

Solis Ortus - Gabriel Residence

Sri Lanka / Pelawatte, Sri Jayawardenepura, Kotte

6.8894361, 79.9283333

Client Name: Harin and Mihiri Gabriel

Project website:

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Project Description

“Solis Ortus” -meaning my rising of the sun is a private residence located in Pelawatte (urban context - within the capital city of Sri Lanka - Sri Jayawardenepura, Kotte). The concept of this residential house is to connect to the environment, in sites deeply embedded in the urbanised and rapidly urbanising “grid” of Colombo and its suburbs, of which the capitol city is very much a part of. The approach focuses on integrating the environment without the heat, humidity of the tropical context. On a more detailed level the approach to the building envelope is cognizant of its immediate function of sheltering the internal spaces, as well as their impact on future usage patterns. Cavity walls that ease the heat gain - left bare, freed of the need to paint over reducing life-cycle cost, inviting to the touch, changing colours and how it is perceived with the rhythm of the sun - insulated roofs, with photo-voltaic panels that render the naturally lit, naturally ventilated house a net-zero energy entity.

Building Details

Type of Building

Private Residence

Type of project

New building project

Site Area

840 m²

Number of Floors

2

Gross floor area

430 m²

Net floor area

395 m²

Non Air-conditioned area

368 m²

Total Cost

EURO 182,000

Cost per m²

EURO 423

Year of completion

2014

Year of occupancy

2014

Project Team

Organisation

Arch. Narein Perera - Individual Practice

General contractor

Mr. Saman Gamage

Structural Engineer

Eng. Keerthi Ratnayake

Architech

Archt. Dr. Narein Perera

Architect's profile

Narein Perera runs a small practice, which prides itself in the degree of innovation and holistic applicability of its architectural solutions. A Senior Lecturer at the Department of Architecture, University of Moratuwa, with a teaching and research focus on climate sensitive design at both, building and urban scales, for which he holds a PhD, strives to apply 'lessons-learnt' in his practice. The practice, now over ten years old, has been quite successful over the years, winning recognition for design, both locally and internationally. On the international `stage, he was awarded the 'Architecture Asia Award for Emerging Architects' as a part of the Asian Congress of Architects sessions in Malaysia, 2014. In his home country of Sri Lanka, he was the recipient of the 'Young Architect of the Year' in 2010 and Sri Lanka Institute of Architects, awards for Design excellence in 2007 and 2011.

Lighting design

Archt. Dr. Narein Perera and Archt. Shashikala Ranasinghe

Other (Please specify)

CQS. Sunanda Gnanasiri Quantity Surveyor

Landscape Architect

Archt. Dr. Narein Perera

Environmental Consultant

Archt. Dr. Narein Perera

Climate Analysis

Describe the local climate

Pelawatte has a tropical climate and fair temperature all throughout the year. The temperature averages around 31 degrees Celsius maximum from March to April. The April is the hottest period of the year and shading is seen as the best effective method of cooling. You can find major changes in the weather during the monsoon seasons from May to August and October to January when heavy rains can be expected. The solar radiation during the day sometimes border on intolerable because of the combination of heat and humidity.

Design Approach

Concept

The conceptual approach to the creation of spaces that can overcome the negativities of building in the urbanised tropics was one of "Layers". Layers that look to distance and isolate. Layers that filter and insulate. Layers that protect and create freedom. Ultimately – layers that welcome "the rising of the sun". The layered approach emanates from the zoning of site and spaces, right down to the minute detail, thus, each level of intervention is deemed essential to the whole.

Site integration

The most creative approach in the design is the integrating the site context with the building. The parameters of the urban context and the definitions of the residential house was clearly understood by the architect and he has used the land edges as boundaries to zone the street and residential site. Protective layers, in particular the aircrete block screen wall on the street edge and bamboo tat screened steel grilles create a further envelope at the edges of the open spaces, allowing almost all of the living, eating and sleeping spaces to be almost devoid of formal doors and windows. The space flows unimpeded both horizontally and vertically, again expanding the physical space to encompass experiential combinations that the home owner has the liberty to control by the act of simply opening or closing a tat screen.

Building design

Passive solutions were initiated from the building orientation onward. Having the long edges of the major habitable spaces facing north-south orientation the architect managed to capture major wind funnels in the context. Service areas such as kitchen and store rooms located to avoid the heat gain to indoor spaces on the east and west edges. The central courtyard

in the building helps to circulate fresh air within the building. The interconnected open spaces encourage cross ventilation. Shaded courtyards create series of cool islands with evaporative cooling on the site. The complexity of this is integrated with both large and small courtyards connected with series of spaces. The intergrating daylight is another passive design decision made. Extensive planting utilised is - by design - for shade and insulation. and evaporative cooling

Special Feature

Natural Lighting

The integrating daylight is a passive design decision made. Extensive planting utilised is - by design - for shade and insulation. and evaporative cooling. Horizontal shading canopies and pergolas shade fenestration and walls on the upper level, while cantilevered plant troughs shade the lower levels.

Water efficiency

The main approach is to direct the rainwater for the garden, replenish the ground water and minimise run-off, especially outside the site. Turfed roofs with a minimum of 300mm of earth, water spouts and collection points at ground level, together with a below ground network of perforated pipes augment this process.

Passive heating/cooling

The shaded building envelope is the strongest element in the design. Screens and extensive vegetation use enhance and facilitate the approach.

Cost effective features

The focus is on life cycle cost, with materials and finishes that need little maintenance and no need for periodic painting etc. Cost implication - Low

Eco-friendly features

Limited material usage for doors and windows. Large openings with bamboo tat screens used as an alternative. Timber utilised for essential spaces for security and privacy, adopt farmed timber species with water based clear protective coatings.

Other features

The landscape encompasses indigenous fruit, flowering trees and climbers as the main focus in space making.

Energy systems

Interior Lighting

Custom designed luminaires use Compact Fluorescent Lamps.

Exterior Lighting

Compact fluorescent and LEDs

Ceiling Fans

KDK (51-57W) / 1 per room except the living room

Air-conditioning

split type - for one room only

Lift

n/a

Energy efficient systems

The residence is designed for natural light and ventilation. So much so sealing of the spaces for mechanical cooling is a special effort. A single room housing the nursery and room for a new born was designed as an air-conditioned space. This too primarily for sound insulation and extra protection from tropical insects. All lamps in the custom designed luminaires are either CFL or LED. The CFLs are predominant in the interior spaces. A Solar water heater is adopted for the supply of hot water.

Energy efficient systems

Solar PV, net-metered systems take the bulk of the lighting and plug loads. A Solar water heater is adopted for the supply of hot water. A distinct difference is seen in the use of the air-conditioner at latter stage of the occupancy, where, the PV system not designed for the air-conditioning consumption, resulted in the use of grid electricity. The systems advantage of being net-zero was compromised by this factor.

