada Observatory

To hunt an asteroid

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A leading scientific volunteer organisation that tracks the trajectory of potentially hazardous rocks from outer space launched its India chapter in the city this month

More than 19,000 Near-Earth Asteroids (NEAs) have been discovered in recent years, reports NASA. These heavenly bodies that hurtle through space and time at breakneck speeds frequently intersect the Earth's orbit without causing any disturbance, but quite a few of them have gone off course and collided with our planet in the past. At present, scientists can only calculate if an asteroid or a comet hit could be catastrophic. Assisting them in their efforts to keep an eye on potentially hazardous rocks from outer space are science and research organisations such as the International Occultation Timing Association (IOTA).

Amateur astronomers across the world, some of whom are members of the country's first amateur astronomers' association, Jyotirvidya Parisanstha (JVP), formed in Pune in 1944, contribute to IOTA's repository. Established in the US in 1983, IOTA, which operates in several countries, launched its India chapter on May 3, with the help of JVP members. Suhas Gurjar, JVP's former president, will lead IOTA activities in the country. "IOTA's presence will initiate the activity of spotting asteroids and comets on a larger scale among amateur astronomers in India," says Gurjar.

A retired engineer, Gurjar grew interested in astronomy when the Apollo 11 astronauts landed on the moon in 1969. In October that year, the astronauts — Neil Armstrong, Buzz Aldrin and Michael Collins — visited Bombay. A million Mumbaikars turned up to cheer them. "I was among that crowd," Gurjar recalls. IOTA gathers data from astronomical occultations, which are events that take place when a celestial object is hidden from view by another. IOTA mainly concerns itself with the occultations of stars by asteroids and the moon. Asteroid occultations offer insight into a designated asteroid's trajectory. "A red flag is raised if an asteroid occultation does not happen as predicted. This means that it has moved from its orbit," explains Gurjar.

Atharva Pathak, a project engineer at Inter-University Centre for Astronomy and Astrophysics (IUCAA), is aware of the threat posed by NEAs, which are also classified as Near-Earth Objects (NEOs). Pathak says, "It is absolutely important to study an asteroid's path, as you don't want it to hit us." To stress his point, Pathak refers to the Tunguska event. In 1908, a meteoroid measuring 200 to 620 feet had flattened 2,000 square kilometres of forest near the Podkamennaya Tunguska River in Russia. "You can't possibly implant a bomb into an asteroid to explode it, as shown in the Hollywood film, *Armageddon*, but we can certainly keep a track of NEOs," remarks Pathak. Scientists are yet to test technology that can effectively deal with impact threats from outer space.

Gurjar is optimistic that IOTA's activities in India will be supported by amateur astronomers and scientists alike. He has already received an encouraging email from Owen Williams, a NASA scientist, to wholeheartedly involve himself in occultation observations. Williams wrote to him saying, "If you don't try to observe it, the probability of success is zero. Even a negative report can be useful and if nothing else, it is good practice." Pathak, who created IOTA India's website, is sure that IUCAA scientists will refer to the website in the future. "That will happen as soon as IOTA India's archive grows," he mentions.

Pathak maintains that astronomers and scientists do not have the same freedom as amateur astronomers. Scientists are bound by their own projects, but all an amateur astronomer must do is be present at the geosite where an occultation is predicted to occur and report it. Such an observation can be carried out with basic equipment. "A great deal of information can be gathered from a single photograph taken during an occultation. Scientists can calculate the diameter of an asteroid simply by referring to such a picture. Online repositories like IOTA also hold raw data, which is invaluable to scientists. What is important, however, is that someone must take the initiative to gather scientific data. The science from it can be derived later," he says.

The IOTA India chapter will be involved in three important missions. JVP secretary Sagar Gokhale informs: "We will create awareness on occultation observation and how it is executed. IOTA will generate occultation predictions for India using open-source software, and validate data submitted by amateur astronomers, which would be submitted to the central IOTA archive." The central IOTA archive is accessed by scientists from across the world. Gurjar foresees scientists worldwide referring to data provided by IOTA India. "Our data is unique to our time zone, which in turn is helpful to the scientific community," says Gurjar.

For JVP members, working for IOTA offers them the opportunity to be recognised for their passion for astronomy. Most of them took up the hobby after attending outreach programmes conducted by JVP and IUCAA. For others, the joys of discovering the universe, of which we know so little, is inspiration enough to log a telescope and cameras to capture the heavenly bodies. Besides, it is a matter of honour to have one's name mentioned in the IOTA archives. "IOTA duly gives credit to anyone who submits an occultation report. If a research paper uses your data, your name is cited, and if a major discovery is made with the help of the information you have submitted, your name will be attached to the report," says Pathak.

> **"IOTA's presence will initiate the activity of spotting asteroids and comets on a larger scale among amateur astronomers in India**
>
> — Suhas Gurjar, IOTA India's report coordinator

At there are thousands of NEOs, dedicated amateur astronomers who are into tracking and spotting asteroids maintain a keen vigil. "On July 7 of this year, an asteroid is expected to pass close to Earth," says Gurjar. He knows that the asteroid is not as hazardous as the ones attributed to wiping out the dinosaurs, but you never know.

Global glow for astronomy clubs

SwatiShindeGole
@timesgroup.com

Pune: Amateur astronomy clubs in the city have been able to define the size and shape of an asteroid called 22 Kalliope and their observations have been recognised by the International Occultation Timing Association (IOTA).

On December 24, the asteroid travelled in front of a star identified as TYC 2430-01124-1 and the shadow of this asteroid was cast on earth. The shadow belt of the asteroid spread between Bhuj in Saurashtra to Nellore in Andhra Pradesh. To measure a planetary object, astronomers need to study its occultation.

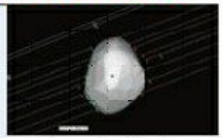
According to the IOTA, an occultation occurs when a solar-system body passes in front of a more distant object, partially or totally hiding the more distant object, momentarily blocking its light.

Director of Nehru Planetarium Arvind Paranjpye said, "There is a simple way to make these observations. Sometimes these asteroids come directly between a distant star and the earth, just like a solar eclipse. The event can be seen over a narrow shadow path on the surface of the earth, this is occultation. When the asteroid comes between the earth and the star the star just blinks off for a few seconds. By carefully noting the duration over which the star disappeared and reappeared from different locations on the shadow belt, it is possible to determine the size and shape of the asteroid."

Amateur astronomy clubs in Pune set up observation stations at various locations on the Bhuj-Nellore belt and, by measuring the time of occultation accurately, they were able to infer the size — about 166km in diameter — and the asteroid's shape.

WHAT HAPPENED ON DECEMBER 24

A remote star, identified by number TYC 2430-01124-1, got occulted by a small asteroid called 22 Kalliope. One revolution around the sun takes it 4.97 earth years and it rotates around itself in 4 hours 8 minutes (Earth time). This asteroid travelled in front of the star on December 24, 2016, 3.26 am. The shadow of the asteroid was cast on certain places. Since the asteroid was travelling in space, its shadow was moving on the surface of the earth. Any one standing in the shadow belt of the star light would notice the star disappearing for a few seconds. This eclipse is called an occultation



Each line on the sides of the asteroid shows the occultation

Suhas Gurjar, of JyotirvidyaParisanstha (JVP) and one of the participants of the December 24, 2016 observation said, "There are a lot of lone observers, who note such events. Their work is very important as lone observation gives us an idea of minimum possible dimension of the asteroid. But simultaneous observation from a number of locations, gives one a better idea of the shape and size of an asteroid."

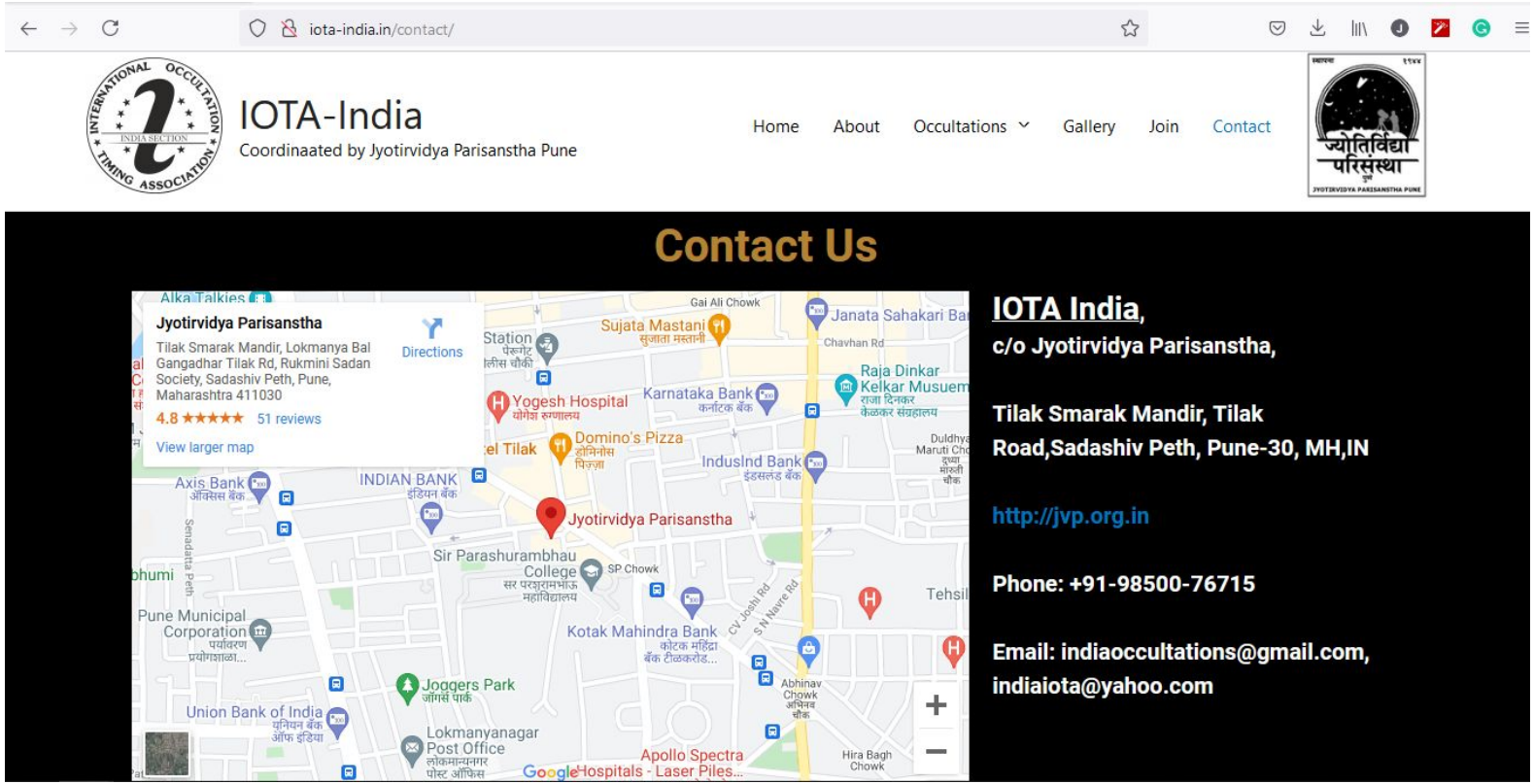
The JVP erected eight videostations between Pune and Aurangabad, three stations for telescope viewing and from one station through DSLR camera viewing to observe this event from different locations.

There were various teams, including Citizen's Science Centre, JVP and Akashmitra and from Pune and Nehru Planetarium from Mumbai.

Paul Maley, leading asteroid occultation observer from United States of America and ex-vice president of IOTA was also in Pune for the event. "Paul provided technical support. He brought eight video recording equipment sets and pointed accurately at a field where the star being occulted was to arrive at the time of the occultation. Based on all the observations, Paul and his team analysed and deduced the shape of the asteroid 22 Kalliope," said Deepak Joshi of JVP.

Joshi further explained why such observations are important, "Though asteroids mainly far away in the asteroid belt between Mars and Jupiter, they can sometimes wander and change their path under influence of Jupiter's gravity. Many asteroids come very close to Earth when their orbits are changed due to the pull of Jupiter's gravity These near earth orbit can be a hazard to life here. Thus, understanding their size and orbit is very important."

Contact us at: http://iota-india.in/contact/



Thank You.