

# AID for Narcolepsy People

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**Abstract:** *The objective of this paper is to design and build a portable assistive device for narcolepsy patients in order to help them to feel comfortable and lead a normal life, so people can be independent. A narcoleptic person suffers from a brain disorder that causes uncontrolled sleepiness because of over emotions, anger etc. This device provides real time monitoring system and alerts if they are in state of sleep and it also reduces the parameters causing narcolepsy (such as excessive vibration, heavy noise etc) . This paper gives brief description about an assistive system designed for narcoleptic patients in order to help them to lead a normal life.*

## I. INTRODUCTION

Narcolepsy is also known as hypnolepsy and it is a chronic neurological disorder involving the loss of the brain's ability to regulate sleep-wake cycles normally. People with narcolepsy experience frequent excessive daytime sleepiness, comparable to how people who don't have narcolepsy feel after 24 to 48 hours of sleep deprivation, as well as disturbed nocturnal sleep which often is confused with insomnia. In the absence of cataplexy and EDS, it becomes much more difficult to make a firm diagnosis of narcolepsy. Various terms, such as essential hypersomnia, primary hypersomnia, ambiguous narcolepsy, atypical narcolepsy, etc., have been used to classify these patients, who may be in the developing phase of narcolepsy.

The exact cause of narcolepsy is currently unknown, but some theories and studies say that due to the lack of hypocretin peptides in the brain which are neurotransmitters in the hypothalamus involved in regulating sleep.

The system is customized to be used by narcolepsy patients, the task is to assist narcolepsy patients through providing real time monitoring of the electrophysiological signals; mainly the electroencephalogram (EEG) and responding to the sleep at different states of the patient by issuing alerts to them so that they can able to control the sleep and be safe at critical areas.

The main treatment of excessive daytime sleepiness in narcolepsy is central nervous system stimulants such as methylphenidate, amphetamine, methamphetamine, modafinil (Provigil), a new stimulant with a different pharmacologic mechanism. Other medications used are codeine and selegiline. Another drug that is used is atomoxetine (Strattera), a non-stimulant and norepinephrine reuptake inhibitor (NRI), that has little or no abuse potential. In many cases, planned regular short naps can reduce the need for pharmacological treatment of the EDS but only improve symptoms for a short duration. A 120-minute nap provides benefit for 3 hours in patient alertness whereas a 15-minute nap provides no benefit. Ongoing communication between the

health care provider, patient, and the patient's family members is important for optimal management of narcolepsy.

So this device will help them to be independent and control their sudden sleep.

## A. ELECTROPHYSIOLOGICAL SIGNALS

Electroencephalography is the neurophysiologic exploration of the electrical activity of the brain by the application of electrodes to the scalp. Active transport of ions through cell membranes results in bioelectric events that can be quantitatively detected in ionic voltages produced as a result of electrochemical activity of the cells known as bio potentials.

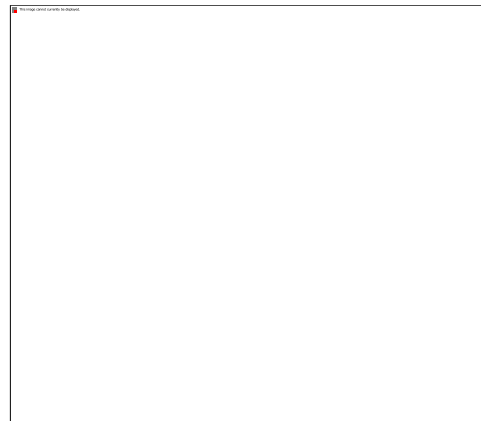
## II. EFFECTS OF NARCOLEPSY

1. The narcolepsy causes physical problems. Hypocretins helps to control food intake, the hypocretin deficiency can result in obesity, which is often associated with narcolepsy, but other than that effects are confined to the extreme inconvenience of uncontrollable sleeping.
2. It would be very difficult to overstate the hindrance that falling asleep at any time of day, in the middle of any activity imaginable, can present in the narcoleptic's life. Having a medical problem that is mistaken for a behaviour problem, a mental illness, or a seizure disorder is quite unpleasant in and of itself.
3. But if you think about what it would be if we experience a period of sudden sleep while driving, or a period of sudden sleep during critical situations.

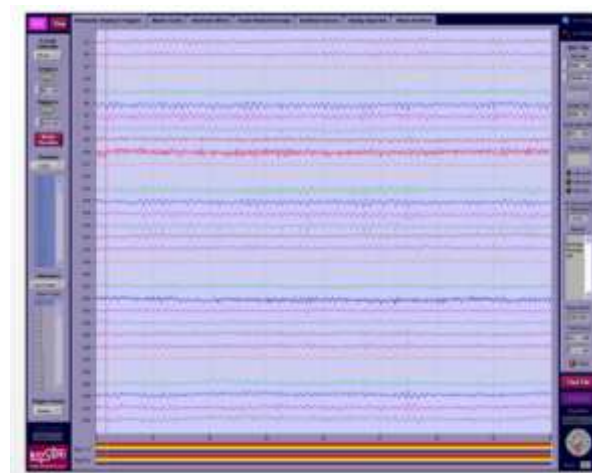
## III. NARCOLEPSY SYMPTOMS

1. **Cataplexy (loss of muscle control):** Often narcolepsy may cause you to have a sudden loss of muscle control while awake, usually caused by strong emotions, such as laughing, angry, crying,

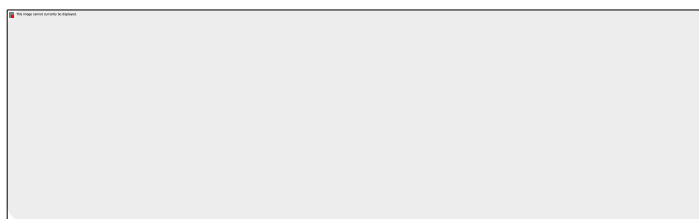
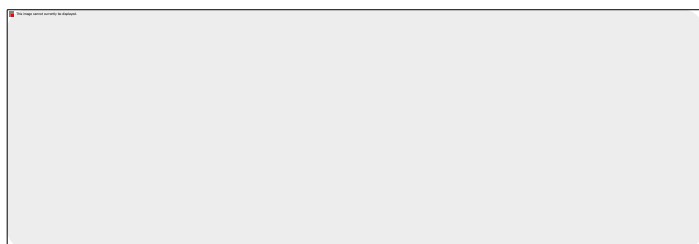
2. **Hallucination:** Some people with narcolepsy experience vivid, sometimes frightening, visual or auditory sensations while falling asleep or upon awakening.
3. **Sleep paralysis:** You may be unable to move or talk at the beginning or end of sleep.
4. **Micro sleep:** is a very brief sleep episode during which you continue to function (talk, put things away, etc.), and then awaken with no memory of the activities.
5. **Night time wakefulness:** If you suffer from narcolepsy, you may have periods of wakefulness at night with hot flashes, elevated heart rate, and sometimes intense alertness.
6. **Rapid entry into REM sleep:** Narcoleptics have unique sleep cycles where he or she may enter the REM or dream phase of sleep right after falling asleep, whereas most people take about 90 minutes to enter REM. Therefore, you'll experience the characteristics of REM sleep (vivid dreams and muscle paralysis) at the beginning of sleep, even if that sleep is during the day.



#### A. BRAIN WAVES OBTAINED WITH THE HELP OF BIOSEMI AND ACTIVIEW SOFTWARE



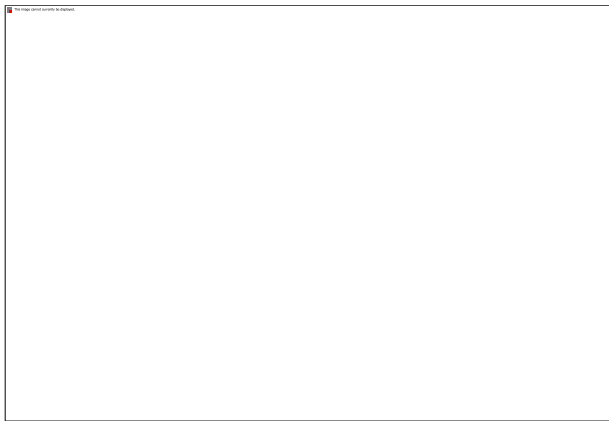
#### IV. EEG WAVES



**ELECTRODES PLACEMENT** on the surface of the head are arranged in this process, by which EEG Waves are recorded hence with the help of **BIOSEMI AND ACTIVIEW** the EEG waves are recorded.

#### V. ELECTRODE PLACEMENT SETUP

#### VI. NARCOLEPSY EEG WAVE PATTERN



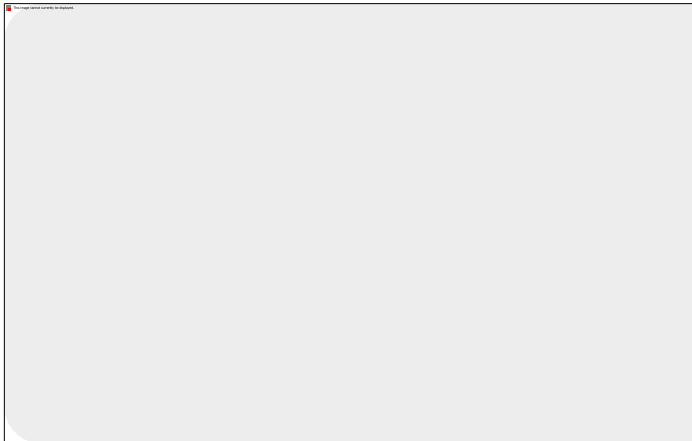
Weighted resistor type .Here we are going to use separate type ADC so that it will have high performance that built in type any damage to the ADC can be easily replaced, in built in type damage to ADC must replace the controller, so separate ADC are use in this prototype.

### C. NOISE REDUCTION

Many narcoleptic patients suffer EDS because of sudden excessive noise from the surroundings and atmosphere, so a noise reduction of about some minimum decibels heard by the people so EDS can be avoided as shown in block diagram.



## VII. BASIC BLOCK DIAGRAM



### D. MICROCONTROLLER

The microcontroller is already programmed to suppress the disturbances which leads to sudden sleep for the narcoleptic patients and it continuously monitors the EEG waves which is given as analog signal to microcontroller.

The microcontroller acts a heart of this device because on monitoring the EEG waves periodically it also tells the person that he is about to fall asleep and it also reduces the excessive noise by continuously monitoring it and passes the sound in lower decibels to the narcoleptic patients. Thus they can be comfortable and feel free from disturbances.

## VIII. COMPONENTS

### A. DRY ELECTRODE

Dry electrode is used so it may not cause any skin disease because of non application of gel . Improved mechanical contact. Improve conductivity and signal pick up. Diminish electrode motion, artifacts, Cosmetically concealable.



### IX. ADVANTAGES

1. Narcoleptic patients can lead a normal life with the help of this device.
2. They can also be scare free even in the presence of noisy environment.

### X. DISADVANTAGES

1. The cost becomes more.

### B. ANALOG TO DIGITAL CONVERSION

The microcontroller to be used in the device prototype has a built-in multi-channel 10 bits successive approximation ADC or

### XI. CONCLUSION

A technological treatment for narcolepsy patients is proposed in the form of a portable assistive device. Besides to issuing alerts in case of a narcolepsy attack, the device runs a sleep detection, classification and analysis algorithm to provide objective data required for the treatment process.

### XII. REFFERNCES

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