Log Book

July 2025: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

- Found information / advertising flyers in my community

- I was wondering about the PureFiber that provides the speed to the internet technology
- On the website, I learned that PureFiber is the Fiber Optic Cables
- Discussed with my parents on 'Fiber Optic Cables' and how it looks like
- Then, I remembered the 'Fiber Optic Lamp' that we have in our living room

- I was surprised that how 'Fiber Optic Cables' are useful in our daily life and the its also used as an Internet transmission cable
- I need to study more on 'Fiber Optic Cables' as it gives me more information on the current technology

Online search on Google: Fiber Optic Cable

August 2025: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

- I learned that the 'Fiber Optic Cables' are not only used to transmit internet within the city, it is all spread out under the ocean to transmit data (includes Internet and communication)

- Now, I got interest to learn more about the data transmission through 'Fiber Optic Cable'
- I found that the data transmission through Fiber Optic Cable is in the form of light
- There is about 1.4 million kilometers of fiber optic cables under the ocean to transmit data (includes Internet and communication) in the form of light all across the world
- I knew that the speed of light is very fast and efficient and it travels at 300,000 km per second in a vacuum
- I also learned in school that sunlight takes 8 minutes and 20 seconds to reach earth from the surface of the Sun

Log Book

August 2025: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Online search on Google: Submarine Cables (Fiber Optic Cables) under the ocean

Sources (references):
- Online search on Google
- Calgary Public Library

Log Book

September 2025: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

- My school started in the first week of the September and I was in Grade 6
- I was sure that in my next science fair project, I will find some interesting topic on the Fiber Optic Cables and its different uses

Online search on Google: Usage of Fiber Optic Cables

Sources (references):

- Online search on Google

October 2025: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

- Now, I am working on the 'Fiber Optic Cables,' its different uses and area of applications
- Visited few hardware stores (such as Rona, Home Depot) to check cables, and got information of the usage of the different Fiber Optic cables
- Also, got knowledge on how the cable is transmitting the data in the form of light

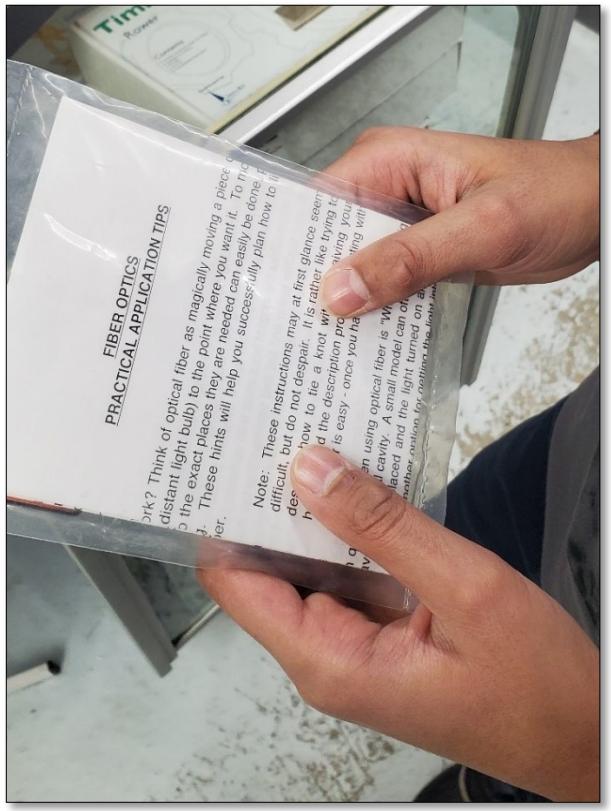
October 2025: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

- Brainstorm and discussion in family on the science fair topic

Question:

How can we use the Fiber Optic Cable for our daily usage other then the electronics usage?

- Visited hobby center (Model Land, PM Hobbycraft) and electrical store to find more options and more understanding on the fiber optic cables



Log Book

October 2025: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

- Brainstorm and discussion in family on the science fair topic

Question:

Can we use the Fiber Optic Cable to transmit light?

Online search on Google: Light transmission through Fiber Optic Cable

Learnings & Ideas:

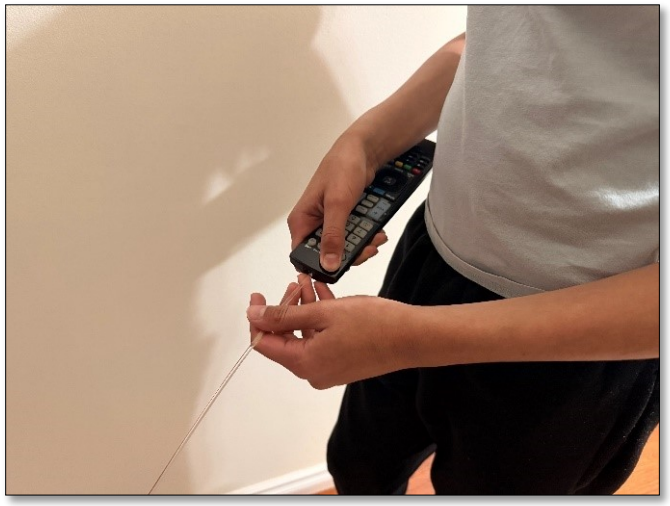
- Question

Sources (references):

- Online search on Google
- Visit to various stores

November 2025 (including Fall Break): Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

- Visited hobby center/ electronics store (Active Tech, Solarbotics Ltd.) to search Fiber Optic Cables
- Bought small piece of Fiber Optic Cable for my checking and experiment on how its working with light or any other signals
- I was wondering if the cable can transmit the TV Remote signal or not
- TV Remote have IR light (Invisible Infrared light)



- Surprisingly, I am able to transmit the TV Remote signals from one room to other TV room through the Fiber Optic Cable
- Brainstorm and discussion in family on the science fair topic
- Now, I have one more topic for the Science Fair Project

Question: Can we transmit the TV Remote signals through the Fiber Optic Cable?

Online search on Google: Different usage of Fiber Optic Cables

November 2025 (including Fall Break): Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Observations

- I observed that we are still using the artificial light in my school during daytime
- Also, I have seen that in my father's office in Calgary Downtown, the tall building is using the artificial light for 24/7
- During my visit to the Singal Hill Calgary public library, I find that there is a open space on the roof to get the Sunlight directly inside the library
- Few houses in Calgary, also have the roof window
- Now, I am connecting my observation of artificial light usage during the daytime with the function of the Fiber Optic Cable
- I am wondering can we get the natural Sunlight for illumination during daytime

Questions:

1: Can we get the natural Sunlight for our light energy requirements?
2: Can we get 24-hour Sunlight?

- Now, I am more precise to decide my Science Fair Project Title
- I will finalize the topic on Sunlight with the usage of Fiber Optic Cables

November 2025 (including Fall Break): Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Project Title:
24-hour Sunlight

Learnings & Ideas:
- Observation
- Question
- Project Title

Log Book

December 2025 (Week 1): Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

- Email received from Mr. Howey (School Coordinator) for the Glamorgan School Science Fair

Background Research

Topic: Sunlight / Light energy (Electromagnetic Energy)

Importance of Light for Society

- Light energy is very important in our daily life.
- Sunlight is very useful for giving us light and it helps to make Vitamin D cells in our body.
- Artificial light energy is used in our houses and other buildings such as workplaces etc.
- Light can be used for both nighttime and even daytime too.

Already know about the topic

- Sunlight gives energy, light and it helps to make Vitamin D to our body
- From Sunlight, we can get electricity through solar panels
- Speed of Light is very fast and efficient (300,000,000 meters per second in a vacuum)
- Fiber optic cable helps to transfer the light quickly from one place to the other
- There is about 1.48 million kilometers of fiber optic cables under the ocean to transmit data (includes Internet and communication) in the form of light all across the world

Learnings & Ideas:

- Background Research

December 2025 (Week 2): Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

- Working on background research

Missing part during my research

- How do we get Sunlight for illumination with the help of Fiber Optic cables
- How do we get 24/7 Sunlight for illumination?

- Visited Calgary Public Library and talk with the librarian to find more books on Light
- I study few books from the Calgary Public Library on light
- Calgary Public Library:
- Searched different books on Light, Fiber Optic Cables, Undersea Cables.

Project Title: (Revised-Final)

24/7 Sunlight

Learnings & Ideas:

- Background Research
- Project Title

December 2025 (Week 2): Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

- Based on the revised Project Title, and Question, I am looking for the missing part of my background research

Missing part during my research (Revised-Final)

How do we get 24/7 Sunlight for illumination with the help of Fiber Optic cables in homes and workplaces, even during the nighttime?

- Based on the background research, I revised my questions more precisely
- I will try to solve these questions during my project

Question: (Revised-Final)

- Can we maximize the use of natural sunlight for illumination in homes and workplaces?
- How can we harness 24/7 Sunlight for illumination and reduce dependence on artificial lighting, even during nighttime?

Learnings & Ideas:

- Background Research
- Question

December 2025 (Week 3): Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

- Now, the time to work on hypothesis and prediction of my project
- Did research more on light and fiber optic cable
- Read books from Calgary Public Library

Hypothesis

- I think, the Window, a Reflective Tube or the Fiber Optic cable installed on the roof of the building/house can give enough direct Sunlight into the building/house for illumination.
- All the buildings/houses have a roof, and they can have windows to get direct natural sunlight.

Prediction:

- If I install a Window, a Reflective Tube or the Fiber Optic cable on the roof of the building/house, it will give direct Sunlight into the building/house for illumination.
- If we install a window or a reflective tube on the roof of the building/house, it will give direct sunlight into the house.

Independent Variable (What I change)

The roof of the building can be modified by installing a window or a reflective tube, or a fibre optic cable to pass the sunlight into the building/house.

Dependent Variables (What I observe)

During the daytime, we can get the sunlight inside the building/house.

Controlled Variables (What I keep the same)

- Same Sun,
- Same House/building,
- Same roof

December 2025 (Week 3): Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Resources used for information

- I saw many houses and in our school with Roof Windows to get the Natural Sunlight
- Also, I saw 'Skylights' that help to let sunlight from the roof of the building through reflective tubes in the house.
- Study on Fibre Optic Cable when Telus installed near our house
- Study on Sunlight that comes with heat and UV

Learnings & Ideas:

- Hypothesis
- Prediction
- Independent Variable
- Dependent Variable
- Controlled Variable

December 2025 (Week 4-5) Winter Break: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

- Brainstorm on Hypothesis and Prediction

Hypothesis (Additional)

I believe that the Fiber Optic cable can pass the Sunlight

Prediction: (Additional)

If I install a Window, a Reflective Tube or the Fiber Optic cable on the roof of the building/house, it will give direct Sunlight into the building/house for illumination.

December 2025 (Week 4-5) Winter Break: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

- Brainstorm on Hypothesis and Prediction

Hypothesis: (Revised-Final)

I think, when we install the fiber optic cables on a house/building roof, it can transmit enough direct sunlight for illumination inside the house/building.

Also, I believe that the fiber optic cable can transmit sunlight from the daytime location to the nighttime location on the other side of the world for illumination.

Prediction: (Revised-Final)

If I install the fiber optic cables on a house/building roof, it will transmit direct sunlight inside the house/building for illumination.

Besides if we install the fiber optic cable at one location (such as Calgary, Canada) and connect it to its antipodal or another location (like Perth, Australia), we will transmit sunlight for illumination from the daytime location to the nighttime antipodal, location and vice versa.

Learnings & Ideas:

- Hypothesis
- Prediction

Log Book

January 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Experimental Project name: 24/7 Sunlight
(Engineering: forces, structure and design)

Independent Variable: (Final)
(What I change)
- Installing fiber optic cables with a reflector dome and convex lens on a house/building roof
- Passing fiber optic cables inside the house/building from the roof
- Measured in numbers of Fiber Optic cables and number of reflector domes and a convex lens

Dependent Variables (Final)
(What I observe)
- Illumination/Sunlight inside the house/building (Measured in Lux (Lumen per square meter))
- Temperature inside the house/building (Measured in Celsius)

Controlled Variables (Final)
(What I keep the same)
- Same Sunlight
- Same house/building
- Same roof of the house/building

Log Book

January 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Material will be used for Working Model:

- Fiber Optic cable (approx. 10ft)
- Flashlight
- Light Meter
- Small toy houses (2)
- Reflector Dome (3-4)
- Hot Glue Gun and Sticks, & Glue (1 small bottle 150ml)
- Electrical Tape (1 roll), Clear Tape (1 roll)
- Cardboard, Scissors, Other Craft items

Experiment: step-by-step procedure: (for Working Model)

- First, I am going to install a Fiber Optic cable on the roof with reflector domes of both toy houses.
- The cable will go inside the toy houses, and it will connect to the reflector dome.
- Then, I will experiment with both, artificial light (Flashlight) and Sunlight.
- These lights will go through the dome on the roof then through the Fiber Optic cable and finally transmit the light out of the other dome inside the toy houses.
- As a result, the light illuminates the whole toy houses.

January 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Background Research:

Big Topic:

Light energy (electromagnetic energy)

Why is this important for society:

Light energy is very important in our daily life. Sunlight is very useful for giving us light and help to make Vitamin D cells in our body. Artificial light energy is used in our houses and other buildings such as workplaces etc. Light can be used for both nighttime and even daytime too.

Specific Topic:

'Transmitting Light Energy' through 'Fiber optic cable'

What do we already know about your topic:

Sunlight gives energy, light and help to make Vitamin D to our body. From Sunlight, we can get electricity through solar panels. Speed of Light is very fast and efficient. Fiber optic cable helps to transfer the light quickly from one place to the other.

What are we missing? (Final)

How do we get 24/7 Sunlight for illumination with the help of Fiber Optic cables in homes and workplaces, even during the nighttime?

January 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

How does my research answer that missing piece? (How my topic solves a problem)
We can get Sunlight by transmitting it into the Fiber optic cable. When one place in the world has Sunlight (Daytime), we can transmit it to other places which have no Sunlight (at the same time - Nighttime) and a dusk. Fiber optic cable is very efficient to transfer light very quickly without losing much of it.

Learnings & Ideas:
- Background Research
- Independent Variable
- Dependent Variable
- Controlled Variable
- Experiment

February 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Material used for Working Model: (Final)

- Fiber Optic cable (approx. 6.5ft)
- Shrink tube (to protect fiber optic cables)
- Flashlight
- Light Meter, Temperature Meter
- Small toy houses (tealight houses) (2), Reflector Dome (3)
- Convex Lens (1), Aluminum Foil
- Hot Glue Gun and Sticks, & Glue (1 small bottle 266ml)
- Duct Tape (1-2 roll), Clear Tape (1-2 roll)
- Masking tape (1 roll), Aluminum Tap (1 roll)
- Measuring Tape, Paper, Cardboard box
- Cardboard, Scissors, Other Craft items

February 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Procedure: (Experiment on a Working Model)

- First, I set up two toy houses (tealight houses) inside a cardboard box, with a partition dividing them to show different locations – one representing daytime and the other nighttime.
The houses are the controlled variables because they remain unchanged.

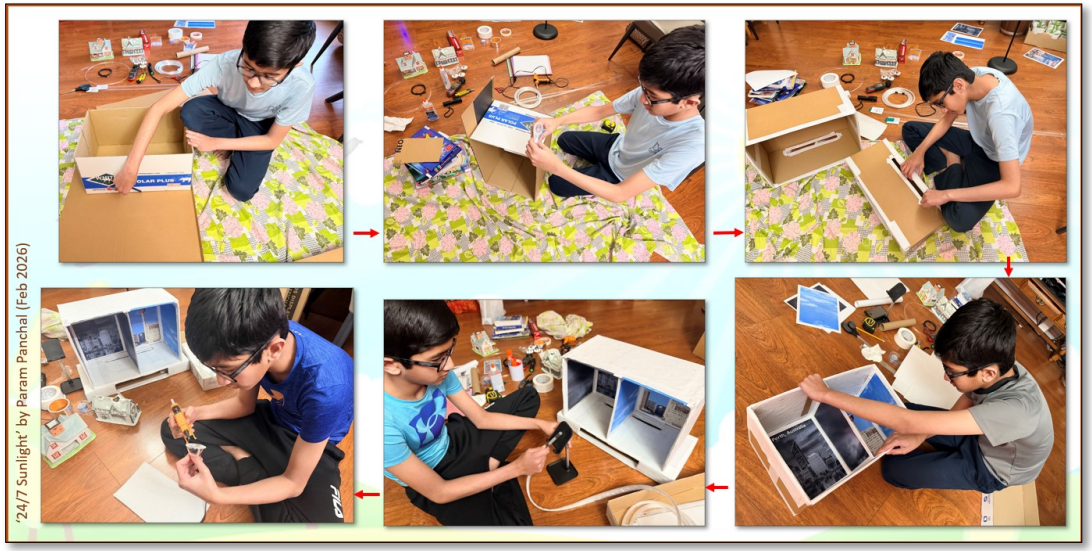
- Next, I installed fiber optic cables (about 6.5 ft long) along with a reflector dome and a convex lens near the roof of the daytime house to collect sunlight and transmit it through the cables.
The dome, convex lens, and fiber optic cables are independent variables that I changed, measured by the number of cables, the reflector dome, and the convex lens.

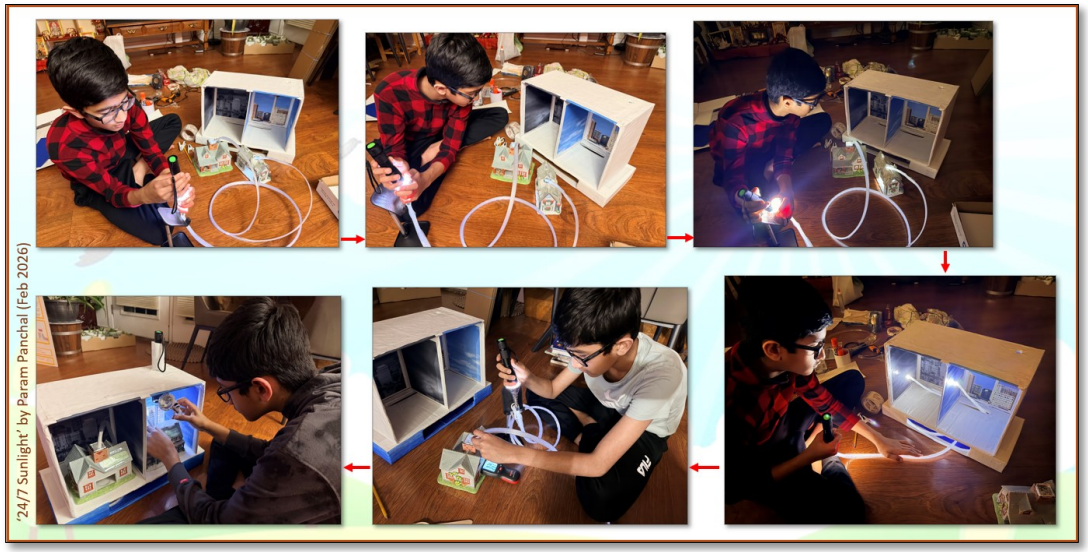
- Then, half of the fiber optic cables are connected inside the daytime house, ending in a reflector dome to distribute light throughout the house. The other half connect to the nighttime house, also ending with a reflector dome for light distribution.
The fiber optic cables and reflector domes are the independent variables (what I changed), while the houses are the controlled variables (what I kept constant).

- We can test the model using a flashlight by shining light into the dome near the roof of the daytime house. The light will travel through the fiber optic cables and reach the reflector dome inside the house. The same setup applies to the nighttime house. The illumination inside both houses can be observed with a light meter, measured in Lux (lumens per square meter).

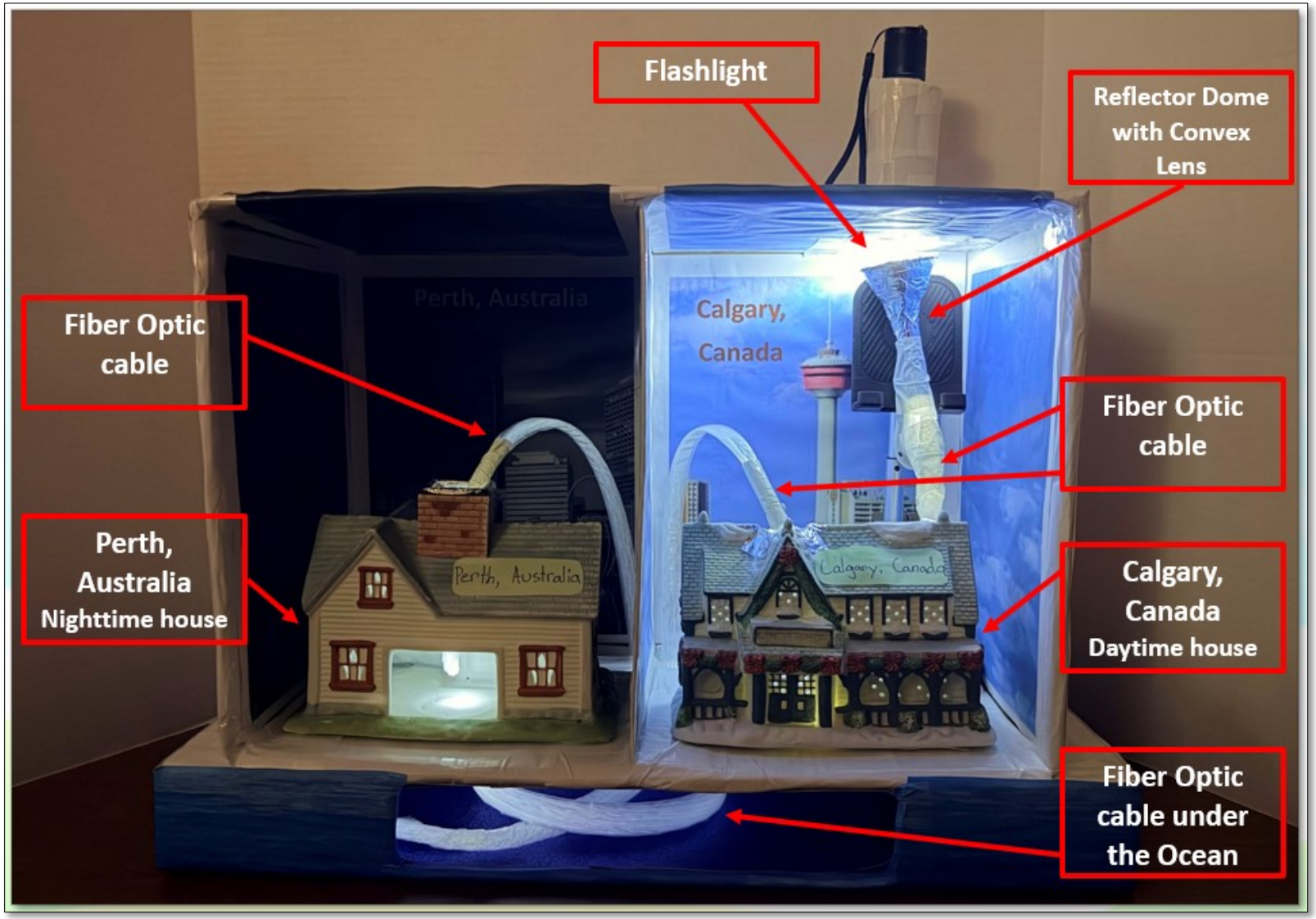
- Finally, we can test the model under sunlight and measure the illumination inside both houses with the light meter.

February 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)



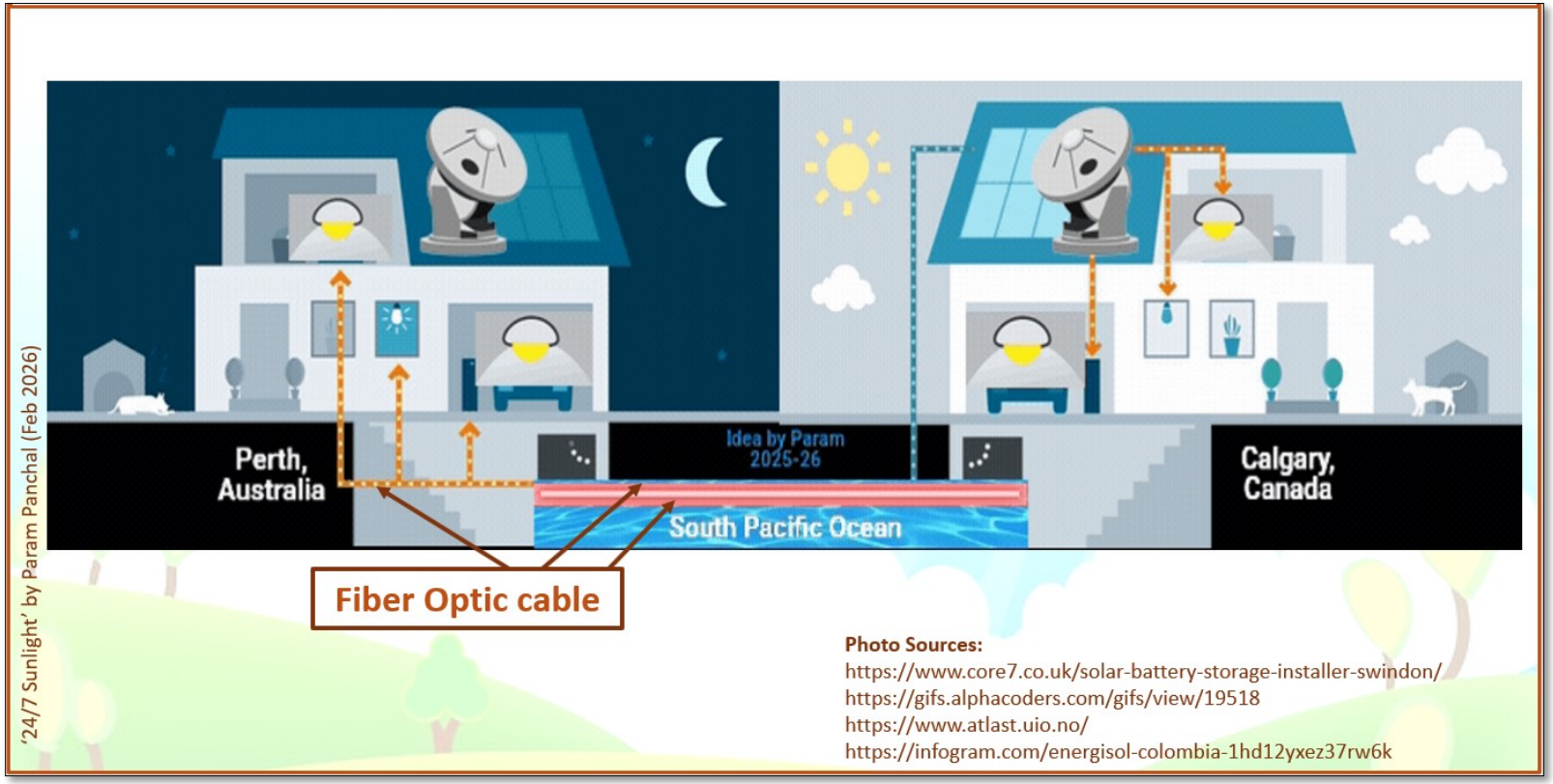


February 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)



February 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Diagram of the Working Model



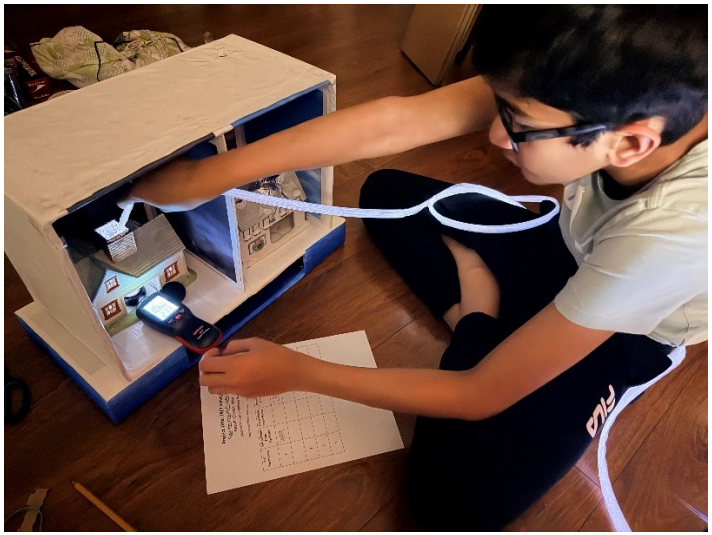
February 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Observations:

Result: (Experiment on a Working Model)

- I shined the flashlight into the dome a few times near the roof of the house.
- The light went into the fiber optic cables.
- The light continued going through the cables and ended in the house with a reflector dome.
- First, I used a light meter to measure the light in Lux (Lumen per square meter) directly from the flashlight.
- I have done the same thing for measuring the light inside the house at the end of the reflector dome.
- Lastly, I used the same light meter to measure the temperature in Celsius from at the start of my experiment to after 5 minutes, to check if the fiber optic also transfers heat with the light.
- I have also tested it under sunlight, and went through the same procedure.
- We can transfer light through the fiber optic cables inside the house with the help of speed of light.
- All my observations (in a table form) are recorded to show how much light is being transferred through the fiber optic cables.

February 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)



February 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Project Title: 24/7 Sunlight

Experiment with Flashlight

Result: Observation

(Experiment on a Working Model)

Final Experiment Date: Feb 21, 2026
1st Experiment Date: Feb 7, 2026

By: Param

# of Experiment	Lux (Lumen) From Flashlight	Lux (Lumen) Inside House	Temperature Inside House		Notes
			At Start	After 5 Minutes	
1	1449	1060	23.3°c	23.3°c	
2	1156	1008	23.4°c	23.4°c	
3	1310	1169	23.1°c	23.1°c	
4	1253	1148	23.3°c	23.3°c	
5	1175	1029	23.2°c	23.2°c	

Project Title: 24/7 Sunlight

Experiment under Sunlight

Result: Observation

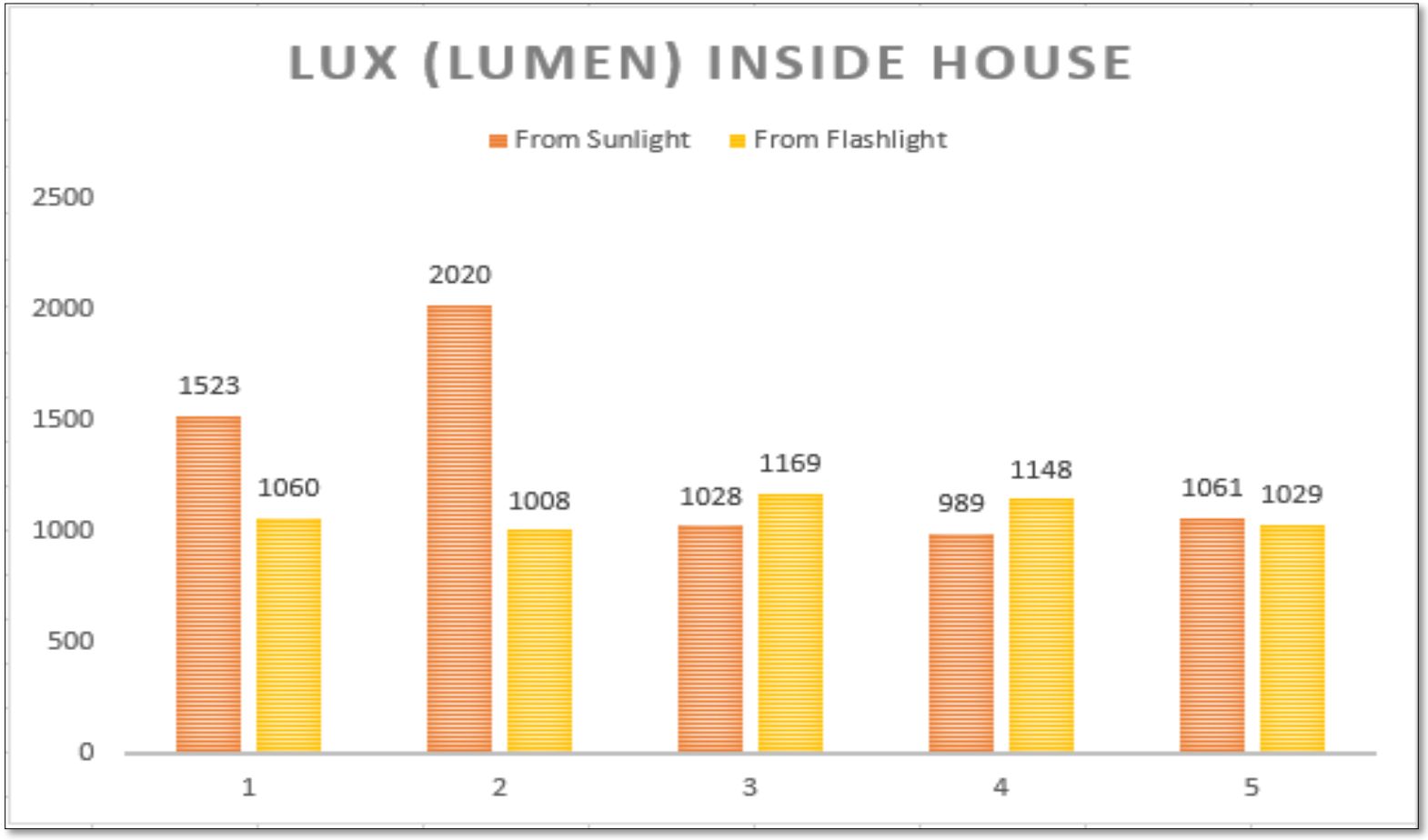
(Experiment on a Working Model)

Final Experiment Date: Feb 22, 2026
1st Experiment Date: Feb 8, 2026

By: Param

# of Experiment	Lux (Lumen) From Sunlight	Lux (Lumen) Inside House	Temperature Inside House		Notes
			At Start	After 5 Minutes	
1	61800	1523	21.7°c	21.8°c	Direct Sunlight
2	13830	2020	20.9°c	21.0°c	Daylight
3	9800	1028	20.5°c	20.5°c	Cloudy
4	7170	989	21.0°c	21.0°c	Cloudy
5	7360	1061	21.1°c	21.2°c	Cloudy

February 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)



February 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Analysis 1:

Lux (Lumen per square meter): Amount of Visible Light

- From direct sunlight, we can get between 32,000 to 100,000 Lux (Lumen per square meter)
- For daylight (in case sun is hiding behind the clouds), it provides 10,000 to 25,000 Lux (Lumen per square meter)
- In our house, normally we need about 100 to 500 Lux (Lumen per square meter) for our daily usage
- The maximum we would need is for small and detailed task, such as on Kitchen worktops. It would need to be between 500 to 700 Lux (Lumen per square meter)

- As per my experiment under Sunlight and with a Flashlight, I found that the light illuminates above 1,000 Lux (Lumen per square meter)
- 1,000 Lux (Lumen per square meter) is more than enough for all our daily illumination usage
- We can reduce the brightness of light by 'Light Dimming Filters' as per our illumination requirements

My project will provide an alternative solution instead of using the electricity for illumination. Instead, we will harness sunlight for 24/7 lighting all across the world.

February 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

ACTIVITY	LUX
Direct sunlight	32000-100000
Daylight (not sun)	10000-25000

February 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Analysis 2:

The speed of light

- The speed of light is very fast and efficient because it travels at 300,000,000 meters per second (300,000 km/s) in a vacuum
- In fiber optic cables (made with silica glass), the speed of light will be slower by 30%. The speed of light will be approximately 200,000 km/s in a fiber optic cable

Calculation:

n = c / v
n = Light refraction index / Electromagnetic waves
c = Speed of Light in a vacuum (300,000 km/s)
v = Speed of light in a material/medium

The refractive index of fiber optic cables (made with silica glass) n = 1.5

v = c / 1.5
v = 300,000 / 1.5
v = 200,000 km/s in a fiber optic cables

So, the speed of light is 200,000 km/s in a fiber optic cable.

<u>As per my project, the speed of light is very fast and efficient. The fiber optic cable can transfer the light quickly from one place to the other without losing that much light.</u>

February 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Undersea fiber optic cables

Currently, there are 1.4 million kilometers of fiber optic cable that have spread across the ocean for global internet connectivity. And the amplifiers, sometimes called repeaters, are installed every 100 km to amplify the light signals.

I have prepared my working model on a small scale to show how the fiber optic cable can pass light from once location to the other. For the real-life project, amplifiers need to be required to strengthen the light that is being passed through it.

Conclusion:

- **My hypothesis is true:**
  - We can maximize the use of natural sunlight (Controlled Variables) and transmit direct sunlight inside the house/ building (Controlled Variables) for illumination (Dependent Variables) from the roof of the house (Controlled Variables) through the fiber optic cable (Independent Variables).
  - Likewise, we can transmit sunlight from the daytime location to the nighttime antipodal location through the fiber optic cable (Independent Variables).
- **My experiment answers the missing piece of my background research:**
  - Fiber optic cable is very efficient to transfer light very quickly and we can transmit the Sunlight in homes and workplaces, even from daytime location to the nighttime location.
- **Importance of energy to the world:**
  - We found another way to harness 24/7 sunlight for illumination and reduce dependence on artificial lighting, even during nighttime.

February 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Application: Next Steps

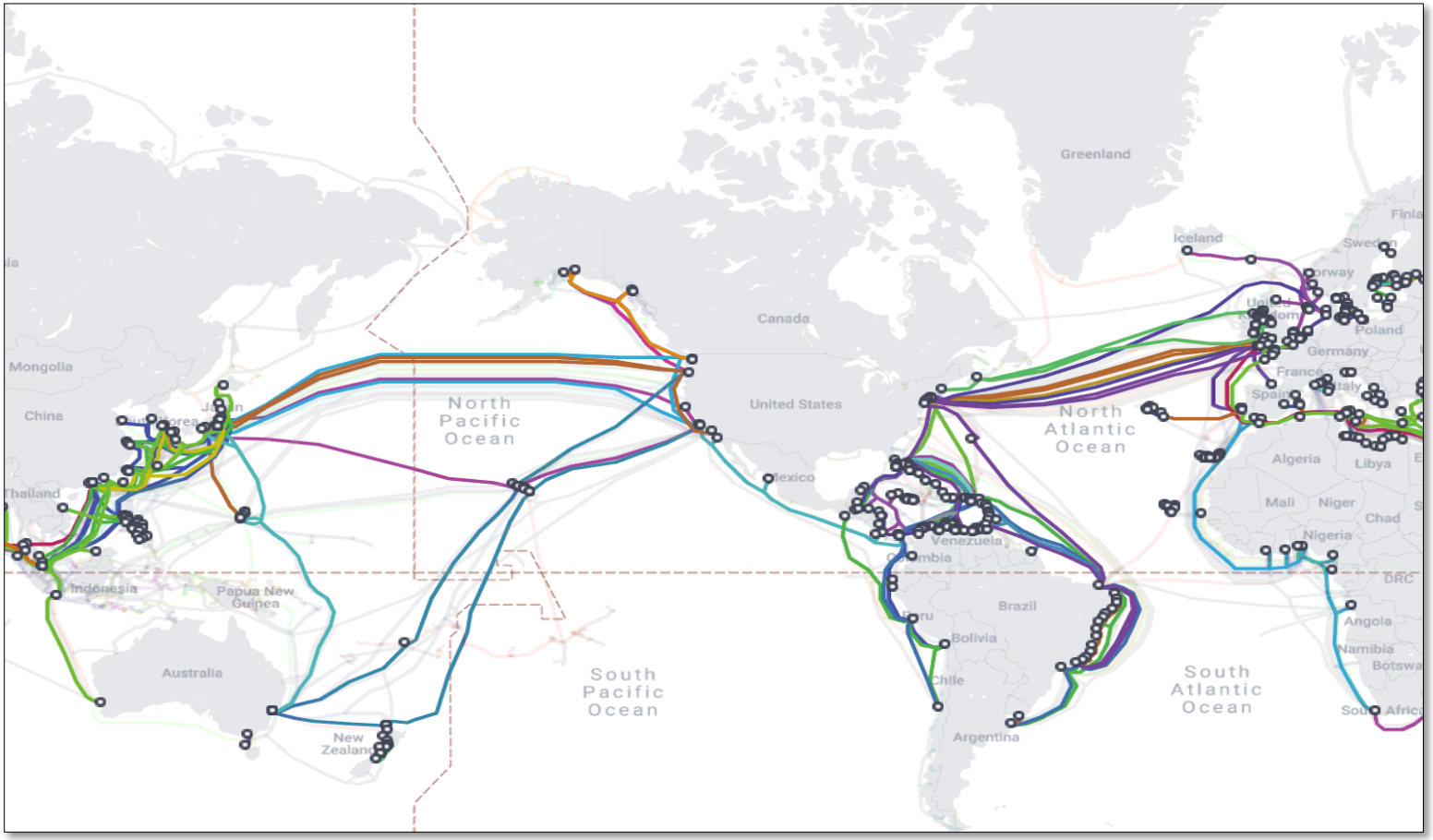
Daytime Location

- We can install the dome on the roof of the house and the big building with the fiber optic cable and end inside the house with the reflector dome for illumination during the daytime.

Daytime to Nighttime Location

- The distance between Calgary and Vancouver is 972 Kilometers by road, and Vancouver to Perth, Australia by cargo ship (by sea) distance is 16,862 kilometers
- In total, the distance is **17,834 kilometers** between Calgary, Canada and Perth, Australia
- As per current undersea cable network, the cost for installing the cables under the sea is really high, from $6,000 to $20,000 per kilometer
    - The cost depends on number of cables and the distance or amount of fiber optic cables
- The approximate cost for the real-life big scale project (From Calgary, CA to Perth, AU)
    - Total cost may be: $10,000.00/kilometer for 18,000.00 km = **$180 million**
- Population of Canada is **41,549,366** currently (as on February 11, 2026)
- If each residence of Canada donates or gives **$4.34**, it will cover the whole cost of installing the fiber optic cable
- We can transmit sunlight for illumination from the daytime location to the nighttime antipodal location
- After installing the fiber optic cable network for illumination, there will not be **No electricity bills** for lighting
- Need more research and experiment for the real-life large-scale project and the expert engineers would study for the practicability of my project for the real-life large-scale project.

February 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)



February 2026: Learnings, Observations, Ideas, Feedback, Notes, Sources (references)

Sources of Error:

Measurement Errors: (during conducting experiments)

- During the observation of my working model, Sunlight strength is not constant during the day because of the clouds.

Machine / Mechanism errors:

- Light Meter is more sensitive and the readings to hit their maximum limit under direct sunlight
- Illuminance accuracy +/- 1000 Lux as per Light Meter description
- Temperature accuracy +/- 1 Celsius as per Light Meter description

Fiber optic cable:

- Plastic fiber optic cable with good quality (not the best quality) is used for my working model. The cable helps to reduce heat while transmitting light.
- There are different types of high-quality optic cable that can be used for real-life project and for underwater usage.

Sources (References, Citations)

Websites: For Project Research

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