**Title: Y-Shaped Electronic Test for Multi-Directional Stability Measurement**

**1. Introduction** The Y-Test is an advanced electronic testing method designed to measure stability and balance in three distinct directions: mediolateral, anteromedial, and posteromedial. By utilizing sensor-based technology, the test provides a composite score that assesses an individual's dynamic stability and movement efficiency. This method is particularly useful in sports science, rehabilitation, and biomechanics research.

**2. Objectives**

* To quantify directional stability using electronic sensors.
* To analyze the composite score for better assessment of postural control.
* To provide a reliable and reproducible method for stability testing.

**3. Methodology**

**3.1 Equipment and Components Used**

* **Y-Shaped Platform**: A rigid platform with designated paths for each direction.
* **Ultrasonic Sensors**: Used to detect the length on each axis.
* **Microcontroller (Arduino/8051/8086)**: For data acquisition and processing.
* **Analog-to-Digital Converter (ADC)**: Converts sensor readings into digital format.
* **LCD Display**: To present real-time data and composite scores.
* **Power Supply Unit**: Provides necessary voltage for the circuit components.

**3.2 Testing Procedure**

1. **Preparation**: The individual stands on the designated start position of the Y-shaped platform.
2. **Calibration**: The system is initialized, and baseline readings are recorded.
3. **Directional Movements**: The individual moves in the three prescribed directions:
   1. **Mediolateral**: Side-to-side movements.
   2. **Anteromedial**: Forward diagonal movements.
   3. **Posteromedial**: Backward diagonal movements.
4. **Sensor Recording**: Pressure sensors capture the force and balance exerted in each direction.
5. **Data Processing**: The microcontroller processes the input signals and calculates the composite stability score.
6. **Result Display**: The final score is displayed on the LCD or transmitted to a connected device.

**4. Advantages of the Y-Test**

* **Objective Measurement**: Provides quantitative assessment rather than subjective evaluation.
* **Real-Time Data Analysis**: Immediate feedback on balance and stability.
* **Customizable for Different Applications**: Can be adapted for sports, medical rehabilitation, and ergonomic research.
* **Portable and Cost-Effective**: Compared to traditional lab-based motion analysis systems.
* **Improved Rehabilitation Tracking**: Helps physiotherapists monitor progress in patients recovering from injuries.
* **Enhances Athletic Performance**: Useful for assessing stability in athletes to prevent injuries.

**5. Conclusion** The Y-Test is an innovative electronic system for measuring balance and stability across multiple directions. By integrating sensors, microcontrollers, and real-time data analysis, it offers a reliable method for evaluating movement efficiency. This system has significant applications in medical, sports, and research fields, improving the way stability and rehabilitation are assessed.