

chapter 1

Introduction: NYAWA Light

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**Allah is the Light of the heavens and the earth.
The example of His light is like a niche within which is a
lamp,
The lamp is within glass, the glass as if it were a pearly
[white] star,
Lit from [the oil of] a blessed olive tree,
Neither of the east nor of the west,
Whose oil would almost glow even if untouched by fire.
Light upon light.
Allah guides to His light whom He wills.
And Allah presents examples for the people,
and Allah is Knowing of all things.
Quran, 24-35**

NYAWA is back in its sixth edition with the theme LIGHT. Throughout the ages, light has been valued as the most beautiful phenomenon of creation and the eye that perceives it as the most important human organ of sense perception. Its presence is essential for the most rewarding perception of almost all art. With the advancements made in lights and display technology nowadays, there is no better time than the present for NYAWA to explore the mystical, yet beautiful wonders of light, whether it be seeing shadows with the naked eye or observing fireflies through an application from a mobile gadget. Through scientific experimentation in the form of art, NYAWA provides scientists with a revolutionary way to educate visitors about the many functions of light and its significance to human life.

LIGHT: What is it anyway?

To answer this question, we have to go back more than 1000 years to the year 1015 when Al-Haytham (Al-Hazen) published his famous seven volume Kitab Al-Manazir (Books of Optics). Al-Haytham was a pioneering scientific thinker who made important contributions to the understanding of vision, optics, and light. Today, many consider him a pivotal figure in the history of optics. He has been dubbed the 'father of modern optics'. He was the first person to explain that vision occurs when light bounces on an object and then is directed to one's eyes. The United Nations Educational, Scientific and Cultural Organisation (UNESCO) proclaimed 2015 as

the International Year of Light (IYL2015) to celebrate Al-Haytham's findings and raise awareness about the achievements of light science and its applications, as well as its importance to humankind.

Light is part of the electromagnetic spectrum, visible to the human eyes at the wavelength range of 400nm to 700nm, or in laymen terms from blue to red. Blue colour lights have high energy but is shorter in its wavelength, while red colour lights have lower energy but are longer in wavelength. That is why rainbows always appear in the shape of an arch with the longer wavelength (red) at the outmost part of the rainbow and the blue is located on the most inner side of the rainbow. Combine all the colours and you will get white light. Absorb them all and it will get pitch black (or the absence of light). It took another 900 years before Max Planck of Germany came up with the 'duality concept of light' which posits that light can behave as a wave and as a particle. This theory answers so many questions on light-matter interaction, as Albert Einstein wrote, "It seems as though we must use sometimes the one theory and sometimes the other, while at times we may use either. We are faced with a new kind of difficulty. We have two contradictory pictures of reality; separately neither of them fully explains the phenomena of light, but together they do." Perhaps it is also true for scientific findings, only by describing it as an art can better understanding be achieved for all.

Opening this chapter, I quoted a verse from the Holy Quran from the Chapter of Light (Surah An-Nuur). Notably the most mystical verse from the holy book, many great minds and scholars throughout the ages have been drawn to interpret that single verse. Scientists in optics have always wondered if we can store light and stop light in its path without even destroying whatever information it carries. Imagine stopping a bullet fired through a gun with the palm of your hand, let alone stopping a very fast light without destroying the light or your hand. Light is mysterious yet beautiful and full of wonder!

Jury Review 1

Mohd Saleh Jaafar

The wonders of the world may easily be perceived by the eyes but in order to truly appreciate them, in many cases they need to be explained in very simple and interesting ways. This is what NYAWA'17: LIGHT accomplishes. It beautifully explains the science behind the wonders of nature through an interactive and educational showcase. I was very impressed with all the exhibits presented. Most of them were attention grabbers and the artefacts were showcased as if they were 'speaking' to me.

The exhibitors really outdid themselves this year and the result is a diverse and eye-opening showcase of educational artworks from various fields of science including biology, biotechnology, agriculture, forestry, physics, medicine, engineering, and veterinary science. These exhibits are not only nice to view, but are very informational and enlightening as well. All of them are able to connect the dots often missing between science and technology with arts, without compromising the scientific reasoning underpinning each artefact. The exhibition is also a brilliant opportunity for scientists to learn how to present scientific facts through artforms.

Out of all the artefacts displayed, two that really caught my eye were 'You Light Up My Life!' and 'Glowing Mushrooms'. The former is a most effective showcase of the symbiotic relationship between squid and microorganisms. I learned very quickly about this mutually beneficial relationship through the artefact, which was presented in the form of a human sized mechanical squid that visitors can engage with. The

latter demonstrates the way plants interact with light, and was impressively displayed as an art exhibit that aroused the curiosity of audiences in wanting to know why the mushrooms glow.

Using apps easily downloaded from any smartphone, visitors can view two of the coolest exhibits at NYAWA'17, namely 'Bioluminescence' and 'Cold Light'. Kudos to the exhibitors for coming up with a fun way for visitors to learn about science and the nature of light. Similarly, 'Maze Warriors' enables visitors to have a blast playing with the artefact, which involves locating the antagonist using a light pen, as they learn how light behaves.

All of the artefacts display great workmanship, as well as ability to convey and transform science and the wonders of nature into a magical artistic piece. This proves that learning science and technology can be a lot of fun, and provides a platform for group discussions among experts on how to capture the public's heart and nurture an appreciation and love of science.

Congratulations to the organizers of NYAWA'17 for making this year's exhibition a delightful experience for visitors, providing them with the opportunity to expand their knowledge. I hope in the future, more hype will be generated for future editions of this exhibition so that more people will be aware of NYAWA and come to view the exhibition. I also extend congratulations to the chief curator and other creative minds behind these exhibits. You are also wonders of nature!

Jury Review 2

Wan Nor Liza Mahadi

Light is the agent that stimulates sight and makes things visible. It is also an illumination that allows us to see more clearly and at the core of every living thing is a sphere of light.

What would our life be like without light? NYAWA'17: LIGHT exhibition wonderfully showcases the essence of light in our lives. This exhibition unfolds light in multifaceted ways.

I am overwhelmed with the richness of meaning that can be conveyed through many masterpieces here. Knowledge in various fields such as engineering, medical, biology, sciences, health, architecture, and environmental science to name but a few, are successfully communicated to the audience through many artefacts.

The artefacts displayed range from various fields. For example, the dancing light in 'Light Music', which shows a light transmission from a laser pointer, modulated with a musical sound, is from an engineering perspective. From a medical perspective, we have 'Loop Mediated Isothermal Amplification (L.A.M.P.)', showcasing a fluorescent DNA based detection method, which can be measured upon direct reaction of target DNA. 'Circuit of Life' depicts neurons that generate electricity. The 'Bouncy Beam' shows the jumping action of electric currents to mimic the nervous system.

The symbiotic relationship between the squid and the microorganism *Alivibrio fischeri*, which provides the squid with natural protection from predators is displayed in an attractive and colourful way in 'You Light Up My Life!'.

A favourite among Malaysians and even in Southeast Asia for its wide ranging use, pandan leaves are beautifully displayed in the video that depicts the movement of pandan essential oil in the water in 'Rhythm of Pandanaceae'.

'The Felicity of Fractals' reveals how patterns of nature can be experienced visually. Gold nanoparticles' interaction with light is influenced by their environment, size, and dimensions as explained in 'The Gold Particles'. Both artefacts are informative as well as decorative.

The artefact 'Squint' offers the audience the opportunity to experience different types of squint, ranging from exotropia to hypotropia through handheld glasses. This is a clever way to educate people about the condition, especially our youngsters so that they will be more supportive of those who have the condition.

'Light Gap Forest' explains the distribution of light through the forest floor while 'Glowing Mushrooms' showcases the light-emitting substance luciferin.

There are more such as 'Wax and Wicks', 'En'light'ening Journey', 'A Cupful of Light', 'LightBOX', 'Cold Light', 'Artificial Photons', 'Maze Warriors', 'Cat-Eye Conundrum', 'Bioluminescence', and 'Shape of Image', all of which stand on their own in delivering impactful messages to the audience.

NYAWA'17: LIGHT exhibition is an excellent way to educate and convey knowledge to our society. It stimulates our thinking, in nurturing and challenging our minds to dissect and understand this new wave of borderless knowledge.

I would like to congratulate UPM, the organisers, curator, and committee of NYAWA'17: LIGHT.

Bravo. You are light years ahead!