CHAPTER-1

INTRODUCTION

1.1 INTRODUCTION TO BCI:

A Brain Computer Interface (BCI) [1] is a communication pathway between the human brain and external devices that relies on movement related thoughts to control devices. It enables the human mind to interact with the devices through variations in neural activity. Such systems would enable people to use their brain as an alternative mechanism to control and communicate with computers and/or other communication devices (e.g. Smart Phones, Neuro Phone etc). BCI systems also find their applications in other domains like gaming, multimedia and virtual environments.

BCIs can be divided into invasive and non-invasive. Invasive BCI is any system where the human user has a device physically implanted into their body, either in their brain or in another part of their body, where nerve impulses can be used to communicate directly with the external component of the BCI system. Non-invasive BCI is any BCI technology which does not involve implanting a foreign device into the human user's brain. EEG [4] is the most researched form of non-invasive BCI interface .There are some disadvantages of invasive methods in comparison to noninvasive methods. Invasive BCI systems must be implanted surgically, which can introduce risks associated with any type of surgery. Implantation surgery, and the presence of a foreign object within a human's body, can create scar tissue in the area around the implantation. Scar tissue build can even cause the relatively stronger signal to weaken or be lost altogether.

Advances in brain imaging technology enable scientists to access neural activities in the human brain via non-invasive approaches [6]. Over the past decades, several research groups have attempted to construct communication techniques independent of peripheral neuromuscular activities. One technology of particular interest is the use of brain neurophysiological activity. Through elaborately designed tasks, users can learn to generate specific brain signals to control a computer or physical prostheses. The name for such technology is the "Brain Computer Interface (BCI)". By its very nature BCI technology is suited for use both as a treatment for human's who have physical

limitations resulting from an injury or illness and for the enhancement of the capabilities of humans (cognitive ability) who have relatively normal physical capabilities.

A wireless BCI system can dramatically reduce installation complexity, wire weight, and trouble-shooting effort associated with traditional wired BCI systems and wireless BCI system would provide users with more freedom of posture and movement so that they can perform their routine tasks in real-world environments, also when built with low-power, miniature signal acquisition and conditioning circuits, the front-end of a BCI system can be integrated into a truly wearable device such as a baseball cap, a headband, or a pair of sunglasses to maximize portability and wearability. If wearable and wireless EEG monitoring proves feasible, a much wider range of applications for BCI will emerge. In addition, the low power integrated circuit design can also fulfill the requirements for long-term field operations.

The process implementation of our project is, we are acquiring the Brain signals (EEG) through MUSE device, further the filtered signals are given to the graphics program which includes blur and un-blur effect of the particular image based on the attention level of the user.