DESIGN OF AN ELECTROSLEEP THERAPY DEVICE

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The work explored Electric Sleep Technology, also known as CES, which involves exposing the head to low-intensity electrical currents. It is known that low-intensity electrical currents can improve the balance of neurotransmitters, which leads to improved sleep patterns. Noninvasive cranial electrical stimulation can improve sleep by noninvasively increasing the release of endogenous opioids from areas of the brain responsible for pain control.

Clinical studies show that pulses of approximately 0.3–0.5 ms duration and frequencies between 0.5–2 and 80–100 Hz are most effective, with current levels typically ranging from 50–5 mA. Modern cranial electrical stimulation (CES) devices are pocket-sized, battery operated at varying frequencies (100 to 15,000 hertz) with currents of about 1 mA or slightly higher [1, 2].

A block diagram of an electro-sleep therapy device typically includes the following components: Power Supply - provides the necessary electrical power to the device. Pulse Generator - creates electrical pulses at specific frequencies and intensities. Control Unit - allows the user to adjust the settings of the device, such as pulse rate and intensity. Electrodes - conduct the electrical pulses to the patient's head. output - regulates the final signal that is delivered to the electrodes. These components work together to deliver controlled electrical stimulation to the brain, which is thought to help with sleep and relaxation.

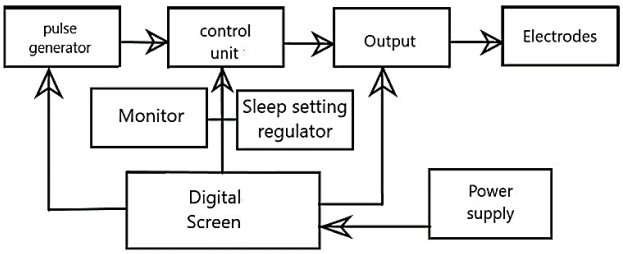

Figure 1 – A block diagram of an electro-sleep therapy device typically includes the following components:

1. **Power Supply**: Provides the necessary electrical power to the device.
2. **Pulse Generator**: Creates electrical pulses at specific frequencies and intensities.
3. **Control Unit**: Allows the user to adjust the settings of the device, such as pulse rate and intensity.
4. **Electrodes**: Conduct the electrical pulses to the patient's head.
5. **Output Stage**: Regulates the final signal that is delivered to the electrodes.

The electro-sleep device can also be connected to a personal computer and has the ability to configure the necessary parameters through the application's graphical interface. It is also possible to connect additional ECG and EMG monitoring channels during the procedure.

This electro-sleep device was developed as part of a bachelor's thesis project in Electronics.

References:

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2. Guleyupoglu, Berkan, "A Comprehensive View of Electrosleep: The History, Finite Element Models and Future Directions" (2014). *CUNY Academic Works.* https://academicworks.cuny.edu/cc_etds_theses/626