VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"Jnana Sangama" Belagavi – 590 010

PROJECT REPORT ON

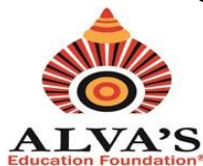## "EFFICIENT CLASSIFIER FOR THE DETECTION OF SLEEP APNEA"

Submitted in partial fulfillment of the requirements for the award of degree

BACHELOR OF ENGINEERING IN ELECTRONICS & COMMUNICATION ENGINEERING

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

MOODBIDRI – 574 225.
2019-2020

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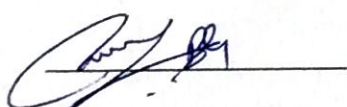### (Affiliated to VTU, BELAGAVI)

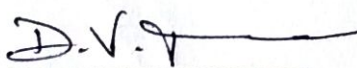### DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CERTIFICATE

Certified that the project work entitled "EFFICIENT CLASSIFIER FOR THE DETECTION OF SLEEP APNEA" *is a bona fide work carried out by*

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In partial fulfillment for the award of BACHELOR OF ENGINEERING in **ELECTRONICS & COMMUNICATION ENGINEERING** of the **VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI** during the year 2019–2020. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the Bachelor of Engineering Degree.
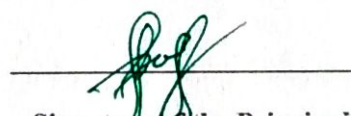
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ABSTRACT

Sleep disorders are the most common health condition that can influence various aspects of life. In many countries these kind of disorder is generally analyzed in sleep laboratories by the traditional detection process called Polysomnography. Most of the apnea disease are currently not analyzed properly because of high cost of the test and the limitations of overnight sleep in the laboratories, where an expert human observer is needed to work over night. The ECG analysis program can provide much information about cardiac disorder. Therefore, computer-based techniques is developed for ECG analysis and can used to train inexperience staff and pre diagnostic the ECG data. In this project, the ECG analyzing algorithm for sleep apnea detection is applied using MATLAB. Parameter used in this analysis is QRS complex. The detection of RR interval and conversion of RR interval to heart rate (minute by minute) are developed. ECG analyzing program is easy to use. This can be done by loading the ECG data to analyze the necessary value for apnea detection.

In present different techniques are used for detecting the minute based analysis of SA by Electrocardiogram (ECG) signal processing. Using the Physionet apnea ECG database, QRS complex is detected. Feature like Mean, Standard deviation and covariance is extracted from the output of the QRS complex and has been used to classify the apnea and non-apnea events from the features extracted. The software tool used for the detection of SA is MATLAB platform. In the proposed system a program is written to identify features from an ECG signal and detect apnea and non-apnea. To test the program, data files (in .mat format) taken from Physio Bank ATM of apnea ECG database are used. These files are loaded to MATLAB and loaded ECG records are been segmented into separate in minute by minute for further analysis. Then, signal is used to obtain the peaks of the signal. The peaks are marked using certain symbols. After the peak detection is done the index and the amplitude values of the signal are determined. Based on the values obtained the presence or absence of apnea is decided and the result is plotted using a MATLAB window. The classification algorithm is based on Support Vector Machines (SVM) and has been used to classify the apnea and no apnea events from the features extracted. The software tool used for the efficient classifier for the detection of sleep apnea is MATLAB platform.