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Heart Rate Data Transmitter through GSM

Sandeep Hemadhribhotla[1], T. Krishna Chaitanya[2], T. Rahul[3], Mallikarjun Mudda[4]
[1,, 2, 3]Students, [4]Associate Professor, Department of Electronics and Communication Engineering, Sreenidhi institute of Science and Technology, India

Abstract— The heart rate data collected by analogue sensors is converted to digital and sent to the concerned mobile phone through GSM module. This proposal aims to use a wireless network to continuously monitor a cardiac patient.
ECG equipment are commonly used to monitor the condition of heart patients, however because of their complexity, their output cannot be communicated. As a result, a simple method known as the 'Plethysmograph' is described here to measure the pulse rate. Blood is discharged from the ventricles when the heart muscle contracts, and a pulse of pressure is delivered through the circulatory system of the human body. This pressure pulse can be felt at the tips of the fingers: blood flow can be tracked with IR sensors for this purpose. The setup is such that infrared light emitted by an IR led passes through the finger tip, and the IR energy transmitted through the finger is measured using an infrared sensor at the other end. The IR energy that is given through the blood intensity of the finger will vary slightly depending on the blood flow through the tip. These minute changes are recognised and proportionate digital pulses are created via op-amp because both sensors are positioned in a clip parallel to each other. The microcontroller unit is set up to count and display the pulses based on these signals. The LCD is used in the display part, and the same data is sent to all of the computer processor's concern cellphone number.When the system counts and displays the pulse rate per minute, if it is higher or lower than the average value, an alert is activated automatically, and data is sent to the concerned mobile phone via the GSM module.
Keywords—component, formatting, style, styling, insert (key words)

I. INTRODUCTION

A. Motivation
The design and development aspects are covered in the project work named "Heart rate data transmitter through GSM." It cannot be utilised for real-world applications because it is a prototype module that was created for the purpose of research. Because the sensors employed here may not be as accurate as they should be. Because the heart plays such an important role in the human body, high-intensity sensors are required to detect heart rate.
The idea given here is to use finger tips to measure blood flow. A finger must be placed between the IR LED and the IR sensor in order for this to work. These two gadgets, which are connected in a clipping device, may determine the amount of blood flowing through the fingertip. As a result, accurate pulse measurement necessitates considerable signal preprocessing.

B. Problem Statement
Typically heart rate is a reliable measure for the condition of the body in any circumstance.Precise measurement of heart beat requires complex calculation of body parametres which is can only be achieved by ECG machines. But there are also situations where in such complex machines cannot be utilized,but the heart beat measurement is essential.In such cases, out prototype can be used not only for measuring the heartbeat but also send the message if the body is in any critical condition to the emergency contact setup in the GSM module.

C. Objectives
The new signal processing approach provided here combines analogue and digital signal processing in such a way that both components can be kept simple while still suppressing disturbance signals effectively. The system presented here employs an amplifier, which is based on the LM358 and is capable of detecting minor changes in the preamplifier circuit. An operational amplifier, such as the LM358, converts the sensor output to proportionate voltage and amplifies it.

D. Main Contribution
The heart rate, or the structure of the electrical wave produced by the heart, is the most critical physiological parameter measured in an intensive care unit. This is done to monitor or identify changes in heart rate that could indicate a major problem. As a result, a cardiac monitor is specifically beneficial for monitoring patients with heart difficulties, and the special sections in hospitals where they are commonly utilised are referred to as cardiac care units or coronary care units. The cardioscope is essentially the same as an oscilloscope, which is used in electronic laboratories to display waveforms. Normally, ECG machines are used to monitor heart rate, but in this project, a simple concept is introduced that can gather the pulse rate and send it via SMS to the concerned cell phone. The doctor or caretaker can monitor the patient's condition from anywhere on the planet

because the device uses GSM technology. The following is an introduction to GSM technology, which plays an important role in this project.

II. LITERATURE SURVEY

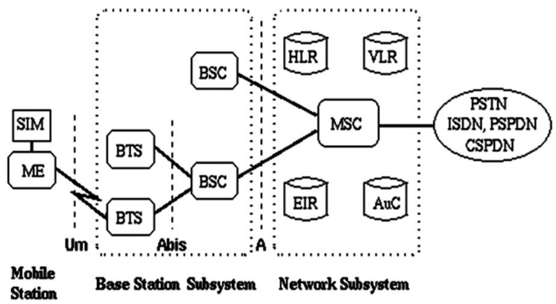
A. GSM Technology

GSM stands for "Global Technology for Mobile Communications," and it is a digital cellular communication system. It was created to produce a single European mobile phone standard, but it has quickly gained international acceptance. GSM is intended to offer consumers a wide range of services and features not accessible on analogue cellular networks, and in many cases, well ahead of the traditional public switched telephone network (PSTN). GSM has various modern services and capabilities, including as international roaming in other GSM networks, in addition to digital transmission. In the early 1980s, analogue cellular telephone networks exploded across Europe, mostly in Scandinavia and the United Kingdom, but also in France and Germany. Each country devised its own system, which was technologically and functionally incompatible with the others. Not only was mobile equipment confined to operation inside national boundaries, which was becoming more irrelevant in a unified Europe, but there was also a relatively tiny market for each type of equipment, prohibiting economies of scale and associated cost reductions.The Europeans recognised this early on, and the Conference of European Posts and Telegraphs (CEPT) formed the Group Special Mobile (GSM) in 1982 to develop and build a pan-European public land mobile system.
The suggested system must fulfil the following requirements:
Low terminal and service costs
Good subjective speech.
Handheld terminal support
Support for a variety of new services and facilities
International roaming is supported

B. GSM Provides Services

GSM planners desired ISDN compatibility from the start, both in terms of the services delivered and the control signals employed. However, due to bandwidth and cost constraints in radio transmission, the conventional ISDN B-channel data rate of 64kbps cannot be attained in practise. Telecommunication services are split into three categories by ITU-T standards: carrier services, tele-services, and supplemental services.The most basic tele-service enabled by GSM is telephony. Like all other communications, speed is digitally encoded and sent as a stream across the GSM network. There is also an emergency service, which entails dialling three digits to reach the nearest supplier of emergency services. In addition, there is interaction with the integrated service digital network (ISDN), which allows a single-subscriber – line system to be expanded into a multi-service system. In 1982, Germany developed the first commercial GSM system, codenamed D2.

Through electromagnetic waves, this important communication channel can provide us with a strong tool for managing a desired equipment or process parameter from a distance. With only a little effort, logic may be built up to get feedback on the state of the device or process under control. There are several data services accessible. GSM users can utilise a number of access methods and protocols, such as X-25 or X.32, to send and receive data at up to 9600bps to users on POTS (Plain Old Telephone Service), ISDN, Packet Switched Public Data Networks, and Circuit Switched Public Data Networks.Because the GSM network is a digital network, no modem is required between the user and the network, however an audio modem is required within the GSM network to interact with POTS. Other data services include Group 3 facsimile, which involves the use of a fax adaptor and is described by ITU-T standard T.30. GSM has a function called Short Message Services (SMS) that was not accessible in prior analogue systems. SMS (short messaging service) is a two-way service that allows you to send and receive short alphanumeric (up to 160 byte) messages. A store-and-forward mechanism is used to send and receive messages. Through point-to-point SMS, a message can be delivered to another service user, and the sender will get an acknowledgement of receipt. In a cell-broadcast mode, SMS may also be used to provide messages such as traffic reports or news updates. Messages can also be kept and accessed later on the SIM card. Supplementary services are given in addition to tele-services or bearer services. In the existing (Phase I) standards, they include various forms of call forwarding (such as call forwarding when the mobile user is unreachable by the network) and call blocking of outgoing or incoming calls, for example when roaming in another country.Many other supplemental services, including as caller identification, call waiting, and multi-party chats, will be included in the Phase 2 requirements. The GSM network is made up of a number of different functional entities, each with its own set of features and interfaces. The GSM network is divided into three sections. The subscriber transports the mobile station. The Base Station Subsystem is in charge of the radio interface between the mobile station and the base station. The Mobile Services Switching Center (MSC), the Network Subsystem's major component, transmits calls between mobile users and between mobile and fixed network users. The MSC is also in charge of mobility management. The Operations and Maintenance Center, which is responsible for the network's correct functioning and configuration, including the Mobile Station and Base Station Subsystem, is not depicted. The Operations and Maintenance Center, which is responsible for the network's correct operation and configuration, is secret. The Un-interface, also known as the air interface or radio connection, connects the Mobile Station to the Base Station Subsystem. The Base Station Subsystem communicates with the Mobile Services Switching Center through the interface.



C. Heart And Human Body

The human body is a complicated engineering marvel that incorporates a variety of systems including electrical, mechanical, hydraulic, chemical, and thermal systems, among others. Internally, these systems communicate with one another as well as with the outside world. Individual systems enable the human body to execute meaningful activities, maintain life, and reproduce itself by way of a multi-level control system and communication network.

The cardiovascular system, which includes the heart, is the most essential of the many functions performed by various parts of the body. The function of this system, which transports oxygen, carbon dioxide, chemical substances, and blood cells, is far too complicated. The right and left halves of the heart are structurally separated.

Average computation is the term for the method explained here for determining heart rate. This is the most well-known and oldest method. An average rate (i.e. beats per minute) is calculated by counting the number of pulses in a certain period of time. The average method of computation misses the actual picture of the heart's responsiveness to exercise, stress, and the environment because it overlooks variations in the time between beats. As a result, beat-to-beat computation is crucial; the time gap between beats is strictly monitored in this procedure. In this project, the heart rate is calculated and represented as a number of beats per minute. By increasing the ECG signal and determining the average or instantaneous time intervals between successive peaks, the heart rate may be estimated. The oldest and most often used method is average computation. Counting the number of pulses in a particular amount of time yields an average rate (beats per minute). The average method of computation ignores variations in the duration between beats, resulting in an inaccurate depiction of the heart's reaction to exercise, stress, and the environment.Calculate beats per minute by measuring the time in seconds between two successive pulses and translating it to beats per minute using the beats /min =60/T method. This method correctly depicts the heart rate in its natural state.This is based on a four or six beat average and combines beat-to-beat computation with averaging. The similarity of this approach to the beat-to-beat monitoring system gives it an edge over averaging strategies.

D. GSM Modem

The role of GSM is critical here; this module, which is interfaced with a pulse counter, is designed to communicate with the caller cellphone in order to deliver pulse rate data via SMS. When someone contacts this GSM module to inquire about the most recent reading, the system obtains data from the processor and sends it to the calling mobile. The GSM module interfaced with the controller over max 232 is necessary here and there since this module operates on TTL logic and the microcontroller performs its function on Cmos logic. The SIM300 processor is found in the GSM module utilised in the project work; this processor, when assembled with the mother board, has a little plastic tray that can hold a SIM card. Because a SIM card is associated with a specific service number, charges are assessed based on usage.

The GSM Smart Modem from Semen is a multi-functional, ready-to-use gadget that can be implanted or connected into any application. Standard AT commands can be used to operate and personalise the Smart Modem to various levels.

E. Display Section

The display part is set up to count and display the number of pulses generated every minute. The microcontroller begins counting the pulse rate data obtained from the finger after clipping the sensor and triggering the start key. The pulses are displayed in increment mode, and because the display is time-based, the number of pulses produced in one minute is displayed. After one minute, the controller regrets the pulses it has generated. The start key must be activated once more to obtain a new count. The LCD panel utilised here has two rows, each of which contains 16 characters, depending on the LCD panel's availability. For this purpose, three or four line panels can be employed to display more information at the same time. The drive circuitry for the display on this LCD is housed within the LCD itself. Because the programme is designed to display heart rate data per minute, earlier data can be collected and displayed in a single row if necessary. After the microcontroller has initialised the LCD screen, a series of control instructions are delivered to display the characters based on the pulse rate data.

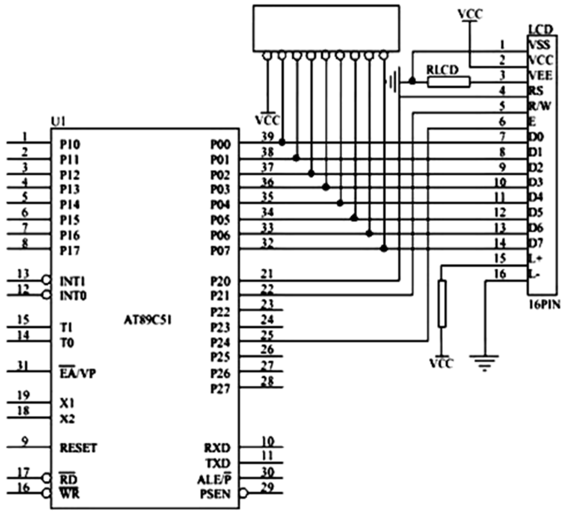
F. Microcontroller

The controller in question is from the 8051 family of architecture, and it's commonly referred to as MCS-51. The data bus on this microcontroller is 8 bits. Some of the controllers in this series can access 64K of programme memory and another 64K of data memory. On-chip Read Only Memory (ROM) provides 4K of code memory for the 8051. (ROM). The internal Random Access Memory (RAM) of the 8051 is 128 bytes (RAM). The 8051 is equipped with two timers/counters, a serial interface, four general-purpose parallel input/output ports, and interrupt control logic with five interrupt sources. In addition to internal RAM, the 8051 has many Special Function Registers (SFR), which are control and data registers for on-chip functionality.

The accumulator, the B register, and the Program Status Word (PSW), which carries the CPU flags, are also part of the SFRs. The required control words are placed into the corresponding SFR's to programme the 8051's different internal hardware features.

Pin No.	Name	Description
Pin no. 1	D7	Data bus line 7 (MSB)
Pin no. 2	D6	Data bus line 6
Pin no. 3	D5	Data bus line 5
Pin no. 4	D4	Data bus line 4
Pin no. 5	D3	Data bus line 3
Pin no. 6	D2	Data bus line 2
Pin no. 7	D1	Data bus line 1
Pin no. 8	D0	Data bus line 0 (LSB)
Pin no. 9	EN1	Enable signal for row 0 and 1 (1st controller)
Pin no. 10	R/W	0 = Write to LCD module 1 = Read from LCD module
Pin no. 11	RS	0 = Instruction input 1 = Data input
Pin no. 12	VEE	Contrast adjust
Pin no. 13	VSS	Power supply (GND)
Pin no. 14	VCC	Power supply (+5V)
Pin no. 15	EN2	Enable signal for row 2 and 3 (2nd controller
Pin no. 16	NC	Not Connected

The 8051 can address 64K of external data memory and 64K of external programme memory, as previously indicated. These might be distinct memory blocks, allowing the microcontroller to have up to 128K of memory. The Harvard architecture refers to the separation of code and data memory. RD# and PSEN# are two different read signals on the 8051. The first is used to read a byte from external data memory, whereas the second is used to read a byte from external programme memory. Both of these indications are what are referred to be "active low signals." When they are activated, they are reset to logic level 0. External programme memory is used to fetch all external code. Special read instructions, such as the MOVC instruction, can also read bytes from external programme memory. The MOVX instruction, for example, is a separate instruction for reading from external data memory. That is, the instructions specify which block of memory is addressed, and during the memory read cycle, the associated control signal, either RD# or PSEN#, is triggered. It is possible to map a single block of memory to serve as both data and programme memory. The Von Neumann1 architecture is the name given to this design. The two signals are coupled with a logic AND operation in order to read from the same block utilising either the RD# signal or the PSEN# signal. When either of these conditions exists, the AND gate's output is low.



G. Ultrasonic Dopler

The heart rate is monitored using ultrasonic Dopplers. Several procedures, gadgets, and sensors have been available in the recent decade that provide reasonably trustworthy information and data about the heart in real time. Nonetheless, due of the heart's complexity, developing ultrasonic Doppler has been a challenging undertaking. Because the heart is mechanically insulated from the outside world beneath the tissues, only a limited quantity of information on the heart condition may be collected immediately. The electrical potential of cardiac activity and sound signals produced during motion are the only readily available information about the heart that can be picked up from muscle tissue adjacent to the heart. When these signals are caught up, they are mixed up with the blood pumping or sucking signals.

III. APPLIED TECHNOLOGIES

A. GSM Technology

The Global System for Mobile Communication is also known as GSM. A French business called Group Special Mobile created this technology in 1985. Although this communication system was created for personal use, it is now used for a variety of purposes. Any equipment that is controlled or monitored can be operated anywhere in the world thanks to the only wireless communication technology that has no range restrictions.

Cellular radio works by using a network of cell sites spread out across a large area to provide mobile phone service. A cell site has a radio transceiver and a base station controller that manages, sends, and receives traffic from mobile phones in the region to a cellular phone switch. It also has a tower with antennas and connects to a mobile communications switching office, which is a remote cellular switch (MTSO). MTSO connects landline and wireless clients, transfers calls across cells as mobiles cross cell boundaries, and authenticates wireless users prior to making calls.

GSM calls employ either data or voice calls. To make voice calls, half-rate, full-rate, and improved full-rate audio codes are utilised. The phone may be turned into a 9600-bps modem by making data calls. It makes use of digital technology and time-divided multiple-access transmission systems. GSM technology is continually evolving, with major advances in the recent decade. It will experience even more alterations in the next years.

GSM-400, GSM-800, GSM-900, GSM-1800, and GSM-R are the frequency bandwidths for GSM services in different nations. In different parts of the world, the GSM-900 and GSM-1800 frequency bands are the most extensively used. The GSM-900 uses a frequency range of 935-960 MHz for the downlink and 895-915 MHz for the uplink. This band is divided into 124 pairs of simplex channels with a 200-kHz spacing. A network provider is assigned a specific range of simplex channels.

Digital air interface is the type of interface utilised by GSM. Before being transmitted, analogue voice signals are transformed to digital. At any given moment, the GSM RF carrier can support up to 8 MS subscribers. Transmission speed is 270 kilobits per second. For digital signal transmission, Gaussian minimum shift keying (GMSK) is utilised. A phase change in GMSK refers to the transition from a digital "1" to a "0" over time. High frequency components are reduced in the spectrum. The phase change in GSMK is not constant and is evenly distributed.

GSM modems resemble mobile phones. It includes a serial port for connecting to a serial device and a SIM card tray. It has its own instructions for sending, receiving, and deleting messages, among other things. The microcontroller is used to transmit these directives. The 8TH chapter contains a comprehensive description of this technique. The following is an overview of the microcontroller.

The system described here uses an Atmel microprocessor, specifically the AT89S51/52. The major purpose of this unit is to collect pulse rate data from the sensor, show it on the LCD, and send it to the concerned mobile phone via the GSM module. The data to be sent to the mobile, as well as its service number, must be encoded into the processor in order to establish an automatic communication link with it. Similarly, the microcontroller-based CPU will only take calls from pre-programmed numbers and will reject calls from other phones.

Communication systems are increasingly being implemented with microcontrollers. Microcontroller-based systems must consequently be thoroughly understood. Microcontrollers are now an essential component of all modern digital communication systems. Microcontroller-based dedicated systems have improved the functional, operational, and performance characteristics significantly. Because of the processing and networking capabilities of Micro controller devices, architectural changes in instrumentation and control systems have occurred. Microcontrollers must be considered as computing and communication tools; knowledge of microcontrollers is only helpful and satisfying if it is used to build a product that is beneficial in industry or society at large. This is a topic that is directly related to the development and automation of industrial products. Microcontrollers are programmed in this project to conduct encoding and decoding procedures, which are necessary for any digital communication system. Any microcontroller that executes the programme programmed into it. The programme is written in such a way that the system may create digital connection between two units that are separated by a large distance. The programme is nothing more than a sequence of instructions, which are commonly written in binary code and referred to as machine code, thereby referring to the software as machine language. Writing a programme in this code is a difficult and time-consuming task. Because the software is essentially a string of 0s and 1s, it is prone to errors, and the instructions are not easily understood by looking at the pattern alone. A simple type of shorthand code for the patterns 0's and 1's is another option. The data received from the remote control unit can be read and stored by the microcontroller. Microcontrollers are single-purpose devices that execute a single programme. The programme is kept in read-only memory (ROM) and rarely changes. If there are any changes to the function or software problems, the present programme must be deleted from the chip and a new modified programme placed into the chip using a chip burner. The next chapters provide a more detailed discussion of these controllers.

Because the operations listed above cannot be accomplished without microcontrollers, these devices are referred to as the "heart" of the instruments. Today, no instrument can function without one. As a result, microcontrollers are increasingly being used to construct a wide range of communication, instrument, control, and robotic systems. As a result, it is critical to have a thorough understanding of microcontroller-based device.Microcontrollers are now an essential component of all modern digital communication systems.

Microcontroller-based dedicated systems have improved the functional, operational, and performance characteristics significantly.

B. RS32 Communication

The Electronics Industry Association assigned this standard the number 232, which stands for "preferred standard" (EIA). The new name is EIA 232D, but most people still refer to it as RS-232. The standard specifies the signal type, timing, the amount of bits in a character, which bit goes first, how to distinguish one character from another, and codes to indicate the start and end of the message. Serial communication, such as RS-232, can now be used over normal telephone lines thanks to these standards.

C. Saving Current through Auto Shutdown Techniques

A basic shutdown feature is provided by many RS-232 transceivers, which is triggered by providing a logic level to the shutdown pin. This function frequently saves enough current to allow a portable piece of equipment's battery to last for an extended period of time. However, there is another method for turning off the power of an RS-232 device; it puts the RS-232 device into shutdown mode anytime the RS-232 interface isn't in use. This capability, dubbed Auto shutdown, is useful since RS-232 devices are frequently utilised for brief periods of time in various applications.By detecting if a cable is present, the Auto shutdown function keeps track of whether the RS-232 interface is in use. There's no point to power an RS-232 transceiver if a cable isn't connected to it. When a transceiver has the Auto shutdown option enabled, it checks the RS-232 signals at its receivers to see if a cable is attached. The signals at the RS-232 receiver inputs linger near 0V when no cable is available; the transceiver shuts down when all of its receiver inputs are at or near 0V. If any of the receiver inputs exceeds +2.7V or falls below -2.7V, the component will immediately come out of shutdown (i.e., whenever the cable is reconnected). This capability can also be disabled via signals that turn the device on or off. Auto shutdown Plus is similar to Auto shutdown in that it saves energy by turning off the RS-232 device when it is not in use. Auto shutdown Plus, on the other hand, shuts off the transceiver not only when the connection is unplugged, but also while the cable is attached and no data edges have shown for 30 seconds or more. That manner, regardless of whether the cable is attached, you may benefit from an automated shutdown. Auto shutdown-Plus devices check for signal activity on both the RS-232 receiver inputs and the digital transmitter inputs; if no activity is detected on any of these lines, the device shuts down. You can force the device on or off using pins that override the Auto shutdown plus function, just as you do with Auto shutdown. An RS-232 transceiver, such as the MAX3238, with Auto shutdown Plus circuitry can continue powered as long as it detects signal transactions at its transmitter or receiver inputs within 30 seconds. If no signal transactions are present, the transceiver will be turned off automatically. Logic levels applied to the FORCEON and FORCEOFF-bar pins switch on and off device power regardless of whether or not signal activity is detected.

D. Enhanced ESD Protection

To defend against electrostatic discharges encountered during handling and assembly, all RS-232 devices have ESD-protected structures on their pins. Devices with ordinary and enhanced protection are available from some manufacturers. Because standard and enhanced-protection parts almost always have the same pin out, adding devices with increased ESD protection to an existing PC board usually doesn't require any changes.

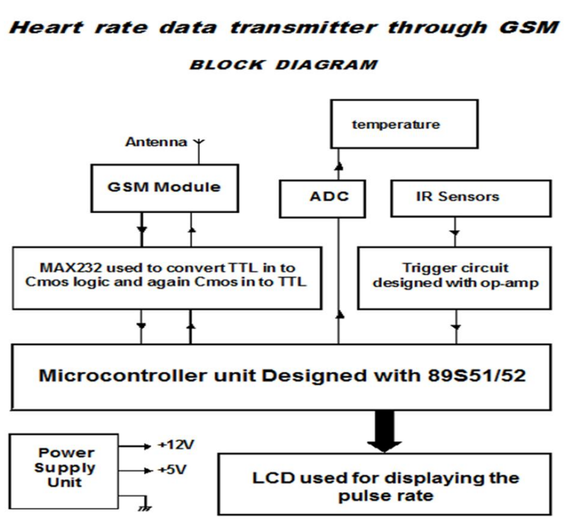
On both the RS-232 and CMOS digital pins, some applications require a 15kV ESD protection. Cell phones, for example, do not have an RS-232 transceiver in the phone itself to save money and space. Instead, they send CMOS-level signals out through the phone's bottom connector. If the owner of a cell phone wants to connect to a laptop's RS-232 port, he or she must purchase a "data-lump" cable that incorporates an RS-232 transceiver.

Both sides of the RS-232 transmitters and receivers are brought out to connectors in this arrangement, putting them at risk of ESD. In such instances, enhanced ESD protection on both the RS-232 and CMOS sides of the transmitters and receivers may be desirable. The MAX3380E and MAX3381E are two transceivers that are well-suited for this application.

Data Rates Data rates of 20kbps or less are required per the newest RS-232 specification. Despite this limitation, most RS-232 transceivers have data rates that significantly exceed that speed. In fact, today's RS-232 transceivers can transmit data at up to 1 Mbps. Figure 2 shows the situation. Those devices break another RS-232 specification, the maximum allowable transmitter-output slew rate of 30V/is, in order to achieve that speed.

E. Compatible Vs Compliant

Transmitters must supply a 5V output in order to comply with the RS-232 specification. The thresholds of RS-232 receivers must be less than 3V to be compatible. As a result, these devices have a healthy 2V noise buffer (and often more, as receiver thresholds are typically less than 3V). It is possible to whittle away at some of the margin while still maintaining reliable data transmissions. When transmitter output voltages span a tighter range, margins are reduced. Compatible, rather than compliant, RS-232 outputs are defined as transmitter outputs that have a minimum voltage of 3.7V. The output voltages of an RS-232 device that does not include charge pumps (and thus is cheaper and smaller) cannot possible reach 5V when powered by 5V supply. RS-232 compatible rather than compliant refers to a device that runs under certain settings and has transmitter outputs of at least 3.7V.



IV. WORKING

The heart rate data received by analogue sensors is transformed to digital and transferred through GSM module to the related mobile phone. The goal of this proposal is to employ a wireless network to monitor a cardiac patient in real time. ECG machines are routinely used to monitor the state of cardiac patients, however their output cannot be conveyed due to their complexity. As a result, a simple method for measuring pulse rate known as the 'Plethysmograph' is explained here. When the heart muscle contracts, blood is ejected from the ventricles, and a pulse of pressure is sent through the circulatory system of the human body. This pressure pulse may be felt at the tips of the fingers, and blood flow can be monitored using infrared sensors. The configuration is such that infrared light generated by an IR led passes through the finger tip, and the IR energy transferred through the finger is detected at the other end by an infrared sensor. The strength of the IR radiation sent via the finger's blood will fluctuate slightly based on the blood flow through the tip. Because both sensors are positioned in a clip parallel to one other, these minute changes are recognised and proportional digital pulses are generated through op-amp. Based on these signals, the microcontroller unit is set up to count and display the pulses. In the display section, an LCD is employed, and the same data is broadcast to all of the computer processor's mobile numbers. If the pulse rate per minute is greater or lower than the usual value, the system immediately activates an alarm, and data is transmitted to the relevant mobile phone through the GSM module.

V. CONCLUSION

The project "Pulse rate data transmitter through GSM" was completed successfully, with satisfactory results. Because it is a prototype module, it has been thoroughly altered to take into account technological advancements and the introduction of new and improved medical instrument procedures for correct diagnosis. The hardware employed in this project was substantial; however, when this prototype module is converted into an engineering model, all of the hefty components can be crammed into a single chip, resulting in a sleek, portable, and attractive module.

People demand better quality service for a variety of additional applications, in addition to personal conversations via mobile phones, as technology progresses, particularly in the realm of global telecommunication networks. GSM modules are being developed in this area, and they can be utilised for a variety of applications. The integration of automation and built-in intelligence in medical instruments has been greatly aided by the usage of GSM technology in medical instrumentation. The benefit of adopting a GSM processor is that there will be no range limitations because the telecoms network has been expanded to cover the entire globe. In order to understand linkages between the life sciences and engineering techniques, it is necessary for engineers to have a fair understanding about the anatomy and physiology of the human body.

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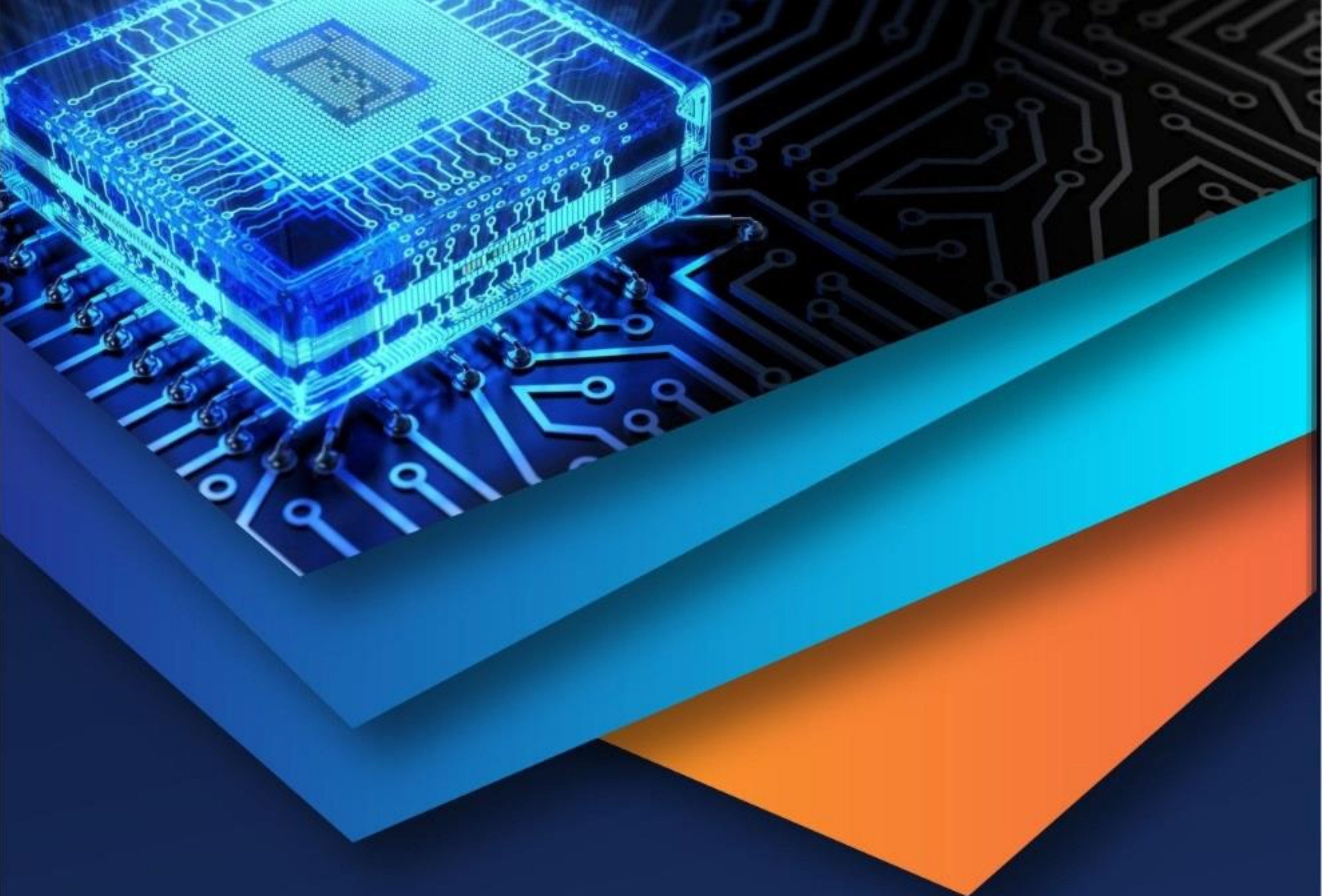

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