# CLAIMS

1. A device for sensing and acquiring data comprising

a first sensing and transducer module configured to sense and obtain a first strain signal;

a second sensing and transducer module configured to sense and obtain a second strain signal;

a data acquisition module arranged in signal or data communication with the first sensing and transducer module and the second sensing and transducer module, the data acquisition module comprises a selector configured to select between receiving the first strain signal and the second strain signal and convert the received first strain signal or the received second strain signal into a digital value; wherein the second sensing and transducer module comprises an optical sensor module, the optical sensor module comprising an interrogation arm and a sensing arm, the interrogation arm is configured to be operating at either an identical or a co-located band as the sensing arm.

2. The device of claim 1, wherein the first sensing and transducer module comprises an electrical strain gauge acquisition unit having an electrical foil strain gauge sensor.

3. The device of claim 2, wherein the first sensing and transducer module comprises a Wheatstone bridge circuit, and the electrical foil strain gauge sensor forms an arm of the Wheatstone bridge.

4. The device of claim 3, wherein the Wheatstone bridge is configured such that the potential difference across two nodes of the Wheatstone bridge circuit vary according to a change in measured resistance of the electrical foil strain gauge sensor.

5. The device of any one of the preceding claims, wherein the interrogation arm comprises a CFBG sensor and the sensing arm comprises an CFBG sensor or UFBG sensor.

6. The device of claim 5, wherein a band of the CFBG or UFBG is selected to be from a linear portion of a slope (rising or falling) of a power intensity vs wavelength graph associated with a wide-band light source.

7. The device of claim 5 or 6, wherein the interrogation arm is built-in or connected to an LED light source, and wherein the sensing arm is operatively arranged to connect externally to obtain strain measurements.

8. The device of any one of the preceding claims, wherein the data acquisition module comprises a transceiver module, wherein the transceiver module includes a single board computer for interfacing with the selector using a universal asynchronous receiver-transmitter (UART) connection.

9. The device of claim 8, wherein the selector and/or the single board computer is configured to integrate the first strain signal and the second strain signal.

10. The device of any one of the preceding claims, wherein the first strain signal and/or the second strain signal is the form of an analogue differential voltage, and the analogue differential voltage is amplified before conversion to a digital value.

11. A system for monitoring strain on a structure comprising

a first sensing and transducer module having an ESG sensor attached to the structure, the ESG sensor configured to sense and obtain a first strain signal associated with an application of tensile or compressive strain on the structure;

a second sensing and transducer module having a fiber-optic based sensor attached to the structure, the fiber-optic based sensor configured to sense and obtain a second strain signal;

a data acquisition module arranged in signal or data communication with the first sensing and transducer module and the second sensing and transducer module, the data acquisition module comprises a selector configured to select between receiving the first strain signal and the second strain signal and convert the received first strain signal or the received second strain signal into a digital value;

wherein the second sensing and transducer module comprises an optical sensor module, the optical sensor module comprising an interrogation arm and a sensing arm, the interrogation arm is configured to be operating at either an identical or a co-located band as the sensing arm.

12. The system of claim 11, further comprises a single board computer arranged in wireless communication with the data acquisition module to receive the converted digital value for further transmission to a terminal device for display.

13. The system of claim 11 or 12, wherein the first sensing and transducer module comprises a Wheatstone bridge circuit, and the ESG sensor is a resistive arm of the Wheatstone bridge.

14. The system of any one of claims 11 to 13, wherein the interrogation arm comprises a CFBG sensor and the sensing arm comprises an CFBG sensor or UFBG sensor.

15. The system of any one of claims 11 to 14, wherein at least one of the first sensing and transducer module, the second sensing and transducer module, and the data acquisition module is arranged in wireless communication with respect to other modules.

16. The system of any one of claims 11 to 15, wherein the received first strain signal or the received second strain signal, and digital value are stored in a database for transmission to a terminal device.

17. The system of claim 12, wherein the selector and/or the single board computer is configured to integrate the first strain signal and the second strain signal.

18. A method for sensing and acquiring strain data on a structure comprising

obtaining a first strain signal from an ESG sensor attached to the structure and sending the first strain signal to first sensing and transducer module;

obtaining a second strain signal from a fiber-optic based sensor attached to the structure and sending the second strain signal to a second sensing and transducer module;

transducing the first strain signal and second strain signal to respective analogue values; and

selecting the respective analogue value and converting the analogue value to a digital value;

wherein the second sensing and transducer module comprises an optical sensor module, the optical sensor module comprising an interrogation arm and a sensing arm, the interrogation arm is configured to be operating at either an identical or a co-located band as the sensing arm.

19. The method of claim 18, further comprising storing the converted digital value in a dataset for display on a computer device.

20. A device for sensing and acquiring data comprising

a first sensing and transducer module configured to sense and obtain a first strain signal;

a second sensing and transducer module configured to sense and obtain a second strain signal;

a data acquisition module arranged in signal or data communication with the first sensing and transducer module and the second sensing and transducer module, the data acquisition module comprises a selector configured to select between receiving the first strain signal and the second strain signal and convert the received first strain signal or the received second strain signal into a digital value;

wherein the data acquisition module further comprises a single board computer for interfacing with the selector using a universal asynchronous receiver-transmitter (UART) connection, and wherein the selector and/or the single board computer is configured to integrate the first strain signal and the second strain signal; and wherein the second sensing and transducer module comprises an optical sensor module, the optical sensor module comprising an interrogation arm and a sensing arm, the interrogation arm is configured to be operating at either an identical or a co-located band as the sensing arm.