الأيـــــة

بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ **[1]** خَلَقَ الْإِنسَانَ مِنْ عَلَقٍ **[2]** اقْرَأْ وَرَبُّكَ الْأَكْرَمُ **[3]** الَّذِي عَلَّمَ بِالْقَلَمِ **[4]** عَلَّمَ الْإِنسَانَ مَا لَمْ يَعْلَمْ **[5]**

سورة العلق الآية (1-5)

صدق الله العظيم

Dedication

To whom is concern , to every one in the realm of searching to solve the problem of organ motion .

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First of all I thanks to Almighty Allah who gave me ability and opportunity to accomplish this project study .

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Abstract

Radiotherapy is concerned as important method for cancer tumor deices treatment ,using Cobalt -60 me chain . But respiration (Inhalation and Expiration) makes the abdomen or a chest expand and contract which cause the organ displace partially away from the field size boundary area , while the collimator diaphragm is fixed adjusted manually to the tumor volume, this results in two problems , one of them is critical healthy tosses that surrounding the tumor area will receive unwanted radiation dose which cause bad effect on this healthy tosses (will damage) .The other problem , represented on some tosses of the treated area displace away out of the radiation field which lead to un sufficient dose , thus the treat will not be totally completed to this part which displaced away from the field size, then cancer will recurring again .

So , for solving the problem of organs motion , so many researchers attempts to overcome the problem of organ motion in radiotherapy , but not succeed totally , so in this thesis there is attempt ion to design an electronic control system to translate the mechanical abdomen and chest movement into an electrical signal , then supplied to the collimator diaphragm after the collimator been manually adjusted to the tumor volume to make it open and close partially according to the organ motion on real time .

Some studies done in the electronic components , their specifications ,types ,manners ,behaviors and values , some of components selected carefully to represent the constructed designed an adaptive control system , then connected using a certain design and then simulation design has been run which gives accepted results linearly ,such as pressure against voltage , also voltage against displacement and also the motor direction of rotation clockwise or anti clockwise in really time .

المستخلص

يعتبر العلاج بالاشعة لعلاج حالات الاورام السرطانية بلستخدام جهاز الكوبالت -60 من اهم الوسائل العلاجية المستخدمة ولكن حركة الاعضاء نتيجة عملية التنفس عند عمليتى الشهيق والزفير يؤدى لعملية تمدد وانكماش البطن والصدر وازاحة الاعضاء من موقعها فى حين ثبات فتحة الج التى تم ضبطها يدويا على حجم الورم المعنى بالعلاج مما يعيق عملية العلاج الناجع بسبب دخول جزء من الخليا السليمةالمتاخمة فى دائرة تغطية الاشعة مما يؤدى لتلف تلك الخلايا . المشكلة الثانية هي خروج جزء من الخلايا المريضة خارج نطاق دائرة تغطية الاشعة المعالجة مما يسبب عدم اخذ الجرعة الكافية لهذه الانسجة الشئ الذى يجعل عملية الانتكاسة وارده بنسبة كبيرة . وهذه الاطروحة تعمل على تصميم دائرة تحكم الكترونية لتحويل الحركة الميكانيكية للاعضاء الى اشارة كهربية تتم معالجتها ومن ثم توصيلها الي محرك فتحة جهاز الكوبالت - 60 لتتحرك هذه الفتحة لتحاكي حركة ازاحة العضو المراد علاجه في نفس الزمن . وبعد جهد جهيد وبحث شديد تم التعرف على مواصفات وخواص وسلوك وطريقة عمل العناصر الاكترونية المختلفة وقد تم انتقاء واختيار بعض منها وتمت عملية الموالفة مع بعضها البعض بألية التصميم وتم توصيلها لتشكل نظام محاكاة(موائمة) وقد اعطت نتائج خطية مقبوله على مستوى الضغط المسلط على الحساس مع الجهد المتولد وايضا الجهد المتولد مع ازاحة العضو المتحرك وايضا اتجاه حركة المحرك اتجاه عقارب الساعه او عكس عقارب الساعه فى نفس الزمن الحقيقى .

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Abbreviations

CO Cobalt
AP Anterior –Posterior
GTV Growth Target Volume
ICRU International Commission on Radiation Units
CTV Clinical Target Volume
PTV Planning Target Volume
GTV-T Growth Target Volume Primary Tumor
GTV-M Growth Target Volume distant metastases
GTV-N Growth Target Volume Lymphadenopathy
GY Gay
CT Computed Tomography
MRI Magnetic resonance imaging
EPID Electronic Portal Imaging Devices
IGRT Image Guided Radiotherapy
OAR Organ At Risk
PRV Planning Organ At Risk
MLC Multi Leaf Collimator
DVH Dose Volume Histograms
DVH Dose Volume Histograms
DC Direct Current
AC Alternative Current
IM Internal Margin
SM Setup Margin
SMART Synchronized Moving Aperture Radiation Therapy
DMLC Dynamic Multi leaf Collimator
RT Radiation Therapy
CCD Charged Coupled Device
3D Three Dimension
4D Four Dimension
MIP Maximum Intensity Projection
KVCT Kilo Volt Computed Tomography
RCCT Respiration Correlated Computed Tomography
ADC Analog to Digital Converter
MCU Microcontroller
AVR Alf Vegrad Risk
DSP Digital Signal Processing
PIC Programmable Interrupt Controller
AT-MEGA Atmel Mega AVR
PCB Printed Circuit Board
SNR Signal to Noise Ratio
LNA Low Noise Amplifier
V+ Non Inverting Input
V- Inverting Input
Vout Output Voltage
Vs+ Positive Voltage Supply
Vs- Negative Voltage Supply
IC Integrated Circuit

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