

**VISVESVARAYA TECHNOLOGICAL UNIVERSITY**

**"Jnana Banganna" Belagavi - 590010**



**PROJECT REPORT ON  
"HYDROPONIC SYSTEM FOR DOMESTIC WASTE WATER  
TREATMENT AND VEGETABLE PRODUCTION IN URBAN  
AGRICULTURE MONITORED BY SMART TECHNOLOGY"**

**Submitted in partial fulfilment of the requirements for the award of degree**

**BACHELOR OF ENGINEERING  
IN  
CIVIL ENGINEERING**

**Submitted By**

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# ALVA'S INSTITUTE OF ENGINEERING AND TECHNOLOGY

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## CERTIFICATE

Certified that the project work entitled "**HYDROPONIC SYSTEM FOR DOMESTIC WASTE WATER TREATMENT AND VEGETABLE PRODUCTION IN URBAN AGRICULTURE MONITERED BY SMART TECHNOLOGY**" is a bonafied work carried out by

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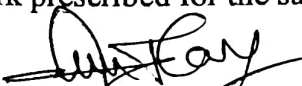
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in partial fulfilment for the award of Bachelor of engineering in civil engineering of Visvesvaraya Technological University, Belagavi during the academic year 2022-2023, it is certified that all corrections and suggestions indicated for internal assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirement in respect of project work prescribed for the said degree.

  
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Signature with date

1.

2.

## ABSTRACT

The Geometric shape factor of a building is the ratio between its envelope area and its volume. Buildings with a higher shape factor have a larger surface area in proportion to their volume, which results in larger heat losses in cold climates and also has effects on humans. This study analyses the impact of the Geometric shape factor on the final energy demand by using several existing apartment buildings and other monuments with different values of shape factor. Each building or monument was simulated for several different scenarios: three thermal envelope scenarios and four climate zones that affect occupants. The differences in shape factor between the buildings were found to have a large impact on mental health, human behavior, space considerations and accounted for 10%-20% of their final energy demand. The impact of the shape factor was reduced with warmer climates and ceased with average outdoor temperature 11°C-14°C depending on the thermal envelope performance of the buildings.

Intentionally or unintentionally, from ages, architects, builders and construction experts have used mathematics as a very basic yet important tool for the soulful purpose of design, execution and finalization of building projects. In history, architects were mathematicians and also some mathematicians were architects too. Vitruvius was a very well-known architect as well as a famous mathematician. Mathematical readings of Pythagoras were later used in building proportions. Well known worker and user of golden ratio Leonardo Da Vinci along with many achievements was an architect too. The approach of this research paper is to come up with findings on the importance of mathematics in architecture, as in geometry, from very important site analysis to final design of elevation or façade. Aim of the whole research is to come up with mathematical functions related to mensuration of building construction and Architectural Engineering. This paper is an initial part of the same research.