IMPROVING SLEEP QUALITY MONITORING WITH IOT AND MACHINE LEARNING

A PROJECT REPORT

Submitted by

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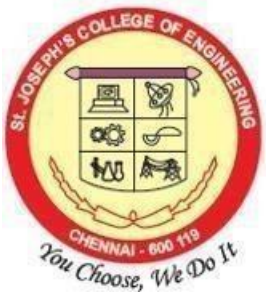
in partial fulfillment for the award of the degree

of

BACHELOR OF TECHNOLOGY

in

INFORMATION TECHNOLOGY



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BONAFIDE CERTIFICATE

Certified that this project report "**IMPROVING SLEEP QUALITY MONITORING WITH IOT AND MACHINE LEARNING**." is the Bonafide work of **SANTHOSHRAJ.Y** and **VARUN.N** who carried out the project work under my supervision.

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The report of the project work submitted by the above students in partial fulfillment for the award of Bachelor of Technology Degree in Information Technology of Anna University was confirmed to be report of the work done by the above students and then evaluated. Submitted to Project and Viva Examination held on

INTERNAL EXAMINER **EXTERNAL EXAMINER**

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ABSTRACT

An innovative sleep monitoring system is presented in this paper, designed to leverage affordable sensors—specifically, an accelerometer, pulse oximeter, and microphone amplifier—integrated with the ESP32 micro-controller. The ESP32's Wi-Fi and Bluetooth capabilities enable efficient real-time data transmission to the AWS cloud. The methodology involves the use of a combination of a random forest model and a recurrent neural network (RNN) algorithm for comprehensive data analysis. Precise body movement is captured by the ADXL345 accelerometer, while heartbeat and SPO2 levels are monitored by the MAX30102 pulse oximeter. Snoring patterns are detected with the assistance of the MAX9814 microphone amplifier. The ESP32, known for its dual-core processing and robust connectivity, serves as the central processing unit for seamless data acquisition and communication. The integrated system allows for the capture and analysis of sleep-related data in real-time on the AWS cloud. The distinct advantages of the RNN algorithm, with its proficiency in processing sequential data, are demonstrated over conventional random forest models. A holistic approach to sleep monitoring is offered by this system, providing an affordable and effective solution for the analysis of sleep patterns, with valuable insights into sleep quality and potential health indicators being provided.

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