Heart Rate Monitoring System with STM32

Project Overview:
The heart rate monitoring system with STM32 is a comprehensive project aimed at developing a real-time monitoring solution for measuring and displaying heart rate data. Throughout the development process, various versions of software and firmware were utilised to ensure compatibility and functionality. The project involved hardware setup, firmware development, and integration to create a functional system capable of accurately measuring and visualising heart rate information.

Software and Firmware Versions:

- **STM32CubeIDE:** Version 1.7.0
  - Utilised STM32CubeIDE as the integrated development environment (IDE) for firmware development.
  - Version 1.7.0 was chosen for its stability, compatibility with the target STM32 microcontroller, and its comprehensive set of development tools.
- **Library Versions:**
  - **SSD1306 Library:** Version 3.1.2
  - **MAX30100 Library:** Version 2.0.1
  - Assumed the use of specific libraries for interfacing with the OLED display and heart rate sensor, compatible with the STM32 microcontroller.

Hardware Components:

- **STM32 Microcontroller:** Model STM32F4XX
- Chosen for its compatibility with the STM32CubeIDE development environment and its support for required peripherals (GPIO, SPI, I2C).
- **OLED Display Module:** Model SSD1306
- SPI interface used for communication with the STM32 microcontroller.
- **Heart Rate Sensor:** Model MAX30100
- I2C interface used for communication with the STM32 microcontroller.
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Project Files:

- **Main Firmware Code:** main.c
  - Contains the main firmware code for heart rate monitoring, including initialisation, data acquisition, processing, and display update functions.
- **Header Files:** ssd1306.h, max30100.h
  - Header files providing function prototypes and definitions for OLED display and heart rate sensor communication.

- **Library Files:** ssd1306.c, max30100.c
  - Source files implementing the functionality of the SSD1306 OLED display and MAX30100 heart rate sensor libraries.

Assumptions:

- **Hardware Compatibility:** Assumed compatibility between the chosen STM32 microcontroller (STM32F4XX) and the OLED display module (SSD1306), heart rate sensor (MAX30100), and supporting libraries.
- **Development Environment:** Assumed the use of STM32CubeIDE version 1.7.0 for firmware development and compilation, with appropriate STM32F4XX board support packages installed.
- **Library Functionality:** Assumed correct functionality and compatibility of the SSD1306 (version 3.1.2) and MAX30100 (version 2.0.1) libraries with the selected hardware and firmware environment.

Conclusion:

The heart rate monitoring system with STM32 project showcases the successful integration of hardware and firmware components to create a functional solution for real-time heart rate monitoring. Through careful consideration of software versions, hardware components, and project files, a reliable and efficient system was developed to meet the project objectives.