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- **Name of the College:** **Shri Madhwa Vadiraja Institute Of Technology and Management, Bantakal, Udupi**

- **Project Title:** **Evaluation of performance and energy saving potential of earth air tunnel system inside the building as sustainable alternative.**

- **Branch:** **Civil Engineering**

- **Theme (as per KSCST poster):**
  Non-conventional structure

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- **Date of commencement of the Project: 20/10/2022**
- **Probable date of completion of the project: 15/05/2023**
- **Keywords:**

Temperature detection, Humidity, Moisture Content, Under ground tunnel system

Introduction:

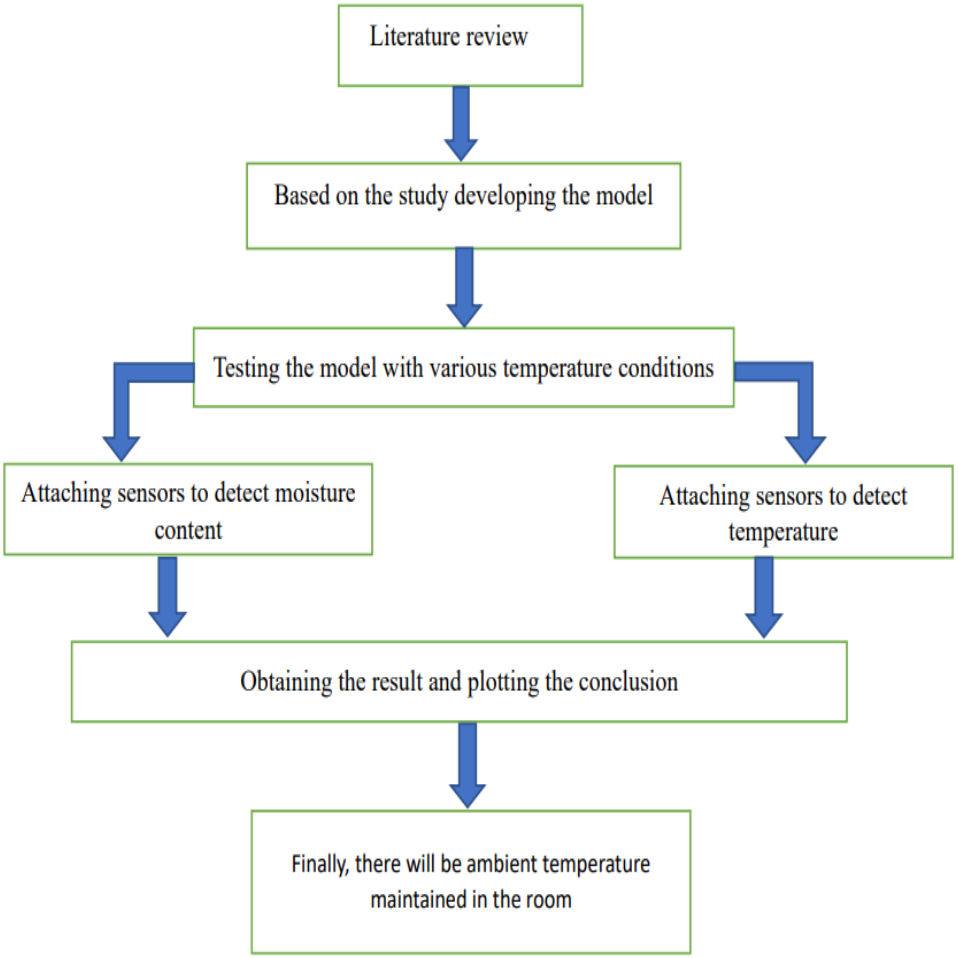
The Earth Air Tunnel System (EATS) is an innovative approach to heating, cooling and ventilating buildings using the earth's natural temperature stability. The EATS consists of a series of underground pipes, known as earth tubes, that circulate air from outside the building through the earth, where the air is naturally cooled or heated, before being brought into the building. The earth tubes are typically made of plastic, concrete or steel, and are buried underground at a depth of about 3 to 4 meters. The length of the earth tubes can vary depending on the size of the building, but they can range from several meters to several hundred meters. The system works by taking advantage of the constant temperature of the earth, which remains relatively stable at around 12 to 18 degrees Celsius throughout the year, depending on the location.

In the summer, the air outside the building is hotter than the temperature of the earth, so the earth tubes cool the air as it passes through them. In the winter, the air outside is cooler than the earth, so the earth tubes warm the air. This helps to reduce the energy needed to heat and cool buildings, as well as reducing the building's carbon footprint.

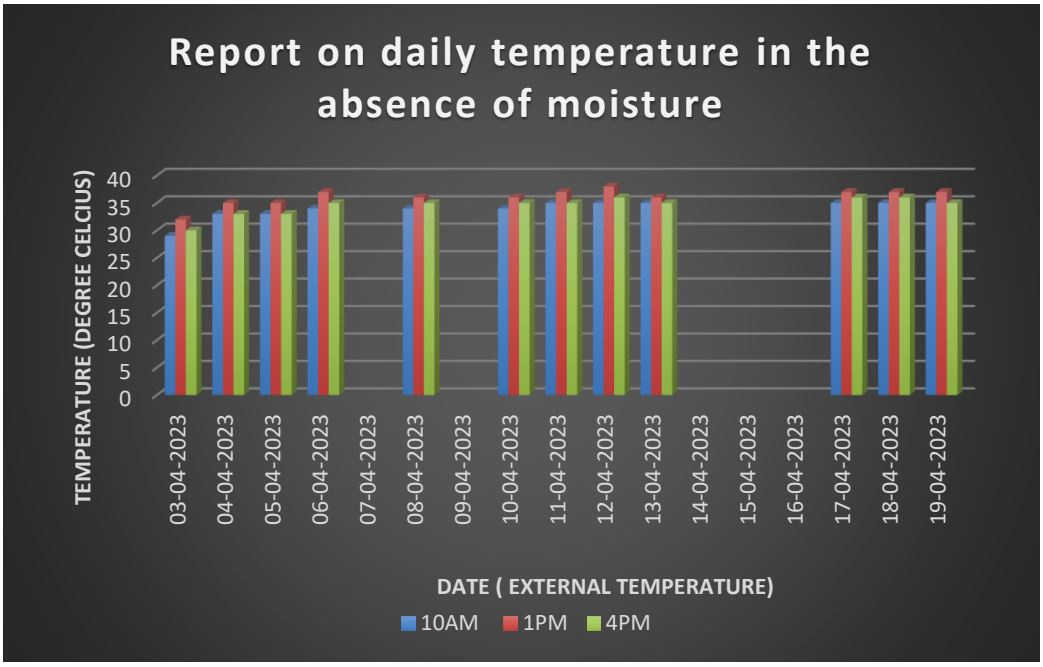
The EATS system can also improve indoor air quality by filtering out pollutants

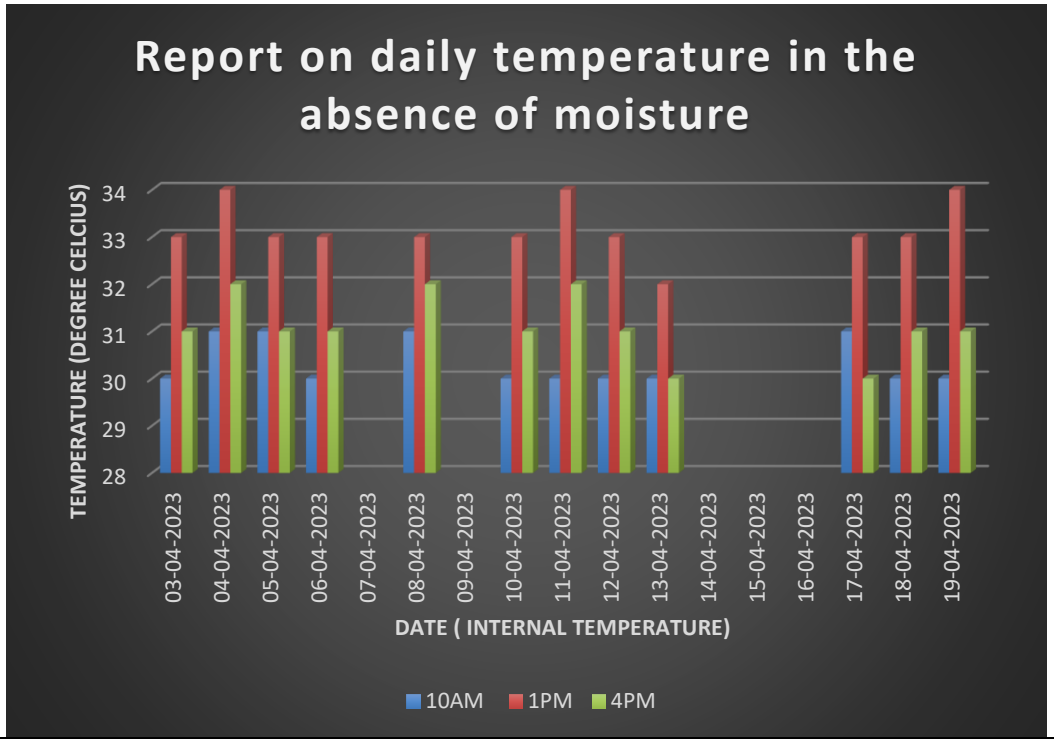
	and allergens from the incoming air. Additionally, because the system relies on natural ventilation, it can reduce the need for mechanical ventilation systems, which can be noisy and costly to operate. The Earth Air Tunnel System, also known as earth-air heat exchangers, is a method of using the thermal energy stored in the ground to heat or cool buildings. The system consists of a network of underground pipes that draw in fresh air and transfer it to a heat exchanger unit, where the air is either warmed or cooled by the ground's temperature, depending on the season. The tempered air is then circulated throughout the building, providing a comfortable indoor environment without relying solely on conventional heating and cooling systems. The Earth Air Tunnel System is a sustainable and energy-efficient way of heating and cooling buildings, as it relies on the natural thermal energy stored in the ground, which remains at a relatively constant temperature throughout the year. This system is especially useful in regions with extreme temperature fluctuations, as it can provide a consistent source of heating and cooling without relying on fossil fuels or electricity. The installation of an Earth Air Tunnel System requires some excavation work and piping installation, but it can be integrated into both new and existing buildings. Overall, the Earth Air Tunnel System is a sustainable and cost-effective solution for heating, cooling, and ventilating buildings that can reduce energy consumption and lower greenhouse gas emissions.
•	**Objectives of the project:** • How eco-friendly the EAT will perform when compared with conventional cooling system. • Comparison of maintenance and service life with the conventional system. • Providing sustainable and renewable energy source.

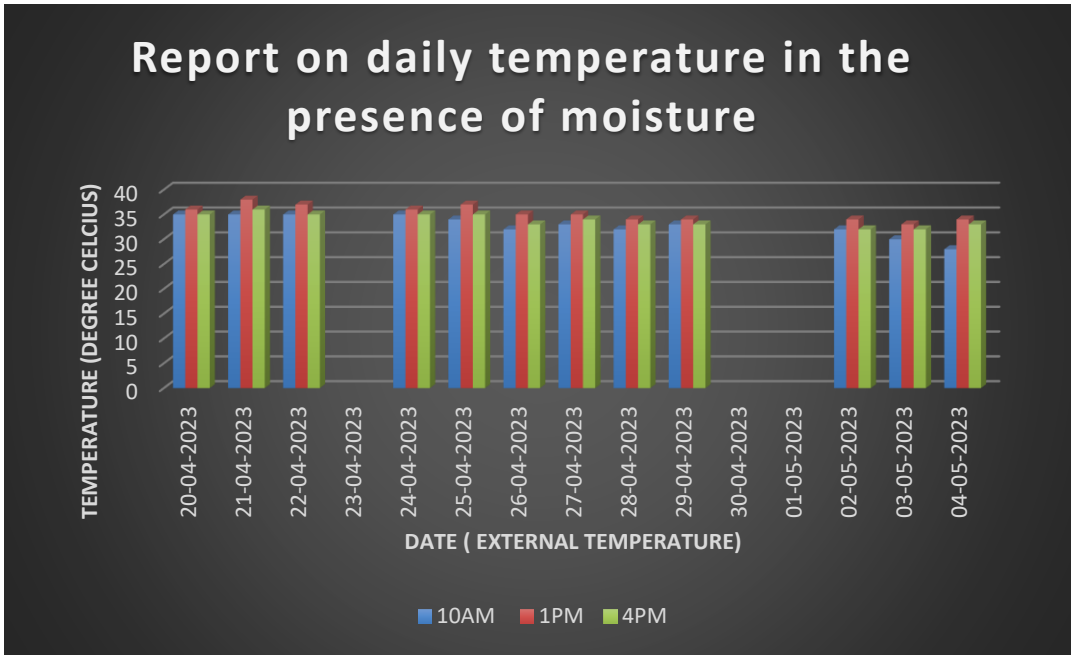
Methodology:

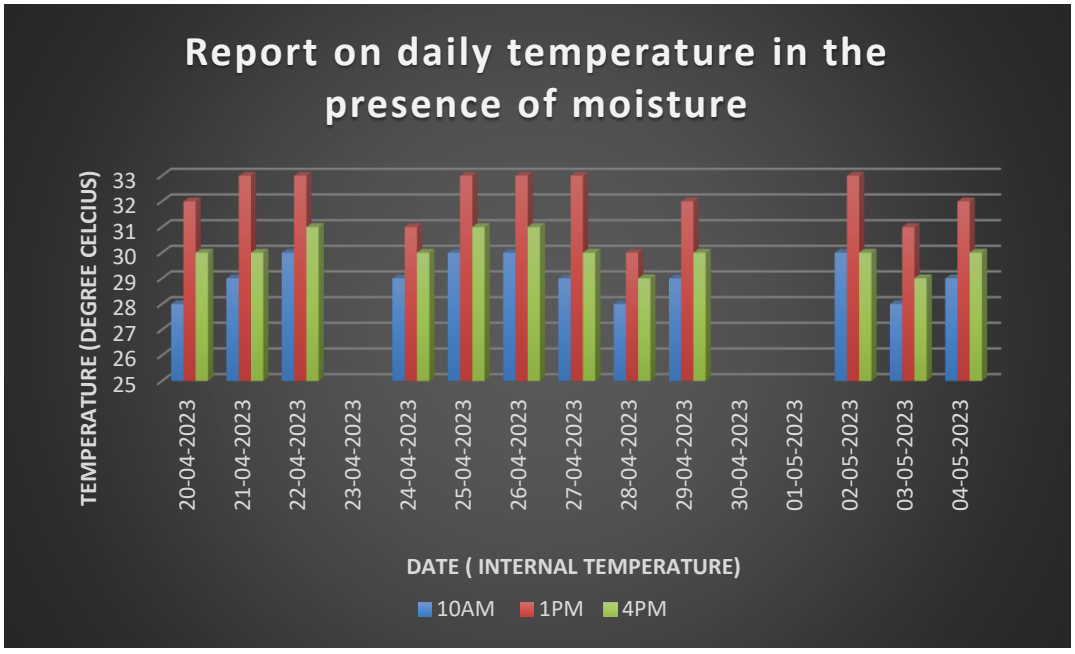


- **Result of the project:**
  - From this analysis we came to the conclusion that the temperature in the model house has reduced when compared to outside temperature from April to May.
  - Henceforth we an conclude that the temperature will further drop down to lower degree when it is actually mounted on the earth layer due to the surrounding moisture, plantation, shaded area etc.
  - By this process we got result from this model, So the results are as given below:-






Report on daily temperature in the presence of moisture
TEMPERATURE (DEGREE CELCIUS)
40
35
30
25
20
15
10
5
0
20-04-2023
21-04-2023
22-04-2023
23-04-2023
24-04-2023
25-04-2023
26-04-2023
27-04-2023
28-04-2023
29-04-2023
30-04-2023
01-05-2023
02-05-2023
03-05-2023
04-05-2023
DATE (EXTERNAL TEMPERATURE)
10AM
1PM
4PM


Report on daily temperature in the presence of moisture
TEMPERATURE (DEGREE CELCIUS)
33
32
31
30
29
28
27
26
25
20-04-2023
21-04-2023
22-04-2023
23-04-2023
24-04-2023
25-04-2023
26-04-2023
27-04-2023
28-04-2023
29-04-2023
30-04-2023
01-05-2023
02-05-2023
03-05-2023
04-05-2023
DATE (INTERNAL TEMPERATURE)
10AM
1PM
4PM

Conclusion of the project:

- Earth air tunneling is an innovative and environmentally friendly solution for creating comfortable indoor environments.
- By utilizing the earth's natural properties, it can help reduce energy consumption and costs associated with heating and cooling.
- By using underground pipes to bring fresh air into a building and exhaust stale air, earth air tunneling can reduce the need for energy-intensive mechanical cooling and improve indoor air quality.
- However, the success of earth air tunneling depends on several factors such as site conditions, design, construction, and maintenance.
- Therefore, it is important to work with experienced professionals and conduct thorough research before embarking on an earth air tunneling project.
- Earth air tunneling can be a valuable tool for reducing energy use and improving indoor air quality inside the buildings.

Scope for Future work:

The Earth Air Tunnel System (EATS) is a sustainable building technology that uses underground tunnels to provide natural ventilation and cooling to buildings. Here are some potential future works for EATS:

- By making use of solar panels one can effectively use as a electricity for the speed rotation of fan in the inlet chamber.
- We can adopt this system in rural areas where the availability of land area are more, but where as in urban area availability of land are not much when compared to rural area, so we can overcome this problem by adopting underground sump system for the passive ventilation process.
- Earth air tunnel system are low cost , energy efficient and environment friendly , making them a popular choice for sustainable building design.