KNEE IMPLANT MONITORING USING IOT

A PROJECT REPORT

Submitted by

NAVEENKUMAR . S **(710419105026)**

NIVYA . K P **(710419105029)**

SARUMATHI . S **(710419105034)**

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CHRIST THE KING ENGINEERING COLLEGE

KARAMADAI, COIMBATORE-641104

ANNA UNIVERSITY: CHENNAI -600 025

ANNA UNIVERSITY: CHENNAI 600 025

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Dr.M.JEYAKUMAR, M.E.,Ph.D.
PRINCIPAL
CHRIST THE KING ENGINEERING COLLEGE,
Chikkarampalayam Village,
Karamadai, Mettupalayam Taluk,
Coimbatore - 641 104.

BONAFIDE CERTIFICATE

Certified that this project work titled " **KNEE IMPLANT MONITORING USING IOT** "is the bonafide work of " **NAVEENKUMAR.S (710419105026) , NIVYA.KP (710419105029) ,SARUMATHI.S (710419105034)** " who carried out the project work under my supervision.

Dr.M.ARUMUGABABU,ME.,	**Mrs.S.DHANALAKSHMI,ME.,**
HEAD OF THE DEPARTMENT	**ASSISTANT PROFESSOR**
Department of Electrical and Electronic Engineering, Christ The king Engineering College, Coimbatore -641 104	Department Of Electrical And Electronic Engineering, Christ The King Engineering College, Coimbatore- 641 104

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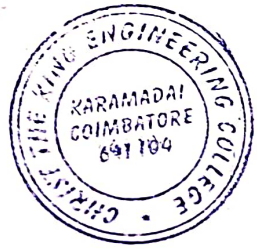
INTERNAL EXAMINER	**EXTERNAL EXAMINER**

CHRIST THE KING ENGINEERING COLLEGE
KARAMADAI
COIMBATORE
641 104

Dr.M.JEYAKUMAR, M.E.,Ph.D.
PRINCIPAL
CHRIST THE KING ENGINEERING COLLEGE,
Chikkarampalayam Village,
Karamadai, Mettupalayam Taluk,
Coimbatore - 641 104.

ABSTRACT

Accurate monitoring of joint kinematics in individuals with neuromuscular and musculoskeletal disorders within ambulatory settings could provide important information about changes in disease status and the effectiveness of rehabilitation programs and/or pharmacological treatments. This paper introduces a reliable, power efficient, and low-cost wearable system designed for the long-term monitoring of joint kinematics in ambulatory settings. Methods: Seventeen healthy subjects wore a retractable string sensor, fixed to two anchor points on the opposing segments of the knee joint, while walking at three different self-selected speeds. Joint angles were estimated from calibrated sensor values and their derivatives in a leave-one-subject-out cross validation manner using a random forest algorithm. The outlier was likely a result of sensor miscalibration. The proposed wearable device can accurately estimate knee flexion/extension angles during locomotion at various walking speeds. Significance: We believe that our novel wearable technology has great potential to enable joint kinematic monitoring in ambulatory settings and thus provide clinicians with an opportunity to closely monitor joint recovery, develop optimal, personalized rehabilitation programs, and ultimately maximize therapeutic outcomes.



Dr.M.JEYAKUMAR, M.E.,Ph.D.
PRINCIPAL
CHRIST THE KING ENGINEERING COLLEGE,
Chikkarampalayam Village,
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Coimbatore - 641 104.

CHAPTER 5

5.1 CONCLUSION

This Project successfully constructed a real-time monitoring system of motion for knee extensor muscle training. During 25 repetitions of knee extensor muscle training. the six muscles involved could be divided into three levels according to their corresponding changes in skin stretch and the resistance measured by the system's sensors. The flexible sensors in the proposed system not only satisfied the standard for 24 repetitions of knee extensor muscle training. but also exhibited excellent reproducibility for 40 repetitions. The methods employed in this study confirmed the correlations between knee bending angle, skin stretch, and change in resistance. Moreover, the system developed in this study facilitates real-time measurement and can evaluate angle, angular velocity, and dynamic exercise or static isometric exercise of knee motion during training process, simultaneously. Furthermore, the flexible sensors in this study can be seamlessly fitted onto curved skin surfaces.

the system developed by this study has three advantages: 1) determine angle of knee bending motion which has reached angles during training; 2) determine angular velocity of knee motion and can prompt the user to correct their improper execution (i.e., too fast or too slow) through feedback on the system screen; and 3) the real-time change in resistance and its relationship with time and knee angle determine whether the user is currently performing dynamic concentric or eccentric exercise or static isometric exercise.

5.2 FUTURE SCOPE

Future scope of the project is to implement the micro level devices during the knee implantation with the multiple sensors. Medical reports of the implantation are collected from the device and stored in the webserver. Patient and doctors can get their medical reports up to one year of previous stored data. This system also suitable for the any bone join or fracture injuries monitoring and can be implemented in the respective way.

CHRIST THE KING ENGINEERING COLLEGE
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COIMBATORE
641 104

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