



THE SKY ON BIKE

1. Overview

The Sky on Bike project was proposed and conducted by SPACE, with the goal of popularizing science via Astronomy and Space Sciences throughout the domains of education, public and media. This project has been introducing the wonders of the night sky to identified groups of economically disadvantaged and uneducated population in Indian villages with the aim to create scientific temper. Telescopes were carried on bicycles and set up at locations where public was gathered to show them the night sky. Educators and Volunteers explained the night sky and showed the sky through telescopes and gave out colorful myth busting handouts.

2. Observations Conducted

Throughout our observations, the objective was to foster science education and dispel myths, as myths related to celestial events are rampant in many areas of India. While many public observations were conducted for the general masses, our Sky Bikes were also especially used to visit some NGOs to cater to the curiosities of underprivileged children. At these NGOs, we were able to engage with about 450 children coming from nearby slums and other such economically humble backgrounds. Most of these children had fathers who did rickshaw-pulling or were daily wage labors and mothers who worked as maids in the nearby colonies for a living. While many concepts were new for these children, they were able to understand and enthusiastically engaged themselves in these astronomy sessions. The NGOs where we have visited till now with our Sky Bikes are as follows:

S.No.	Name of the NGO	Date	Astronomical Observation Type	No. of Students
1.	VIDYA NGO	16 th November 2016	Evening Observation	220
2.	Shine Foundation, Greater Noida	8 th December 2016	Evening Observation	150
3.	Aarohan NGO	9 th December 2016	Evening Observation	50
4.	Shine Foundation, Tughlaqabad	13 th January 2017	Solar Observation	100
5.	Diya India Foundation – Chetan Vidya Mandir	23 rd January 2017	Solar Observation	400

**Reports for each of the conduction in attachments.*



3. Project Timeline

The project was completed as per the following timeline:

S. No.	Details	Date
1.	Identifying and finalizing model of bike and telescope	25 th July 2016
2.	First Design Meeting for Fabricating the Sky Bike	1 st August 2016
3.	Critical Design Review of Sky Bike	1 st -10 th August 2016
4.	Material Procurement	11 th -15 th August 2016
5.	Fabricating the SKY BIKE	16 th – 24 th August 2016
6.	Testing the SKY BIKE – 1 st Observation	25 th – 31 st August 2016
7.	Sending invites to volunteers	29 th August 2016
8.	Registrations and Training of volunteers for initial phase	5 th – 15 th September 2016
9.	Creating Social Media Awareness	20 th September onwards
10.	Meeting to draft the myth busting handouts	1 st September 2016
11.	Coordinating with venues to conduct observations	5 th - 10 th September 2016
12.	Training of volunteers to conduct the observations	8 th – 13 th September 2016
13.	Mass Observations for Public	September-October 2016
14.	Evening Observation at VIDYA NGO	16 th November 2016
15.	Evening Observation at Shine Foundation, Greater Noida	8 th December 2016
16.	Evening Observation at Aarohan NGO	9 th December 2016
17.	Solar Observation at Shine Foundation, Tughlaqabad	13 th Jan 2017
18.	Solar Observation at Diya India Foundation NGO	23 rd Jan 2017
19.	More observations planned	25 th Jan- 15 th March 2017
20.	Preparing all Deliverables	15 th – 30 th March 2017

4. Materials used

Various factors were kept in mind while designing the bikes including:

- Economical affordability
- Easy availability
- Design Efficiency and sturdiness

These factors ensured that our bikes be easily bought, so as to build and expand this project further.



Roadster Bike Model



GAPL's 150mm F/5 Telescope with tube length 65cm.



SPACE and IAU's SKY BIKE



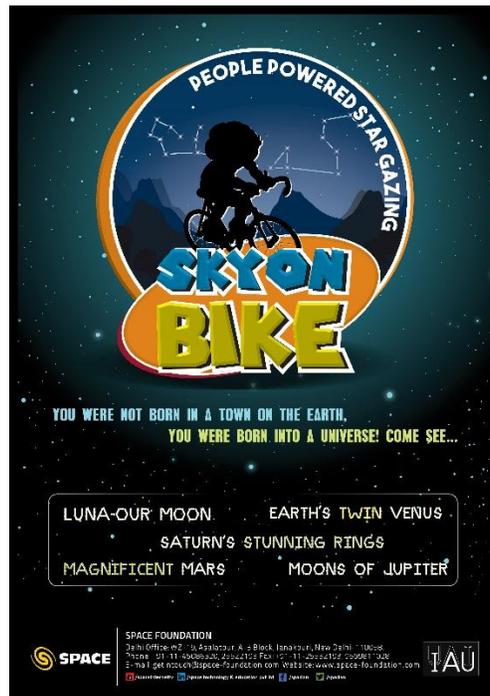
5. Printables Prepared

We developed many handouts, posters and banners to create interest and spread the word about our Sky on Bike. We also especially developed a logo for our project to create an identity of its own.

5.1. SKY ON BIKE LOGO



5.2. SKY ON BIKE POSTER





5.3. SKY ON BIKE BANNER

SPACE IN COLLABORATION WITH IAU PRESENTS

LUNA-OUR MOON
SATURN'S STUNNING RINGS
MOONS OF JUPITER

EARTH'S TWIN VENUS
MAGNIFICENT MARS
MILKY WAY GALAXY

**YOU WERE NOT BORN IN A TOWN ON THE EARTH.
YOU WERE BORN INTO A UNIVERSE! COME SEE...**

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5.4. SKY ON BIKE MYTH BUSTING HANDOUTS

Dispel Myths, Come find out the truth....

MYTH:

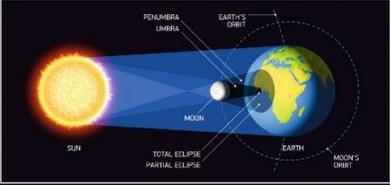
According to popular belief, Rahu is known for swallowing the sun and causing eclipses



FACT:

Actually what happens is...?

As seen from the Earth, solar eclipse occurs when the Moon passes between the Sun and Earth, and the Moon fully or partially blocks ("occults") the Sun. This can happen only at new moon, when the Sun and the Moon are in conjunction as seen from Earth in an alignment.



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ASTRONOMY SIMPLIFIED

Days of the week are named after planets:

- Sunday (रविवार) - Sun
- Monday (सोमवार) - Moon
- Tuesday (मंगलवार) - Mars
- Wednesday (बुधवार) - Mercury
- Thursday (गुरुवार) - Jupiter
- Friday (शुक्रवार) - Venus
- Saturday (शनिवार) - Saturn




Star in a car If you could travel to the nearest star in a car at 70 miles an hour, it would take 356,908,917,036 years!

In India, Milky Way has been referred to as Aakash Ganga, which literally translates into: "Ganga of the heavens." Scientists estimate that this galaxy has somewhere between 100 and 400 billion stars. However, at night when we look up at sky and manage to get a glimpse of the galaxy, we are able to see on 0.0000025% of all stars present in the galaxy.



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6. REPORTS OF OBSERVATIONS

6.1. VIDYA NGO, Evening Observation, 16th November 2016



Sky on Bike poster for evening observation.



A small group of students of Vidya NGO concluding the observation with a group photo

The project was started on a great note with the motive to use it to reach as many people as possible in the identified target audience range. The core team identified a few motivated volunteers who registered to volunteer with us for the SKY BIKE project.

We conducted an **Astronomical Evening** with the students of Vidya NGO. Vidya is a charitable organization that specializes in the education and empowerment of less-privileged children, youth and women through working with them at an individual level.



Students of the NGO sharing their understanding of the features of Moon



A student explaining a supernova

At Vidya, we were able to engage with 220 children coming from nearby slums and other such economically humble backgrounds.

A presentation was especially developed for this session, keeping in mind all that would be of interest to these children. Our Moon was introduced to the students, they were told a few facts and their numerous questions were addressed. The principal was very happy and requested that we may visit them soon for the other classes.



A student identifying the Tycho crater on Moon through the 150mm Sky on Bike telescope.



Teachers and students queueing up to see the Moon through Sky on Bike telescope.

The children were also told about what a Super Moon is and the alignment of Earth, Moon and Sun during this time. Further, along with facts, some handouts were also given to the students to explain them eclipses and dispel the prevalent myth about what happens during an eclipse.



Students observing the Moon and its craters through a Dobsonian Telescope.



Students of Vidya NGO thrilled to see the new Skv on Bike Concept



Students were engaged in a QnA session and were given prizes for correct answers.



6.2. SHINE FOUNDATION, Greater Noida, Evening Observation, 8th December 2016



Sky on Bike poster for evening observation.



Overwhelming response of the students on Project-Sky on Bike

Delhi is one of India's major urban cities where 'marginalized communities' are a ubiquitous social category. Due to rampant poverty, illiteracy, and unemployment in the country, migration towards urban cities, such as Delhi, is on the rise. This segment of the population, at times lives illegally in slum units, resettlement and unauthorized colonies and takes the form of marginalized urban slum communities.

We identified an NGO- The Shine Foundation that operates at the outskirts of Delhi for these marginalized communities. Shine Foundation has centers located in the region of Delhi NCR (National Capital Region), and we joined hands with them to introduce the children of these communities to the world of Astronomy. While it was very difficult to reach this NGO, it did not hamper the motivation and enthusiasm of the Sky on Bike volunteers to reach the children.

On 8th December 2016, we conducted an **Astronomical Evening** with the students of Shine Foundation. **Shine Foundation** works with the commitment and passion to contribute towards the development of marginalized urban slum communities of Delhi and NCR.



Students during their revision session after the telescope watch



A student watching moon through the Sky on Bike Telescope

At Shine we were able to engage about 150 children coming from nearby slums and other such economically humble backgrounds. Most of these children had fathers who did rickshaw-pulling and mothers who worked as maids in the nearby colonies for a living. While many concepts were new for these children, they were able to understand new concepts and enthusiastically engaged themselves in this astronomy session.

A presentation was especially developed for this session, keeping in mind all that would be of interest to these children. Our Moon was introduced to the students, they were told a few facts and their numerous questions were addressed. The children were told how to identify whether the moon is in waxing or waning phase by observing the moon. They were also told about the various features of the Moon and were made to observe those through the telescope.



Our learned volunteers helping the students observe Mars and Venus through the telescope



Further, along with facts, some handouts were also given to the students to explain them eclipses and dispel the prevalent myths about what happens during an eclipse.

We carried our Sky on Bike Telescope which is a telescope of aperture 150mm mounted on a Bike. Along with this, to manage the great number of students, we also took a 150mm telescope of Alt-Az mount to control the crowd.

The children were delighted to see the Moon through the telescope and they were made to revise and relate the shape and phase of the moon at the end. They were also asked if the moon was in the waning or waxing phase after their observation was over. Along with the Moon, the children were also shown planets Mars and Venus through telescope as these planets were also in the sky.



Student learning how to observe the moon through telescope mounted on the Sky on Bike



Student along with the teacher enjoying the moon watch through telescope

By the end of the session, the students were beaming with smiles on seeing the celestial bodies through a telescope. The coordinator was very happy and requested that we visit all centers of Shine. For us, it was a rewarding experience as we interacted with the students and learnt from the various stories that they had to offer.



6.3. Arohan NGO, Evening Observation, 9th December 2016



Students posing with the Sky on Bike poster

Students posing with the Sky on Bike poster

On 9th December 2016, we conducted an **Astronomical Evening** with the students of AAROHAN NGO. AAROHAN is mainly working in the area of education for underprivileged children of the society, women and other community members living in difficult circumstances- children of -daily wage migrant labors, suffering from terminal diseases; from rural/tribal areas and also transgender community.

In line with their endeavors, we organized an astronomical evening for these bright minds.



Students interacting in the Question/ Answer Session



Students learning about formation of Moon and its features

At Aarohan, we got to interact with many diligent students. These group of students, though humble in number, were very much interested to know more about what the sky offers.

There were about 50 children who attended the evening session. Along with a presentation specially developed for these students, they were also shown a video showing a theory about the formation of the moon. Our Moon was introduced to the students, and children were told how to identify whether the moon is in waxing or waning phase by observing the moon. They were also told about the various features of the Moon and were made to observe those through the telescope. Further, some handouts were also given to the students to tell them about some astronomy facts and to explain them eclipses and dispel the prevalent myths about what happens during an eclipse



Students observing the Moon and its features through the Sky Bike Telescope

We carried our Sky on Bike Telescope which is a telescope of aperture 150mm mounted on a Bike. Along with this, we also carried a 200mm Dobsonian telescope to show the features of the Moon.

The children were happy to observe the Moon, Venus and Mars planet through the telescope. They were also made to revise and relate to the shape and phase of the moon at the end. As explained to them before, they were made to identify whether the Moon was in waxing or waning cycle by observing it.

By the end of the session, the students were delighted with the experience of an astronomical evening. The students were also exhilarated to see a new telescope mounted on a bicycle and took turns to observe through the Sky Bike telescope.



6.4. SHINE FOUNDATION, Tughlaqabad, Solar Observation, 13th January 2017



Sky on Bike Poster for Solar Observation



Students and their coordinators with Sky Bike volunteers

On 13th January 2017, we conducted a **Solar Observation** with the students of Shine Foundation. **Shine Foundation** works with the commitment and passion to contribute towards the development of marginalized urban slum communities of Delhi and NCR.

At Shine we were able to interact with 100 children coming from nearby slums and other such economically humble backgrounds.

Our Sun was introduced to these students. They learnt many facts and features of the Sun. They were made to observe the sun safely through the SKYBIKE telescope as well as with the Dobsonian telescope, both protected with a solar filter. They were also made to observe the Sun through solar view goggles.



A student observing the Sun through the 200mm Dobsonian Telescope



A lady keenly observing the Sun through the Sky Bike telescope



Children observing the Sun through safe methods by using a solar viewing goggle



Children of the NGO participating in the session

We carried our Sky on Bike Telescope which is a telescope of aperture 150mm mounted on a Bike. Along with this we also took a Dobsonian telescope too.

The children were thrilled to gaze the SUN using the SKYBIKE telescope as well as the solar view goggles. As these things were new to them, they had a lot of questions which were addressed to them later during the observation.

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Students their coordinators with Sky Bike volunteers



A group of students posing with the Sky Bike after the observation



A volunteer enjoying riding the Sky on Bike



Children understanding our solar system



Little students trying to observe the Sun through solar viewing goggles

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6.5. DIYA INDIA FOUNDATION, Solar Observation, 23rd January 2017



Sky on Bike poster for solar observation.



Students concluding the observation with a group photo

On 23rd January 2017, we conducted a **Solar Observation** with the students of Diya India Foundation. **Diya India Foundation** has always been in the forefront constantly working for the development of underprivileged children in the Nihal Vihar area of West Delhi. Diya Foundation also provides food relief to the poor.

For this event we were able to engage with about **400 students** coming from nearby slums and other urban slum communities. These children were very keen to know more about what the sky offers.

Our parent star the SUN was introduced to these students. They learnt many facts and features of the Sun like the Sunspots. They were made to observe the sun safely through the SKYBIKE telescope as well as with the Dobsonian telescope, both protected with a solar filter. They were also made to observe the Sun through solar view goggles and the students also identified a visible sunspot through the method of telescopic projection.

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SPACE educator introducing Our Sun to the students



Students engaged in Question/Answer session



SPACE Educator explaining the students about Solar Eclipse



Students understanding the concept of Solar eclipse through an activity

We carried our Sky on Bike Telescope which is a telescope of aperture 150mm mounted on a Bike. Along with this, to manage the great number of students, we also took two Dobsonian telescopes. The children were contented to see their parent star through the telescope and its sunspot through the telescopic projection. Along with this they were made to revise and relate the concepts at the end. After the session the students as well as the teachers were very thankful to our team for the informative session that we delivered for them and at the same time their

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Principal is looking forward for a long term collaboration with SPACE for many more such projects in the coming future.



Students gazing the Sun through Solar view goggles



Students being briefed about the concepts of Safe Solar Observation



Student observing the Sun through the Sky on Bike



Students observing the Sun through Dobsonian telescope



Students line up to take turns and see our parent star through the Sky Bike

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7. Social Media and Outreach

We used the social media platform to generate interest and create awareness about our Sky on Bike project. We circulated posts on our Facebook page and also created a special Sky on Bike page on our website.

7.1. Our Sky Bike Website

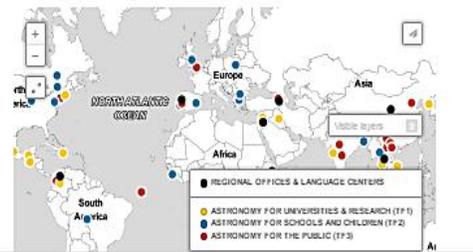
Our Sky on Bike Website: <http://www.space-foundation.com/project.php?id=1>



Sky on Bike

The Sky on a Bike is an astronomy outreach program which has won funding from the International Astronomical Union (IAU) under the 'Astronomy for Development' category. This project has been introducing the wonders of the night sky to identified groups of economically disadvantaged and uneducated population in Indian villages with the aim to create scientific temper. Telescopes are carried on bicycles and set up at locations where public is gathered to show them the night sky. Educators and Volunteers explain the night sky and show the sky through telescopes, give colorful handouts and enact street plays. The objective is to foster science education and dispel myths, as myths related to celestial events are rampant in many areas of India.

SPACE's Sky on Bike project in India amongst the various IAU projects happening all over the world:



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7.2. OUR SKY BIKE FACEBOOK PAGE



8. Plan Ahead

We still have many more observations lined up for our Sky Bike and we plan to continue conducting these observations not just till March 2017, but even after the project ends.

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