

الآية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قُرْأَ بِسْمِ رَبِّكَ الَّذِي خَلَقَ [1] خَلَقَ النَّفْسَ مِنْ عَجَى [2] اقْرَأْ وَرَبُّكَ الْأَكْرَمُ [3] الَّذِي عَلَّمَ بِالْقَلَمِ [4] عَلَّمَ النَّسْلَ مَا لَمْ يَعْلَمْ [5]

سورة العلق الآية (1-5)

صلى لله العظيم

Dedication

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

Acknowledgement

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 باستخدام جهاز الكوبالت -60 من اهم الوسائل العلاجية المستخدمة ولكن حركة الاعضاء

نتيجة عملية التنفس عند عمليتي الشهيق والزفير يؤدي لعملية تمدد وانكماش البطن والصدر وازاحة الاعضاء من موقعها في حين ثبات فتحة الج

التي تم ضبطها يدويا على حجم الورم المعنى بالعلاج مما يعيق عملية العلاج الناجع بسبب دخول جزء من الخلايا السليمة المتاخمة في دائرة

تغطية الاشعة مما يؤى 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 الذي يجعل عملية الانتكاسة وارده بنسبة كبيرة . وهذه الاطروحة تعطل 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 وخوص

وسلوك وطريقة عمل العنصر الكترونية المختلفة وقد تم انتقاء واختيار بعض منها وتمت عملية الموائفة مع بعضها البعض بألية التصميم وتم توصيلها

لتشكل نظام محاكاة (موائمة) وقد اعطت نتائج خطية مقبولة على مستوى الضغط المسلط على الحسلس مع الجهد المتولد وايضا الجهد المتولد مع

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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 the bone rotation around the vertebrae makes the thorax	
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	
DC	Direct Current	
AC	Alternative Current	
IM	Internal Margin	
SM	Setup Margin	
Figure 1.1	Qualitative description of breathing. During the breathing, volume change, and the diaphragm contraction compresses the thoracic volume and the diaphragm contracts, the abdomen is forced down and forward, and the rib cage is lifted. (b). the ribs also contract to pull and rotate the ribs, resulting in increasing both the lateral and antero-posterior (AP) diameters of the thorax (West, 1974). 1
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DMLC	Dynamic Multi leaf Collimator	
RT	Radiation Therapy	
CCD	Charge Coupled Device	
3D	Three Dimension	
4D	Four Dimension	
MIP	Maximum Intensity Projection	
Figure 1.5	Kilo Volt Computed Tomography unit, adapted from Joshi et al. (2008).8
RCCT	Respiration Correlated Computed Tomography unit, adapted from Joshi et al. (2008).	
ADC	Analog to Digital Converter	
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AVR	Alf Vegrad Risk	
DSP	Digital Signal Processing	
PIC	Programmable (PIC) Microcontroller	
AT-MEGA	Atmel Mega AVR	
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PCB	Printed Circuit Board	
SNR	Signal to Noise Ratio	
LNA	Low Noise Amplifier	
V+	Non Inverting Input	
V-	Inverting Input	
Vout	Output Voltage	x
Vs+	Positive Voltage Supply	
Vs-	Negative Voltage Supply	
IC	Integrated Circuit	

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