

**Master 2018**

**Ramalingesh Godavarthi**

**AI / ML based Radar Object Detection and Classification.**

***ABSTRACT - Masterthesis***

The primary objective of the thesis is to develop an object detection model based on 24 GHz FMCW radar sensor. The developed model is used in smart street light application to monitor the road traffic, that is a part of the smart city development. The object detection and classification is done using deep neural networks. Double Discrete Fourier Transform (2D DFT) is applied on the raw data collected from 24 GHz radar sensor to get the details like range and velocity of the objects in a visually represented format called range Doppler Maps.

Different segmentation algorithms are developed using computer vision techniques and their performance is evaluated. Based on the requirements of the application, the best-suited segmentation algorithm is selected. The input data to the neural network is generated by using the selected segmentation algorithm. A high quality dataset required for training the model is created, including bounding boxes for different objects. The neural network is trained to detect and classify multiple objects at a time.

To find the best classification model which needs less computation power, two different neural network architectures are evaluated. Initially, the detection model is created by using MobileNet as the base network [1]. This detection model is used as a baseline model. Then, the R-CNN is used to create second detection model. A detailed comparison between the two detection models are discussed with respect to their compute power, accuracy, complexity and memory requirements.