

Dedication

I dedicate this work to my family relatives,
friends and teachers

Who not only help me but also share me the
hardship I faced

To all my great thanks and gratitude

Acknowledgement

To the staff of the laser instiude

To Dr: Kasim M.Al Hity,

Prof: Saad Daoud,

To prof Nafie Abd Allatif

such very magnificent charcaters comes from Iraq, the country that we all well aware of what is going on.

All my regards and best wishes for them and their splendid country.

Abstract

Electrical safety and more explicitly, patient shock hazard associated with the use of biomedical electronic equipments has become controversial and embarrassing subject and become a continuously growing problem.

Great majority of electric accidents involve a current pathway through the victim from one upper limb to the feet or to the opposite upper limb. So various effects of the electric current on the muscles along its pathway, as well as its effects on the heart as it passes through the chest. So ECG must not produce a direct electrical connection between the subject and ground. Electrical isolation is provided using transformer isolation, capacitive isolation, or optical isolation coupling techniques.

In this work, ECG signal was transmitted via an optical amplitude modulated transmitter and the signal decoded at the receiver, to achieve patient's safety against electrical hazards (Micro shock and leakage current), using diode laser at the end of the patient's circuit and photodetector at the portion of the circuit connected to the ac power line and ground.

الخلاصة

تعد السلامة الكهربائية والعزل الكهربائي من أهم متطلبات التعامل مع الأجهزة الطبية خاصة الأجهزة التي تتطلب تأريض عالي، وبالأخذ في الاعتبار أن اتجاه سريان التيار له الدور الأعظم في مدى خطورة الصدمة الكهربائية والتيار المتسرب فإن الأجهزة التي يكون فيها اتجاه سريان التيار من أحد الأطراف العليا إلى أحد الأطراف السفلى أو الطرف المقابل مروراً بعضلات الصدر بما فيها القلب (مثل أجهزة تخطيط القلب الكهربائي) تتطلب عزل كهربائي بكفاءة عالية.

العزل الكهربائي هنا يعني فصل الجزء من الدائرة الكهربائية المتصل مع المريض أو المستخدم عن بقية الدوائر الكهربائية للجهاز المتصلة مع الخط الأرضي أو خط الكهرباء الرئيسي. وهذا العزل يتم إما باستخدام المحولات أو بتضمين الإشارة ضوئياً وإستقبالها في جزء آخر من الدوائر الكهربائية للجهاز.

في هذا العمل تم تضمين إشارات رسم القلب الكهربائية ضوئياً باستخدام ليزر الثنائي بالطول الموجي 650 نانومتر و تم إستقبالها مرة أخرى بواسطة كاشف ضوئي وعرضها كإشارة كهربائية مرة أخرى. بغرض تحقيق قدر كافي من العزل الكهربائي لأجهزة تخطيط القلب الكهربائي.

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