

DESIGN AND DEVELOPMENT OF LIE DETECTOR USING POLYGRAPH

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Abstract - The main aim of the project is to detect abnormal wave beats of the heartbeat. It is mainly used in the military and special range police to know the terrorist is telling the truth or not. The different types of parameters have been used in the project such that the as blood pressure sensor and heart beat sensor. It is to monitor the rate of heart beat by using the electrodes which is placed in the wrist. During the questionnaire part if any change in body is to be monitored by the sensor and it is plotted in the graph by using the USB communication. The pic16f877a is used for the interfacing the program which has to be used.

Key Words: Arduino, PIC16F877A, SEN-11574(Heart Rate Sensor)

1.INTRODUCTION

It is a part of investigation process under the surveillance of the enforcement law. Mainly used in the analytical field of medical purpose. The poly graph has been used in the project to identify the change in body during any enquires process. At the time there is a change in the body temperature or heart beat and sweating it is identified by the use of heartbeat sensor or pulse sensor. The main principle of the project is about based on the human skin resistivity and the truth accompanied by the person. The sensor are been used to identify the different range during the process and its varying value is plotted in the poly graph by the using the programming language. There will be sensor which converts the electrical signal analog to digital (ADC) from the Arduino. For the process we can interface can be done with the data acquisition system. It is also done by using the PIC 16F887A microcontroller for the main base of the project in that the output is shown on the polygraph with the difference rate of change of the wave in the graph. The overall objective of the work is to build a cost-effective lie detector monitoring device and to construct a prototype system with a low cost. A high performance microcontroller is used to develop technologies for a personal aid for mobility and monitoring.

2.LITERATURE SURVEY

In this paper I have studied that person who has probability of lying was required to fill his/her mouth with a handful of dry rice, the person expectorate the rice afterward. If the rice which came from suspected person was dry, it meant that the person was guilty. This method was explained by physiological principle, and it assumed that when human

beings were in fearful and anxiety situation, salivating process was decreasing and it caused a dry mouth. Namely, human body experienced paralyzing conditions during anxiety and fear situation. However, in these years, people did not know about physiological manifestations and many innocent people were killed by victim of this method [1]. In this paper I studied the history of research into psycho physiological measurements as an aid to detecting lying, widely known as the 'lie detector' or polygraph, is the focus of this review. The physiological measurements used are detailed and the debates that exist in regards to its role in the investigative process are introduced. Attention is given to the main polygraph testing methods, namely the Comparative Question Test and the Concealed Information Test. Discussion of these two central methods, their uses and problems forms the basis of the review [2]. This research aims to discuss the neuropsychological evidence of brain structures that sub serve human deceptive behavior, especially with an emphasis on the role of the prefrontal cortex and its executive functions. This research is of importance to the field of psychology, as it offers insight into the nature of deception by considering the neural processes involved in different aspects of deception, such as the preparation to lie, intention, and context that is eliciting the need or likelihood to resort to deception [3]. Lie-detection using polygraph has been the most extensively used tools for extracting information from a suspect who is believed to be suppressing revealing the truth. By entering the portfolio of physiological responses, a subject makes to each successive question, the polygraphed established a baseline reaction from which the significant deviations are observed and interpreted as indicators of deception. To determine whether subjects are lying or hiding something related to the event took place, the first approach to deception detection relied on anxiety-induced autonomic indicators, using polygraphs measuring pulse, blood pressure, respiration, and galvanic skin response. The modern era of lie detection began around the turn of the 20th century. [4]. This research investigates the feasibility of a lie detector system based on photoplethysmogram (PPG) signal. Lie detector notes physiological changes of a subject commonly under Guilty Knowledge Test (GKT). The proposed research methodology consists of Easy Pulse sensor that captures PPG signal where oxygen saturation is measured with the help of Arduino microcontroller and a software named Cool Term which converts the captured data in a text data. Under GKT, the subject has to answer with a YES or NO [5]. A polygraph, which can measure some of the physiological responses from the body, has been widely employed in lie-detection. Many researchers, however, believe that lie detection can become more precise if the neuronal changes that occur in the process of deception can be isolated and measured. In this study, we

combine both measures (i.e., physiological and neuronal changes) for enhanced lie-detection. [6]. The purpose of this study was to test a new cognitive lie detection method, time restricted integrity confirmation (Tri-Con), which uses response time and inconsistencies across answers as cues to deception. [7]. I have studied the techniques and theories relevant to the emerging field of “lie detection by inducing cognitive load selectively on liars.” To help these techniques benefit from past mistakes, we start with a summary of the polygraph-based Controlled Question Technique (CQT) and the major criticisms of it made by the National Research Council (2003), including that it not based on a validated theory and administration procedures have not been standardized. Lessons from the more successful Guilty Knowledge Test are also considered. [8]. In this paper I have studied accuracy rates comparable to a coin toss, and come with a set of systematic biases that sway the judgment. This pessimistic view stands in contrast to research showing that people make informed decisions that adapt to the context they operate. The account is contrasted with longstanding and more recent accounts of the judgment process, which propose that people fall back on default ways of thinking. [9]. In this paper I have studied The physiological measurements used are detailed and the debates that exist in regards to its role in the investigative process are introduced. Attention is given to the main polygraph testing methods, namely the Comparative Question Test and the Concealed Information Test. It helps to improving current polygraph technology and exploring the role of the polygraph in combination with other deception detection techniques. [10]. In this paper I have studied The possibility of using neuroimaging to detect deception in legal settings has generated widespread resistance flaws are real, but although using neural lie-detection in non-experimental legal settings is premature, the critics are mistaken in believing that scientific standards should determine when these methods are ready for legal use. [11]. In this paper I have studied about the analog polygraph testing to aid Congressional consideration of efforts by the US Department of Defense to expand use of polygraph tests to large numbers of government employees with access to classified information. It is noted that the validity of polygraph testing has yet to be established. The present review suggests serious problems with both the theoretical rationale underlying use of polygraph tests and the quality of available evidence supporting the validity of such tests. The most serious problem in the development of policy-relevant conclusions about polygraph testing is viewed as the lack of theory to explain the results of testing. Although polygraph tests attempt to use anxiety as an indicator of lying, anxiety has many causal factors other than lying. [12].

2.METHODOLOGY

The approach of this work is to keep things as simple as possible. The system mainly carries out signal acquisition and pre-processing. It consists of two parts: Hardware and software. The hardware component consists of a power supply, sensor and amplifier. The software part consists of analysis of input signals from Arduino IDE. The circuit will be operating on its USB portable power source. The power source and circuitry will provide adequate voltage for the electronic components to function properly. There will be a sensor to convert the input signal into electrical signal. The signal will be convert analog to digital from Arduino IDE.

3. BLOCK DIAGRAM

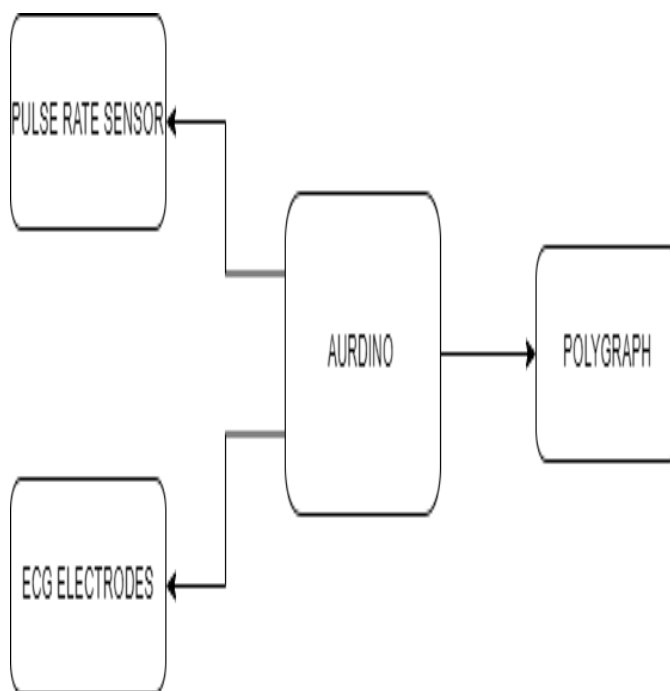


FIG- 1: Block Diagram of Lie Detector Using Arduino

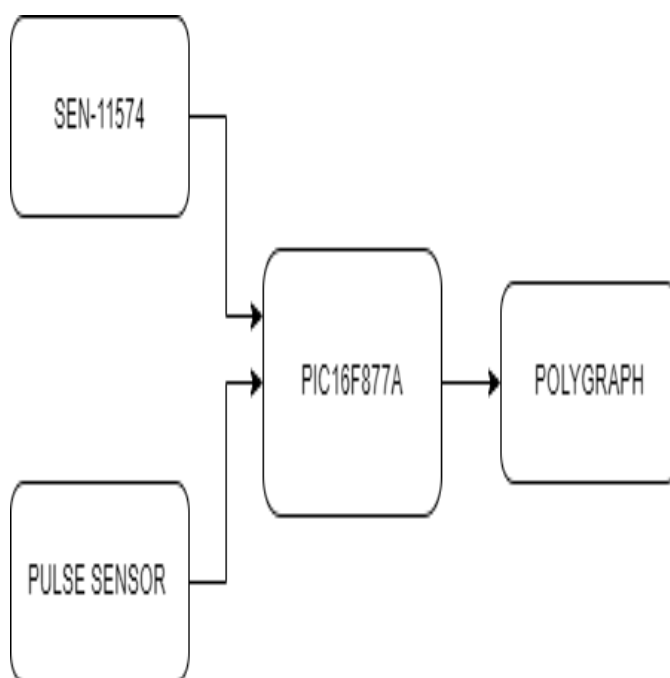


FIG-2: BLOCK DIAGRAM OF LIE DETECTOR USING PIC16F877A

5. PROGRAM FLOW

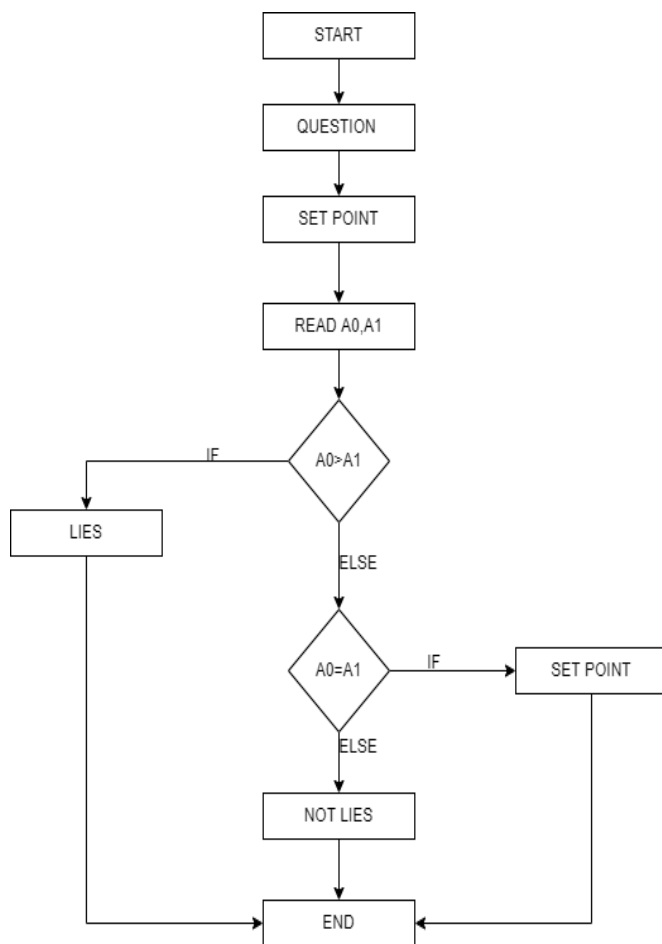


FIG-3: FLOW CHART

6. HARDWARE SET UP

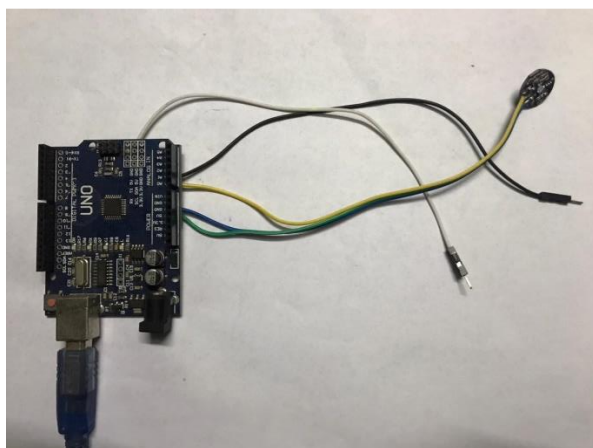


FIG-4: HARDWARE SETUP USING AURDINO

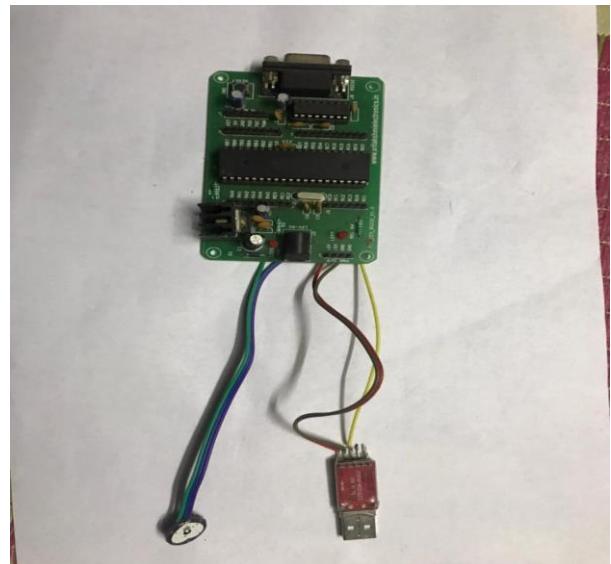


FIG-5: HARDWARE SETUP USING PIC16F877A

7.RESULT

As polygraph is widely used in criminal investigations and court settings, the observed 74.5% classification accuracy of polygraph seems rather weak. Probably, in the criminal investigations, the questions are well arranged in relation to the crime details involved. The average correct detection rate for guilty and innocent subjects using skin conductance and respiratory response ranges from 80 to 85% for all studies. The 74.5% accuracy found in our study is comparable to the average obtained by the above mentioned study. An important point should also be noted that, the results of this study cannot be directly compared with the results of previous studies because the classification accuracies reported in this study refer to differentiation between responses within individuals, whereas most previous studies deal with differentiating between deceptive and truthful individuals or groups.

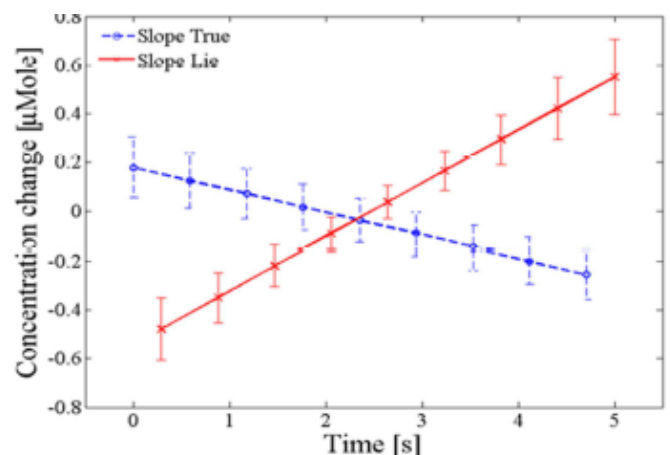


FIG-6: OUTPUT WAVEFORM 1

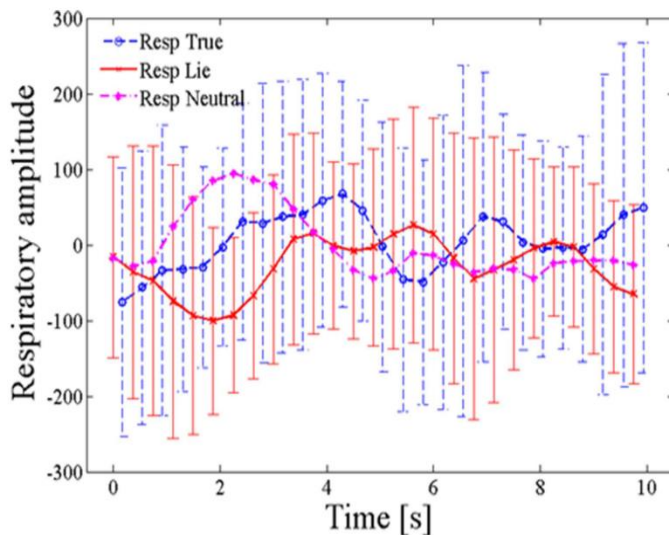


FIG-6: OUTPUT WAVEFORM 2

8.DISCUSSION

The polygraph is widely used in interrogations (i.e., criminal investigations). The major physiological responses measured are respiration, heart rate, skin conductance, body movement, and blood pressure. In this study, a commercially available polygraph machine, the Paragon Acquisition System (PAS), was used to detect the physiological signals. Respiration electrodermal activity and body movement were measured from the respective measuring points shown in **Figure 9**. The body movement data were excluded from the analysis, owing to the lack of difference in detected data. The reason for this might have been the fact that for the fNIRS measurements, the subjects were asked to remain still and not move their body, as this can generate noise in fNIRS data. The measured signals from the respiration and EDA transducers were fed to the PSA, which converted them to digital and then sent them to the host system using a wired connection.

9.ADVANTAGES

Polygraph tests have great significances they have several useful practical applications. They are valuable instruments used to detect truthfulness and deceitful behavior in several fields. The crime investigation departments, national security agencies, and business and industry are some of the important organized sectors where the polygraph tests are utilized.

10.FUTURE SCOPE

Powerful lie detection tools may someday surpass the accuracy of the polygraph and permanently change how suspects are convicted -- and freed. Imagine, a suspect is read words related to a crime while their brain is being scanned. A computer analyzes the data and informs the examiner if the suspect's memory holds information about the crime that only the perpetrator could know. The suspect would not even have to speak, for the examiner to know if the subject has exclusive knowledge of the crime. The guilty could be clearly identified and the innocent would be set free.

11. CONCLUSIONS

The circuit is mainly designed to determine if subject were actually lying. The physiological parameters like skin resistance, skin temperature and heart rate are found to be the simplest and easily accessible parameters that changes accordingly in response to the questionnaire posed to the subject. This test is found to be useful to detect theft person by law enforcement. It helps in crime investigation and for counselling a person by psychiatrist.

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