

Changes in Driving Behavior Possibly Hidden in Stress

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INTRODUCTION:

Driving behavior in Bangladesh is so complex and dangerous. We have multimodal road culture from the past but in recent years, our traffic behavior goes downwards just because of poor road conditions, broken roads and significantly all drivers are very reckless in driving. These unruly issues combinedly responsible for traffic congestion and make the road culture so unfriendly. So, the overall situation is uncomfortable for the civilians. From this point of view we came to study on driving behavior.

MOTIVATION:

Civilians are getting tired of everyday life and from this point of view we want figure out the basic root problems and the easy possible solutions. Then we started a study around Dhaka city which focuses both system and HCI. This study helps us to understand that drivers in the city are always in stress which disturbs their wellbeing. It drives us and then we developed a sensor based wearable device which can detect the pulse reading during driving, ultimately the way to know how stressful they are. We used pulse to identify stress from the reference of American Heart Association, USA.

SYSTEM ARCHITECTURE:

This device carries a heartbeat sensor which can measure regular pulse and the level of uncomfortable region from ears and fingers. Figure 1 represents the block diagram of the total system which consists of a MCU, a LCD, a stress button which is set to the drivers' finger that they press the button when they feel stress personally, a SD card module to record the pulses in real time.

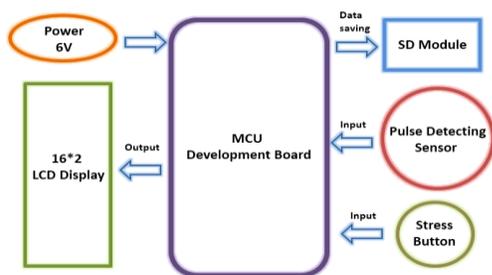


Figure 1: Block Diagram of the System

Heartbeat sensor is a bright green 515 nm InGaN Sapphire LED which brightly light up our flesh and a phototransistor detects the pulse when reflectivity changes in our blood vessels because heart manages the oxy – hemoglobin and de - oxy – hemoglobin blood flow around the body. Sensor modifies the pulse signal as an electric signal and amplify it [1]. we compared this sensor with existing medical device and found the standard deviation of the error is 2.36%. Figure 2 carries wearable part of the system and also the detecting sensor.

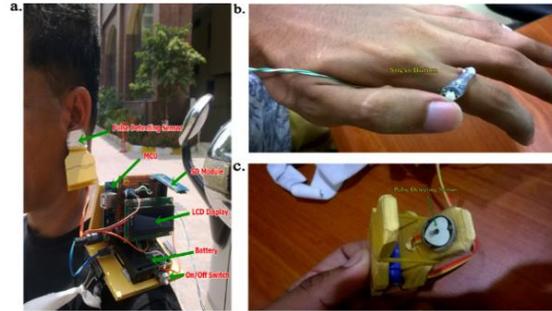


Figure 2: a. The Device, b. Stress button, c. Heartbeat Sensor, All Together in the System.

EVALUATION:

We did 10 experiments on drivers and recorded the movement of the car and the GPS location. We can sync the all data together and Figure 3 represents the graph scenario in different cases for 4 different subjects after analyzing. Pulse increased at turns, backward driving, speed breakers, jam and fast driving. Unluckily, we faced two several accidents where the system recorded the higher pulse compare to subjects regular pulse.

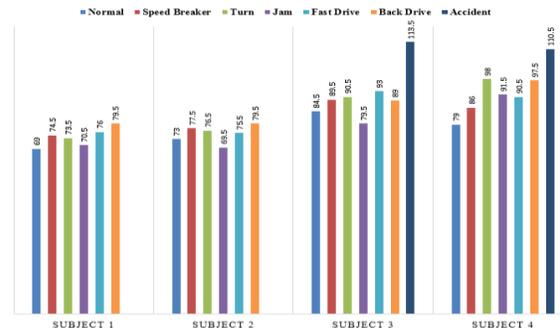


Figure 3: Graph Analysis for Four Different Subjects.

The pulse scenario indicates that they are in stress always. We also interviewed many other drivers about their life and work and they frankly expressed their stressful life. Our ANOVA analysis of interview also proof the stress. Their stress directly matters to their wellbeing as well as the whole driving behavior.

CONCLUSION:

This analysis, can help on the wellbeing of our drivers. It is possible to make a real time health report according to analysis and we may suggest them to follow some strategies to improve the wellbeing. This stress issue has a great impact in our driving behavior.

REFERENCE:

[1] N. Ahmed, S.A. Rahman, R. J. Rony, T. Mushfique, "Assessing Driving Stress using Custom Built Real-Time Sensors", IC4ME2, May 2016, Rajshahi, Bangladesh.