



Sensor-Based Main Mover Muscle Control Device Design for Physical Education Learning

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Abstract. Indicator data for the 2015–2019 National Medium-Term Development Plan for children aged 5–12 years, 18.8% are overweight and 10.8% are obese. These data indicate that obesity is caused by a lack of activities carried out by children. Along with age, if the function of the prime mover muscles is not controlled, it can cause muscle performance to be not optimal (tired quickly), muscle strength endurance decreases and injuries are easy to occur. The purpose of this study is a Sensor-based Main Mover Muscle Control Device. This type of research is engineering research. This tool is useful for controlling that the state and function of the prime mover muscles are still in good condition. The results of this study conclude 1). The creation of Sensor-based Main Mover Muscle Control Devices, 2). The Sensor-based Prime Mover Control Tool can be used to measure the prime mover muscles.

Keywords: muscle Control · Sensor Technology · Education

1 Introduction

Dynamic Neuromuscular Stabilization (DNS), is a manual and rehabilitation approach to optimize the movement system based on the scientific principles of developmental kinesiology (DK), the Dynamic Neuromuscular Stabilization (DNS) approach provides a functional tool to assess and activate intrinsic spinal stabilizers to optimize the Movement system [1]. Based on WHO data in 2016 the number of children under 5 years who are overweight reaches more than 41 million children, half of the obese child population comes from Asian countries including Indonesia, furthermore, the 2015–2019 RPJMN indicator data is 18.8% of children aged 5–12 years are obese. These data indicate that one of the causes of obesity is due to the lack of activity carried out by children. This condition if left unchecked will cause several pathological threats to children, including: unbalanced movements, persistent primitive reflexes, hyper/hypotonia, hyper/hyporeflexia, impaired sensory function, causing body defects, and imitation movement disorders (stereotypic) [2].

Basic locomotion skills are movement patterns that involve body parts such as the legs, arms, trunk and head, and include skills such as walking, jumping, catching, throwing, hitting and balancing. Basic movements are necessary for children 3–8 years as

a precursor to more specialized, complex skills used in play, games, sports, dance, gymnastics, outdoor and physical education and recreational activities [3].

Sensor technology has now become a very strategic need to be developed. Through this technology, various measurements that are complex and expensive and take a relatively long time can be carried out easily and in a short time. The manufacture and development of Sensor- Based Main Propulsion Muscle Control Device, is useful for controlling that the state and function of the prime mover and stabilizer muscles are still in good condition. In previous research, researchers have made a basic movement skill test tool that includes locomotor, non- locomotor and manipulative movements with sensor technology. The test tool that has been made is a tool that is able to identify basic movement skills as well as detect basic movement delays in early childhood. This muscle contraction analysis tool is expected to become a necessity for all movement observers, especially at an early age, and can develop the components and features of the test tool.

2 Research Methods

The type of research used is engineering research. Engineering research is research in the application of science in the form of design or tool design [4]. Tool Design is a synthesis of design elements combined with the scientific method into a model that meets certain specifications. Research is directed at designs that meet predetermined specifications. The steps in conducting engineering research are describing the tools that are made to meet the specified specifications, designing the modeling of the tools made and testing the tools. This research was carried out by testing at the Physics Instrumentation Laboratory, FMIPA UNP, electronics laboratory, FT UNP and. Field trials were carried out at FIK UNP Padang.

3 Result and Discussion

Sensor-Based Main Propulsion Muscle Control Tool is made with the following components: sensor, display. The sensor used is an EMG sensor. In making the Analysis of Muscle Contraction tool, it is done by assembling components and modules according to the design using connectors, cables and other supporting components.

3.1 How the Sensor-Based Main Movement Control Tool Works

This tool serves as an evaluation of the child's motoric motion by means of a pad that is attached to the muscles that move the child's body to detect the resulting muscle contractions by providing information on the strength of muscle contractions to the monitor screen. The child will be asked to perform a variety of basic normal movements and when performing the movement, the pad which is connected to the device is attached to the stabilizer muscles of the body, namely the muscles of the neck, back, thighs, and lower legs. The information displayed from the results of the child's motor movement examination is normal muscle strength, muscle weakness and muscle contraction abnormalities. The pad that is attached to the muscle will be connected using a cable to the monitor screen to be described in the results of the examination.

3.2 Product Design

Sensor-Based Stabilizer Muscle Contraction Analysis Tool for Evaluation of Movement Function Dynamic Neuromuscular Stabilization (DNS) in early childhood motor learning is made with components, sensor parts, Signal Receiver Section to PC, and sensor receiving data (Fig. 1).

Sensor-Based Stabilizer Muscle Contraction Analysis Tool for Evaluation of Dynamic Neuromuscular Stabilization (DNS) Movement Function in early childhood motor learning was revised according to suggestions from the validator team. The initial design uses a cable, after being validated it is given input without a cable. Then made a tool without cables (Fig. 2).

Sensor-Based Stabilizer Muscle Contraction Analysis Tool Product as an Evaluation of Motion Function Dynamic Neuromuscular Stabilization (DNS) in early childhood motor learning is applied as a learning medium in Teaching and Learning activities in Physical Education Learning.

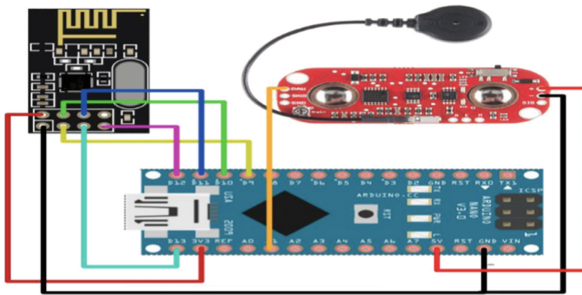


Fig. 1. Sensor-based main movement control design



Fig. 2. Sesor-Based Master Motive Cotrol Device

4 Conclusion

1. The creation of a Sensor-Based Stabilizer Muscle Contraction Analysis Tool as an Evaluation of the Dynamic Neuromuscular Stabilization (DNS) Movement Function in early childhood motor learning
2. Sensor-Based Stabilizer Muscle Contraction Analysis Tool as an Evaluation of Dynamic Neuromuscular Stabilization (DNS) Movement Function in early childhood motor learning needs to be field tested.

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