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- exploring energy-conscious design
- technology-driven architecture...
- auto-art furniture

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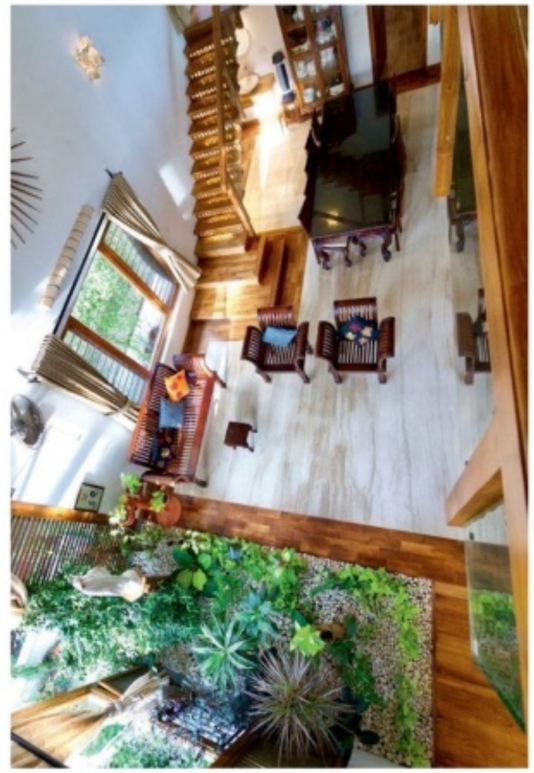

Ajay Abey

Tara Pandala

A Spacious Play of Volumes…

Project: Antony Residence, Kollam, Kerala
Architects: Centre for Sustainable Built and Natural Environment, Kollam, Kerala

This project – a humble abode for a family of four – is located a few hundred metres from the shoreline of the Arabian sea in the city of Kollam at Kerala. The residence is an illustration of a premium energy-efficient project which justifies the typology of a home – a place to live, pray and cherish. The overall plan allows flexibility and interlinking of spaces, encouraging cross interactions between spaces and amongst the housemates. Premium finishes with a warm accent have been used to create a cosy yet lively atmosphere. Complementing these finishes, wooden frames and elements with hues of teakwood add warmth and elegance. Despite its small footprint, an approximate area of 3000sq ft in two floors, the house is a capacious play of varying volumes connected with one another.

The orientation of the house has been carefully decided to optimise passive thermal performance and convective cooling. Structural control of the opening sizes assists in channelising the wind through the smaller opening on the north facade to the large openings on east and south facades, thereby curtailing the need of any mechanical installations or energy supply to increase the wind speed. The stack effect is achieved by the positioning of air outlet gable on the main roof which lets the warm, lighter indoor

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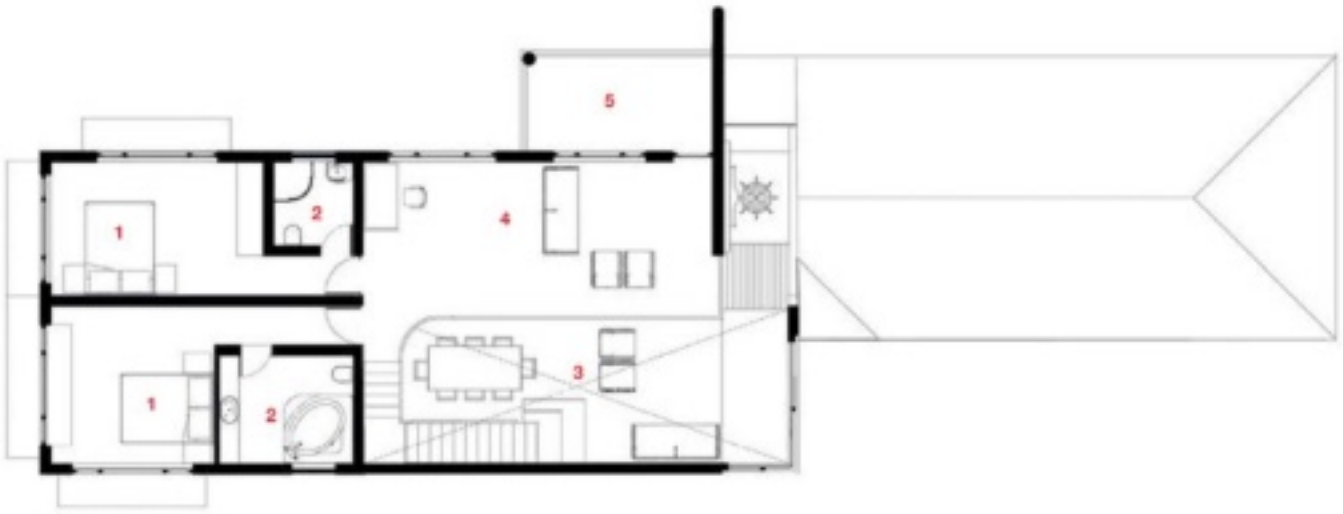
GROUND FLOOR PLAN

1. PORCH
2. VERANDAH
3. DRAWING ROOM
4. FAMILY
5. DINING
6. UTILITY
7. KITCHEN
8. WASHROOM
9. BERDROOM
10. MASTER BEDROOM
11. MASTER WASHROOM



1. BEDROOM
2. WASHROOM
3. DINING AND LIVING BELOW
4. UPPER LIVING
5. NORTH WEST BALCONY

FIRST FLOOR PLAN

Overview of Sustainability Features:

- Space organisation that facilitate both Stack & Cross ventilation to avoid active cooling.
- Large living volumes with combination windows provide ample daylight and insect-free interior.
- Multilayer lightweight roof as a sustainable energy efficient solution by reducing the total quantity of material and reusing old tiles.
- Applying landscape ecological concept.

air to flow out. The cool, denser sea breeze will enter through a number of stainless-steel glazed and louvered combination window wall facade on the lower side. The tallest roof gable of the overhead water tank also acts as a windcatcher which efficiently directs the north west sea breeze into the interiors. Since the velocity of the wind is higher on the sea side, the technique of the windcatcher from the arid zones proved quite successful in tropical climate as well. Dynamic effect of high velocity wind is utilised to create sufficient air movement, as much of the available wind is captured through the windcatcher and the windows. The wind incident at 45° on the north-western side will provide a higher average wind velocity indoors and a better air movement. To increase cross ventilation, larger outlet openings are on the leeward side and smaller inlet openings in the windward side.

The wall façade with large windows on the east side welcomes diffused morning light through the glazed and louvered stainless-steel mesh-configured opening. Despite its small footprint – an approximate area of three thousand square feet – the house is a spacious play of varying volumes connected with one another by the ample natural

LARGE LIVING VOLUME TO ASSIST
CONVECTIVE COOLING

lighting. All the bedroom windows are configured with large glazed opening at the centre pane in order to maximise the natural day light.

Depleting building resources is a huge concern to all energy-conscious designers. Mining of river sand for RCC construction as well as mining of coarse and fine aggregate from the Western Ghats is often considered to be an environmental disaster. To reduce and mitigate the damage of these resources, a multi-layered lightweight roofing system was developed by the architects, who took cues from the local traditional timber roofs of Kerala. This roof is innovative in the application of present era materials, structural rigidity and energy efficiency. The structural framework comprises galvanised iron rectangular hollow sections covered with a layer GI sheet for weather-proofing, which could be reused after its life cycle. The roof tiling consists of used terracotta Mangalore tiles, collected from the dismantled buildings in the surrounding area, acts as a skin atop the lightweight structural system. A 20mm layer of Thermocol slabs acts as an insulating material between the tiles and GI framework. Besides providing thermal insulation, the roof is proof to heavy Kerala rains and also creates interesting volumes and covers larger spans at the expense of very little material as a very successful roofing system replacing the huge resource demanding concrete. Local labour was employed in the fabrication of the roof as the technology involved was simpler and universally applicable. Since the entire roofing system is lightweight, the economical and material savings has been distributed to the walls below and hugely on the foundation cost. A portion of the roof is covered with solar water-heaters and PV panels which generates sufficient energy for the heating needs and common area lighting. The electrical systems are configured to allow the house to incorporate net metering system in the near future. Solar chimney effect is applied to passively cool the roof, wherein the hot air that is present in between the layers of the roof which is heated by the sun escapes through the top (natural stack effect), and the cool air from the lower portion is naturally drawn in and dragged over the metal sheet thereby cooling the roof naturally during the day.

The project relies deeply on a sustainable approach of landscape by selecting the native species and enhancing the potential of recreating the habitat for local flora and fauna. A subtle landscape treatment in the interiors achieved through abundance of natural light helps to connect the inside with outside through symbiosis of green and built environment. The permeable hardscape upholds the sustainability principles through harvesting of rainwater.

Factfile

Client: Antony Mattel

Design Team: Tara Pandala, Ajay Abey and Prof Eugene Pandala as Directors

Consultants: Centre for Sustainable Built and Natural Environment

Contractors: Central Projects and Works Department (structural and civil)

Built-up area: 278sq m

Cost of project: INR 1.15 Crore

Year of completion: 2017