3. RESEARCH METHODOLOGY AND DESIGN

3.1 INTRODUCTION

The aim of this study is to provide a systematic description and analysis of Sustainable road layout design using Fuzzy logic system. The selection of methodological framework is justified on the ground that it enables one to group the interlinkages between the various indicators of the sustainability, while at the same time, highlighting the factors that influence such interlinkages. A suburban area (Tambaran) in south Chennai, Tamilnadu state, India, is chosen for conducting the analysis of sustainable road layout. The present work is exploratory in its methodology and theoretical framework.

3.2 MOTIVATION FOR THE STUDY

The motivation is to consider all model users when designing urban street, the methods by which engineers and planners analyse their design have yet to be fully developed. Typically when preparing new designs, planners and engineers utilize many methods to access the impact of their design ranging from estimating safety performance, operational performance, determining air quality issues, addressing human factors consideration and finally estimating the cost of the proposed design. The current state of art methodology for urban street operational analysis is provided by the Highway Capacity Manual (HCM) 2010 has the tool for engineers and planners that can use to analyse the operational performance of Urban street, however it does
not provide a method to optimize their proposed design to meet perceived level of services on urban street.

3.3 AIM OF THE STUDY

The aim of this thesis is to ensure safe, affordable, quick, comfortable, reliable and Sustainable access to livable communities. The study involves planning, design and orientation of road network configuration to attain sustainability.

3.4 OBJECTIVE OF THE STUDY

The above aim is attained by achieving the following objectives

- To identify the sustainable transport parameters for urban street for heterogeneous traffic in the decision making process.
- An approach for study of heterogeneous traffic using video image processing.
- To develop a sustainable road layout design model that demonstrates the potential of possible best practice in Sustainable urban Transportation system.

The objectives of this thesis would be achieved through a multi – pronged approach.
3.5 COMPONENTS OF SUSTAINABLE TRANSPORT

Sustainable transport can be achieved through measures pertaining to

- Transportation System Management - *Access, not mobility*

- Energy Management - *Moving People, not cars*

- Safety Management - *Reducing the accidents frequency & severity*

- Environmental Management - *Minimizing Environmental impacts*

3.6 METHODOLOGY

The Methodology to attain a sustainable layout is explained in the Figure 3.1. The flowchart explain the various indicators used for transport system management, Energy management, safety management and environmental management to attain a sustainable road layout design. The modelling is done using fuzzy logic system.
Figure 3.1: Methodology of the Study

Formulation of road layout design for:
- Arterial road
- Sub arterial road
- Collector street
- Local street

To attain the Sustainable Urban Transport system for live able communities.

Detailed assessment of each measure with Current Scenario was assessed using Fuzzy logic System for a road layout design.
3.7 CONTRIBUTION TO STATE OF THE KNOWLEDGE

The study utilizes the sustainable transportation planning concept for Road layout design for suburban area. The use of multi objective optimization method by fuzzy logic is present further in this thesis, will allow engineers, planners and decision makers to optimize the component of an urban street and obtain the perceived level of services across all modes on urban street within a given right of way.

Specifically this study

1. Identifies the sustainable transportation parameters on urban street for heterogeneous traffic in the decision making process.

2. An approach for study of heterogeneous traffic using image processing techniques.

3. Develop a sustainable road layout model using fuzzy logic system to design a sustainable road layout for suburban area.

The contribution of the new model provides practitioners with a tool that will allow them to design street that will accommodate all modes ideally a transportation engineer or planner will utilize the modelling approach presented here in the preliminary design stage of a new facility or in the redevelop process of an existing cross section of urban arterial. The modelling approach presented takes into account the level of perceived service of pedestrians, bicyclists, two wheeler, auto, LMV, and HMV with the available right of way and required design standards.