

# Sleep Inducing Device

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**Abstract:-** In today's competitive world mental stress is major problem which results in insomnia. It involves difficulty in falling asleep for one who go to bed at night, waking up too early in the morning and waking up too often in night period. This lack restless of sleep can affect their responsibilities. Insomnia, memory problems, depression, frustration, irritability, an increased risk of heart disease, anxiety, poor concentration and automobile related accidents etc... are some side effects of sleeplessness.

As there is nothing pleasant as a sound sleep, people usually take high drug dosages to overcome this problem which is disadvantageous for body. High dosages ultimately lead to the addiction which has adverse effect on the patient. Magnetic field associated with the is called geo-magnetic fields. It is essentially dipolar on the earth's surface.

Many people experience sleeping well in the natural surroundings into a tent or a wooden hut. This fact is due to not only to the healthy atmosphere but also from our unconscious ability to perceive natural earth's magnetic fields. In this paper, is a circuit which creates and radiates an electromagnetic field through a radiator coil which is low-cost and user-friendly that helps to fight against insomnia by creating an electromagnetic field. It creates an environment which is helpful to fall first stage of sleep.

**Keywords ;** Insomnia, Geo-magnetic field, Anti-medication.

## INTRODUCTION

All types of insomnia lead to diverse effects like day time drowsiness, Irritability, lack of concentration which affects our day to day responsibilities as we have trouble concentrating due to the sleep deprivation. For treatment of various physical disorders magnets have been used for centuries. Accelerated Transition theory can be used to explain how to get relief from insomnia by achieving low strength magnetic fields. Impulsive magnetic field therapy was also conducted where patient got clear improvement, the results were satisfactory like 24% patients got clear results, 49% had no improvement, and 6% got slight improvement.

From various researches it was disclosed that it was possible to induce a wave from a single pulse that looks identical to the brain waves formed normally during sleep. Binaural beat and pulsating light also contribute to brainwave entertainment and it was discovered decade ago, but it also had some limitations. The main purpose behind all these researches was to design a circuit which will form the similar pattern of waves which are created by the brain during sleep. This will generate an electromagnetic-field, which results in a prolonged and sound sleep without drugs.

## TYPES OF INSOMNIA

### 1. Transient insomnia:

In this, patient can't sleep lasts for less than a week. It is also known as short term insomnia.

### 2. Acute insomnia:

It means inability to sleep well for a period of less than a month. It is also known as chronic or long-term insomnia which is lasts for longer than a month. Both types of insomnia can lead to daytime drowsiness, poor concentration, and the inability to feel refreshed and rested in the morning.

## CAUSES OF INSOMNIA

- Life events such as fear, stress, anxiety, emotional or mental tension, work problems, financial stress, birth of a child and bereavement.
- Use of fluoroquinolone antibiotic drugs, associated with more severe and chronic types of insomnia.
- Restless Legs Syndrome, which can cause sleep onset insomnia due to the discomforting sensations felt and the need to move the legs or other body parts to relieve these sensations.
- Disturbances of the circadian rhythm, such as shift work and jet lag, can cause an inability to
- sleep at sometimes of the day and excessive sleepiness at other times of the day. Chronic circadian rhythm disorders are characterized by similar symptoms.
- Abuse of over-the counter or prescription sleep aids (sedative or depressant drugs) can produce rebound insomnia.

## SYMPTOMS OF INSOMNIA

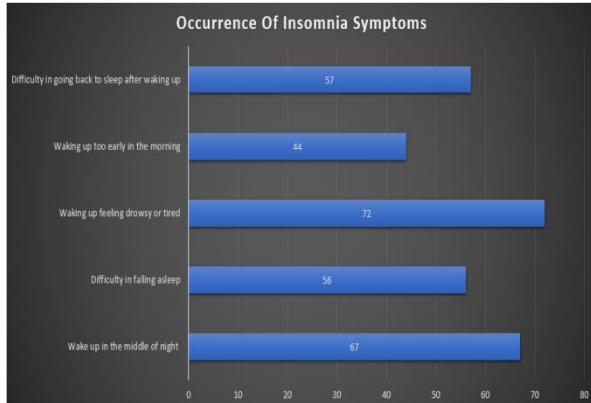
### Night-time Symptoms:

- Frequent difficulty falling asleep.
- Frequent episodes of waking up accompanied by difficulty in falling back to sleep.
- Waking too early in the morning with inability to fall back to sleep again.
- Non-refreshing night time sleep.

### Day-time Symptoms:

- Fatigue
- Memory of attention impairment
- Anxiety and irritability
- Depression
- Sleepiness

Now, a survey is presented in the form of a bar chart where it is shown in percentage which indicates patterns of insomnia observed among people. It is clear from the figure that, major portion of these people wake up anytime from sleep and feel drowsy or tired. Among them, 56% people are at terminal stages who are suffering from chronic insomnia.



### INSOMNIA & ITS DIFFERENT STAGES

Insomnia or sleeplessness is an individual's reported sleeping difficulties. A definition of insomnia is, Difficulties initiating and maintaining sleep, or nonrestorative sleep, associated with impairments of daytime functioning or marked distress for more than 1 month. Insomnia can occur at any age, but it is particularly common in the elderly. Insomnia can be transient insomnia (lasts for less than a week) or Acute insomnia (means inability to consistently sleep well for a period of less than a month) or chronic insomnia (lasts for longer than a month) which can lead to memory problems, depression, irritability and an increased risk of heart disease and automobile related accidents for math, etc.

### CATEGORIES OF BRAIN WAVE PATTERNS

#### Beta (14-30Hz)

- Concentration, arousal, alertness, cognition
- Higher levels associated with anxiety, disease, feelings of spation, fight.

#### Alpha(8-13.9Hz)

- Relaxation, super learning, relaxed focus, increased serotonin production.

#### Theta (4-7.9Hz)

- Dreaming sleep (REM sleep)
- Increased production of catechol amines, increased creativity

#### Delta(1-3.9Hz)

- Dreamless sleep
- Human growth hormone released
- Deep, trance-like, non-physical state, loss of body awareness

### SLEEP THEORY

Sleep occurs in repeating periods. Sleep is divided into two parts in which the body alternates. Sleep occurs in periods of approximately 90 minutes. Sleep proceeds in cycles of NREM and REM. As humans fall asleep, body

activity slows down like body temperature, heart rate, breathing rate, and energy all decrease, brain waves get slower and bigger. Sleep affects other brain-body functions, including virtual paralysis of the body. Humans may suffer from various sleep disorders, Insomnia, hypersomnia, sleep apnea and sleep walking etc.

Sleep modes are known as non-REM and REM sleep. Both types are associated with a distinct set of physiological and neurological features.

1. REM stands for "rapid eye movement".

REM sleep is consisting of more dreaming, faster brain waves, low muscle tone throughout the body, muscle paralysis abnormal behavior during sleep phase, fast pulse and breathing.

2. Non-REM sleep stands for "non-rapid eye movement".

In this dreaming are rare, muscles are not paralyzed, and sleep walk problem occurred. The brain uses less energy during sleep than it does in waking. In quiet waking the brain uses 20% of the body's energy.

NREM is divided into three stages: N1, N2, and N3. The whole period proceeds in the order from N1 to N2 to N3 to N2 to REM.

#### Stage 1(N1):

It is the stage between wakefulness and sleep, in which the muscles are quite active, and the eyes rolls slowly, and dreaming is rare. Random beta (12-30 Hz) and gamma (25-100 Hz) brain waves are appear, which is the normal range for the awake state. Breathing gradually becomes more regular and the heart rate begins to slow. The person may be aware of sounds and conversations but does not respond to them. This stage represents 5% of the total sleep time.

#### Stage 2 (N2):

Theta waves are appearing only. Muscle activity decreases, awareness of the outside world begin to fade fully. If any sounds are heard, the sleeper is not able to understand. It covers 45%-50% of total sleep time for adults.

#### Stage 3 (N3):

It is known as deep or delta (0.5 to 4Hz) or slow-wave sleep (SWS). Greater amount of deep sleep occurred earlier in the night. So, the sleeper response to the outer world is very less and unaware of any sound. Sleep-walking, sleep-talking and bedwetting occur. It covers 15%-20% of total adult sleep time. Brain temperature, breathing rate, heart rate and blood pressure all are decreases. Dreaming is more common. It is difficult to wake a person during this stage. Stage 3 was divided into two stages, stage 3 and stage 4 and it is depending on the frequency of delta waves

### METHODOLOGY

The brain is always generating a pattern of internal neural frequencies. These neural frequencies of the human brain are:

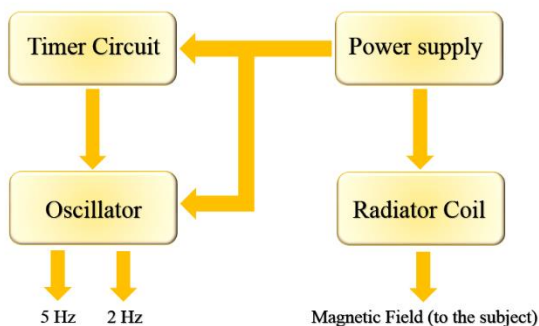
1. Beta waves (14 to 30 Hz)
2. Alpha waves (8 to 13 Hz)
3. Theta waves (4 to 7 Hz)
4. Delta waves (1 to 3 Hz)

At Alpha frequencies human brain is in the relaxed condition. At Theta frequencies brain becomes dreamy and creative. At delta frequency brain is in the first stage of sleep.

These formations are changed by the resulting patterns of electromagnetism from surroundings around us. Radio waves, mobile phone waves, TV, Noise from circuits are different kind of waves responsible for generation of electromagnetic frequencies, the smaller electromagnetic forms of the Earth are also a portion of the environment. This fact is known by all of us that earth is encircled by compelling fields, some are formed by its own magnetism and others are created by the fluctuations in weather and solar storms. Electronic devices (e.g. motors, televisions, computers, power lines) also create magnetic field, even humans generate an insidious magnetic field, which is due to chemical reactions taking place in ionic currents of the nervous system.

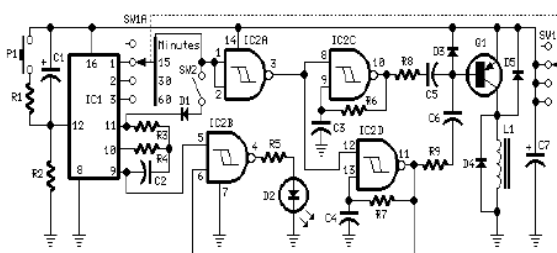
Researchers have also ascertained that external magnetic fields impact the functioning of human body in various ways. To treat and diagnose both physical and emotional pain magnetic field is very useful; it alleviates signs and decelerate the series of new disease. Nowadays magnetic therapies are used to reduce pain, healing of fractured bones and to fight stress. Scientists had discovered that if a magnetic field is applied to the topmost part of head it results in soothing, and has sleep-inducing effect on brain and bodily functions, which is possible due to the incentive of the formation of the hormone melatonin.

#### BLOCK DIAGRAM



Timer circuit and oscillator require 5v dc and radiator coil drives on 12v dc. For all the purpose only one supply is given. By using timer circuit, set the time within an hour of generation of the magnetic field. Oscillator generates the two frequencies such as 2Hz and 5Hz which is given to radiator coil. Radiator coil generates the magnetic field of 2Hz and 5Hz.

#### CIRCUIT DIAGRAM



#### Major points regarding circuit

- Mean current drawing is about 7mA.
- Battery life can be dramatically increased omitting LED D2 and its associated resistor R5.
- Plastic box can be used to enclose the circuit; metal cases can severely limit electromagnetic radiation.
- To reset a cycle press P1 push button.

#### CONSTRUCTION AND WORKING

IC2C and IC2D generate two square waves at about 1.2 and 5 Hz respectively. These waveforms are converted into 60μs pulses at the same frequencies by means of C5 & C6 and mixed at Q1 Base. This transistor drives the Radiator coil with a scalar series of pulses of 60μs length and 9V amplitude.

IC1, IC2A & IC2B form the timer section. C1 & R2 provide auto-reset of IC1 at switch-on. The internal oscillator of IC1 drives the 14-stage ripple counter and, after about 15 minutes, output pin 1 goes high. Pin 3 of IC2A goes low and stops IC2C & IC2D oscillation.

If SW2 is left open (Alternate mode operation), after 15 minutes' pin 1 of IC1 goes low, pin 3 of IC2A goes high and oscillators are enabled again.

If SW2 is closed (Stop mode operation), the first-time output pin 1 of IC1 goes high, the internal oscillator of the IC is disabled by means of D1. Therefore, the circuit remains off until a reset pulse is applied to pin 12 by means of P1 or when the whole device is switched-off and then restarted.

#### FEATURES OF SLEEP INDUCER

- Makes easier to fall asleep.
- Induces a prolonged and sound sleep without drugs.
- Generates a natural electromagnetic – field and No side effect.

#### LIMITATIONS

- Radiated power is very small. Because of this, we cannot measure the radiation by using conventional instruments.
- Measuring frequency is difficult in practical case by using oscilloscope.
- Practical value is surprisingly more than theoretical or simulation value.
- Electromagnetic field has been detected through galvanometer deflection, but it cannot be measured accurately because lack of flux meter in the lab.

#### ADVANTAGES

- This project helps in fighting insomnia. apart from this it also supports relaxation, stress management and induces sleep easily.
- This project generates type of geo-magnetic fields and it helps the brain surrounded by an ideal environment for a sound sleep.

## DISADVANTAGES

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- Measuring frequency is difficult in practical case by using oscilloscope

## CONCLUSION AND FUTURE WORK

This project helps in fighting insomnia. Apart from this it also supports relaxation, stress management and induces sleep easily without medication.

This project generates type of geo-magnetic fields and it helps the brain surrounded by an ideal environment for a sound sleep. This project can be improved more.

The result is not so satisfactory and the research on this respect is yet to develop furthermore. Now we should try to get more efficiency and avoid any kind of adverse effects.

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