The Analysis of an Electrocar Diosignal in a System of Data Transmission in Control Office

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Abstract— *Abstract Among the reasons of accidents on roads there is drivers' drowsiness. So, it is very important to develop a system that detects an approach of drowsiness and awakes a driver in a case of alarm. The method of detection o drowsiness based on analysis of ECG parameters is convenient and informative enough. A problem of monitoring a driver's state by controlling his heart rate is actual because this parameter is simple to register. But a threshold of drowsiness can vary for different people. So, it is necessary to control some additional parameters. Research of how parameters of heart rate variability (LF/HF and index of stress of Bayevsky) change in time depending on a state person (during wakefulness, drowsiness and stress) has been carried out. The results showed that there are certain intervals of values characterizing each kind of state. To sum up, it's suggested to use the analysis of three ECG parameters (HR, LF/HF and index of stress of Bayevsky) in drivers' drowsiness detecting systems. Using a GPRS data transmission system allows to realize processing and storage of ECG information on a powerful server.*

Keywords— ECG, GPRS

I. INTRODUCTION

One of the causes of road accidents is drivers' falling asleep. There are many systems of controlling wakefulness, the most accurate of which are systems monitoring physiological parameters. A general algorithm of such control systems consists of obtaining data about a particular parameter, its processing and activation of the alarm system when the level of wakefulness falls below a critical one. Among the physiological indicators the most convenient to register in driving conditions is ECG. 2. PHYSIOLOGICAL INDICATORS Among the physiological indicators the most convenient to register in driving conditions is ECG. An actual task is to monitor the status of driver's heart rate, as the method for detecting heart rate - the simplest and quickest (the maxima of the ECG signal). It was found that during falling asleep signs of bradycardia are observed (HR 2 means that a man is strongly mobilized. • Stress Index (Baevsky's index of stress, IN) is calculated from the histogram of distribution of a given set of cardio intervals. Normally, IN 50 - 150 c.u., < 50 is a state of relaxation, > 150 is the state of stress. 3. RESEARCH OF ECG PARAMETERS The research of how three discussed parameters of ECG vary in time has been carried out. values of parameters were calculated using such programs as Cygwin with service "wfdb", Kubios HRV and Matlab. The results showed that during an active wakefulness heart rate is within the normal range of 60 to 90, during the initial stage of sleep less than 60 (about 58for selected ECG), during wakefulness LF / HF takes values of 1.5 and above, primarily 2 - 5, in a state of reduced activity it is below 1.5, IN also corresponds to the known criteria.

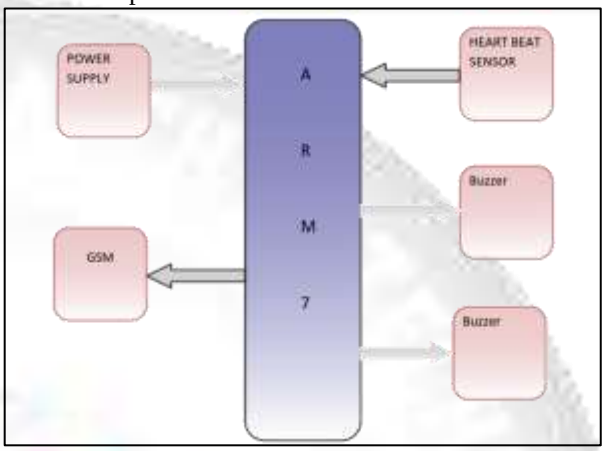

Fig. 1:Block diagram of proposed configuration

II. WORKING

The main aim of this project "THE ANALYSIS OF AN ELECTROCARDIOSIGNAL" is to monitor the patient's heart rate and temperature continuously and to send those values or reading to the registered mobile number when certain threshold values are reached.

For example: If the heart rate threshold value is set as 70 and the temperature threshold value is set as 37 degrees centigrade then the registered mobile number will continuously get those values in the form of SMS through GSM modem.

With the help of these values a person can monitor the patient's heart rate and temperature continuously where ever he was.

In our paper we have used IR heart beat sensor for the monitoring of heart rate and LM35 temperature sensor to monitor the temperature of the patient. Through GSM modem these results are send to the respected person in the form of SMS

Here the IR heart rate sensor is clipped to the figure of the patient where the IR sensitivity varies with the density of blood flow. So, the time variation of IR sensitivity represents the density of blood flow and reads the heart rate. If the heart rate exceeds the threshold value, then a message is send to the registered mobile number.

In the same way, the body temperature of the patient is also continuously monitored with the help of LM35 (temperature sensor) and when the threshold value is exceeded the temperature values are also send through message to the registered mobile number.

Here the messages are sending through GMS Modem and we can customize the number to which the messages should be arrived.

By this project one can continuously monitor the patient's conditions based on his heart rate and the body temperature values irrespective of being at the patient.

III. HEART BEAT SENSOR

Heart beat sensor is designed to give digital output of heat beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heartbeat. This digital output can be connected to microcontroller directly to measure the Beats per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.

A. Temperature sensor (LM35):

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 device does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾° C over a full −55°C to 150°C temperature range. Lower cost is assured by trimming and calibration at the wafer level. The low-output impedance, linear output, and precise inherent calibration of the LM35 device makes interfacing to readout or control circuitry especially easy. The device is used with single power supplies, or with plus and minus supplies. As the LM35 device draws only 60 μA from the supply, it has very low self-heating of less than 0.1°C in still air. The LM35 device is rated to operate over a −55°C to 150°C temperature range, while the LM35C device is rated for a −40°C to 110°C range (−10° with improved accuracy).

B. Pulse Rate sensor:

Pulse Rate sensor is used to sense the pulses of human body by which we can know the condition of the person.

Pulse Rate sensor monitors the light level transmitted through the vascular tissue of the fingertip and the corresponding variations in light intensities that occur as the blood volume change in the tissue.

IV. CONCLUSION

At the RTS department of KNRTU-KAI named after A. N. Tupolev there was developed a portable device for removal of 1 lead of ECG and a data transmission system on a remote server via GPRS-channel. Thus, it is perspective to develop a system that controls drivers' wakefulness based on analysis of the considered ECG parameters, the calculation of which can be implemented on a remote server.

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