**STRESS DETECTION AND MANAGEMENT USING WEARABLE DEVICES AND MACHINE LEARNING**

1. **Invention is Related to:**

* The invention is related to the field of wearable computers and machine learning, especially focussing on stress detection using bio sensors. The agenda and the purpose of the project was to contribute in the sphere of mental health which is a concerning omnipresent issue in the world.

**Process**: The invention is a wearable device integrated with bio sensors designed to detect and monitor stress levels in individuals.

**Process Steps:**

1. **Wearable band and shirt:** A comfortable, adjustable band to be worn on the wrist and a comfortable shirt with embedded bio-sensors to collect bodily data.
2. **Bio Sensors:** Sensors to measure physiological parameters such as heart rate, skin conductivity, and body temperature, oxygen levels etc.
3. **Data Processing Unit:** A module to collect and process the data from the sensors.
4. **Machine Learning Model:** A Machine Learning algorithm designed to analyse the data and detect stress levels on various input parameters.
5. **Mobile Application:** An app to display real-time stress data and alerts to the user integrated with user profile to collect data about the user and give personalised recommendations.
6. **Novelty of the Invention:**

* The integration of multiple physiological parameters through bio sensors and their analysis using a sophisticated machine learning model to provide real-time stress detection and alerts is novel.

**New Components**:

• A combination of bio sensors in a shirt is a new feature so that a variety of precise body data can be collected.

• An advanced machine learning model tailored specifically for personalized stress detection and recommendations for the user based on the user’s historic data and his profile is a new feature implemented in the process.

1. **Inventive step of the Invention:**

**Technical Advantages/Benefits:**

* **Real-Time Monitoring:** Continuous stress monitoring providing instant feedback and alerts.
* **Predictive Analysis:** Ability to predict potential stress episodes based on historical data.
* **User-Friendly:** Easy-to-use wearable band and mobile app for seamless user experience.
* **Measures for well-being:** Further step in the process is the measures provided to the user that might prove to be helpful for his/her betterment like connecting him to a welfare community or giving recommendations to the user based on the stress levels detection. This includes the integration of the model with user’s details and activities to gather a holistic view of user’s overall mental health and in times of stress eventually the user can be given suggestions to seek social support.

1. **Technical problem solved:**

**Technical Problem Identified:**

* Traditional stress detection methods are often intrusive and not real-time.
* Existing wearable devices do not provide predictive stress analysis.

**Drawbacks of Existing Products:**

* Lack of integration of multiple physiological parameters.
* No predictive analysis for stress detection.

1. **Details of the invention:**

**Experiments Performed:**

* **Sensor Calibration:** Testing the accuracy of bio sensors in different conditions.
* **Data Collection:** Gathering data from subjects under various stress levels.
* **Model Training:** Training the machine learning model with collected data.
* **Validation:** Validating the model's accuracy in detecting stress.

**Experiment Results:**

* Comparative analysis showed significantly lower accuracy in stress detection when not using the specific machine learning model developed for this invention.

1. **Applications:** Please describe about all the possible application areas of invention

* **Healthcare:** Monitoring stress levels in patients with anxiety, panic or stress related disorders.
* **Students:** High school, preliminary, intermediate, undergrads and especially the students preparing for competitive national/international exams can be diagnosed and informed about their stress conditions whether chronic or acute so that they can abstain from taking adverse steps and be aware that its normal to feel that way and that they can get better.
* **Workplace:** Helping employees monitor their stress levels and improve workplace well-being.
* **Personal well-being:** Paving a revolutionary way for individuals to be able to track their stress and manage it effectively leveraging the advancements in machine learning and technology.

1. **Diagram:**

Below is a conceptual diagram illustrating the components and data flow of the stress detection system:

1. **Wearable Device:**
   * Bio Sensors: Heart Rate Sensor, Skin Conductivity Sensor, Temperature Sensor.
   * Data Processing Unit.
2. **Data Flow:**
   * Sensor Data Collection → Data Processing Unit → Machine Learning Model.
3. **Mobile Application:**
   * Display Real-Time Data and Alerts.
   * Predictive Stress Analysis.

**Diagram Description:**

1. **Wearable Device:**
   * Contains bio sensors to measure heart rate, skin conductivity, and temperature.
2. **Data Flow:**
   * The sensor data is collected and sent to the Data Processing Unit.
   * The processed data is then analysed by the Machine Learning Model.
   * The results are displayed in real-time on the Mobile Application, providing alerts and predictive stress analysis.

