Chapter 2

Motivation, Scope and Objectives

2.1 MOTIVATION

The diagnosis of the disorder is very much important because early detecting will help parents or caretakers to handle their children in a better manner. The literature survey says that physiological signals play an important role to study about the autistic children. The proposed thesis is designed to analyse the physiological signal (PPG and GSR) variation in autistic children and to provide the assistive device for learning and monitoring the process to the autistic children during the mental task.

2.2 SCOPE

The study designed for the autism children and also for their parents to better understand the level of severity. Hence, right diagnosis is required for getting better treatment and service. Here, we framed list of the questionnaire on communication, stereotyped behaviour, and social interaction. This template was used to understand better and scale them as likely, probably and unlikely category of autism. In addition, we compared the standard and autism based on above questionnaire asked the caretakers to understand the better level of autism. The signals such as the cardiac (heart) rate and response of skin are used to analyse the autism degree in the children. Heart rate (HR) details measured by placing the pulse oximeter at the tip of the finger and the pulse rate recorded. HR measurement is one of the critical parameters of the human cardiovascular system.

An electro-optic method called PPG signals were used to measure the pulse from the body and hence pulse waves indicated due to pulsation from blood volume. The infra-red light used because the blood well observes it and weakly absorbed by the tissue. The volume change in the blood measured in cooled parameters contrast. The HR acquired from HRV analysis provides useful information regarding the Autonomous Nervous
System (ANS). On the whole, the heart rate of an adult is found 70 per minute whereas healthy heart rate between to 60 - 80 per minute. Usually, irregularity is caused due to the various factors such as stress, attacks, anxiety and sometimes other heart problems. Hence, it is always better to monitor heart rate consistently and continuously so that it will be helpful in finding the relationship between HR and physical environment.

The electrophysiological technique called GSR is a simple and useful method to check sympathetic nervous system activity. In GSR, the conductance and reactance are measured by using two electrodes. The GSR gives very needed information regarding the emotional status of the human body. The electrical properties of the skin of the individual change quickly and closely related to the psychological and physiological process. The fluctuation in the electrodermal activity and conductance are caused by the sweat glands and its activity very much closely related to Sympathetic Nervous System, which is one of the branches of ANS. Hence, the conductance and resistance are very useful tool for finding out emotion and motivation respectively.

The physiological signal was measured and during that time, a task is given to the children the baseline recorded for thirty seconds. The task is for three minutes in the full duration pulse and skin response is measured for both autism and controlled children. The diagnosis of the disorder is very much important because early detecting will help parents or caretakers better handle their children. Physiological signals play a significant role in studying the autistic children. The goal of this thesis is to analyse the physiological signal variation in autistic children with control groups and to provide the assistive device for learning and monitoring during the mental task.

2.3 OBJECTIVES OF THE STUDY

The proposed overview of the study is to analyse the effect of the individual physiological response of autism children during mental task performance. The following specific objectives:

1. To identify the autism severity index using screening questionnaires.
2. To analyse the performance between autistic and control children during the mental task.

3. To monitor the physiological signals variation between autism and control group.

4. To develop a webcam based interactive learning and monitoring assistive device for autistic children.