***Indian Institute OF Technology, Ropar***

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***GE – 107***

***TINKERING LAB PROJECT***

***(Project Report)***

***Arduino-Based Heart Rate Monitoring System***

***Submitted By -: G02\_Monday***

***Group Members:***

***Name -: Entry Number-:***

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***Objective-:***

*Arduino-Based Heart Rate Monitoring System*

*To measure and display heart rate using an Arduino and a low-cost pulse sensor. To help understand. bio-signal acquisition, real-time data processing, and visualization using Arduino****.***

***Components Used:***

*1. Microcontroller – ESP32*

*2. USB Cable (USB to B-type and data transferable)*

*3. Power Source – 3.7v batteries \* 2, with Battery Snap Connector*

*4. Buck Module DC-DC 7.4V to 5 & 3.3v \* 1*

*5. OLED Display (Driver IC: SSD1306, Resolution: 128 x 64)*

*6. MAX30100 Pulse Oximeter Sensor*

*7. Pulse Sensor Amped*

*8. Breadboard (400 Tie Points)*

*9. Header Pins*

*10. Soldering Iron and Solder Wire*

*11. Jumper Wires (Male-Male, Male-Female, Female-Female)*

*12. Resistors - 220 ohms \*3*

*13. RGB LED (2)*

*14. Buzzer (2)*

*15. Galvanic Skin Response (GSR) (or any other similar product - need not be the same brand and product code)*

Brand: [**SeeedStudio**](https://www.robotistan.com/seeedstudio)

Product Code: 13133)

***Circuit Diagram -:***

***Challenges Faced While Making the Project:***

1. *Low-cost pulse sensors such as the MAX30100 or generic light sensors can be very sensitive to movement, background light, and positioning, providing noisy or inaccurate measures.*
2. *Noise on the power from other nearby devices, loose wires, or a malfunctioning power supply (i.e., applying a 3.7v battery through a buck converter) may cause interference in detecting pulses.*
3. *Driver installation for the ESP32 microcontroller is an actual and commonly neglected setup issue.*

***How We Addressed the Challenges:***

1. *We replaced MAX30100 with the new one, and it was in good working condition.*
2. *Utilise short and compact connections; do not use loose jumper wires. Separate sensor wiring from display wiring to minimise interference.*
3. *We have located the chip employed in your ESP32. Download and install the proper driver from the official site. Rebooted the system and chose the appropriate COM port in Arduino ID.*

***Conclusion -:***

*The Arduino-based Heart Monitoring System provides an efficient way to track heart rate in real time. It is a cost-effective solution for personal and medical applications. With further enhancements, this system can become a vital part of wearable health technology*