

Innovation and Commercialization



Evaluation of Hand Joint Angle using Inertial Measurement Unit

Tech ID: UTA 18-36

INVENTOR: Muthu B.J. Wijesundara, Charu Pande and Maghshenas-Jaryani

TECHNOLOGY NEED

Measurement of active and passive range of motion of the figure joints and wrist are routinely done during physical assessment of a person's hand and wrist condition when planning surgeries, assigning rehabilitation treatment, and evaluating rehabilitation progress. The goniometer is the most common tool used in the range of motion measurements. However, it becomes highly time consuming and cumbersome for the hand and wrist due to the large number of joints and multiple types of measurements required. Recently, vision-based motion capture analysis and sensor-based joint angle measurement system have also been developed. Despite successful tracking of large human motions, the application of vision based systems for figure motion is difficult due to line of sight issues arising from the compact nature of the human hand. Thus, there is need of system which has a wide range of accuracy along with less time consumption and cost effective.

INVENTION DESCRIPTION/SOLUTION

We have developed an Inertial Measurement Unit (IMU) based Joint Angle Measurement system comprising of wearable attachment, data acquisition and processing (DAP) algorithm, and graphical user interface (GUI). The system accurately measures, records, processes, and displays active as well as passive hand joint range of motions (ROM) which include flexion and extension of metacarpophalangeal joints (MCP), proximal interphalangeal joints (PIP), and distal interphalangeal joints (DIP) from index, middle, ring, and little fingers as well as the MCP, and interphalangeal joints (IP) of the thumb. Additionally, this system can also measure dorsiflexion, palmar extension, ulnar deviation, radial deviation, and supination of the wrist as well as thumb abduction, adduction, and retropulsion of carpometacarpal (CMC) joint.

APPLICATIONS

- Hand joint angle measurement
- Virtual reality application
- Autonomous vehicle
- Biomechanics

KEY BENEFITS

- No line of sight limitations.
- Measure range of motion of hand (fingers, thumb and wrist joints).
- GUI for joint angle measurement data during active and passive ROM.
- Data acquisition and processing algorithm to accurately measure each of the hand joint angles.

STAGE OF DEVELOPMENT

Prototype

INTELLECTUAL PROPERTY STATUS

Patent Pending



About the Inventors:
Muthu B.J. Wijesundara
Charu Pande
Mahdi Haghsgenas-Jaryani

Contact information
For licensing, please contact
Sharon Ngwenya, Ph.D.
(Assistant Director)
sngwenya@uta.edu
innovation@uta.edu
P: 817.272.1132

Our mailing Address:
Innovation &
Commercialization
701 S Nedderman drive,
Suite 350, Arlington, TX
76019

Connect with us:

