

Wet Field Bi-Polar Surgical Treatment for Retinopathy

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Abstract:- Retinopathy is a major cause due to high blood sugar and it affects the major nerves damage in the back of our eyes. This poor management of sugar levels in our daily intakes and it initiates major cause in human vision. Diabetic retinopathy rectification has most important favored for the every patient whose are affected by the diabetic mellitus. Surgery and surgical instrument based retinopathy has a most featured approach. Wet-field bi-polar cautery is an instrument to reduce the unwanted progressive tissue in our eyes. This device or temperature generated has controlled with the aid of sensor and microcontroller devices. This sensor based temperature optimization has increased the performance of the device. The current scenarios of the device and temperature level have explicated via various electronic devices and improve the surgical performance. Thus the efficiency and effectiveness of the system has most useful for the diabetic retinopathy patients.

Keywords:- *Bi-Polar Devices, Retinopathy Surgical Treatment, Diabetic Mellitus.*

I. INTRODUCTION

Diabetes is a common disease for the every human being at any cause at any age constraints. Diabetes is disease due to abnormal food habits and high intakes of glucose presenting foods. Diabetes has classified into many categorizes based on the wound or soreness appear in human out structure. Diabetic retinopathy is a soreness or extra membrane has created on the retina and it hugely causes vision reduction although blindness. The major complications and wounds has presented in the retinal area as well as behind the eye nerves. There are numerous treatment strategies and ideas has invented and executed in real-time.

Over time, too much of sugar content in blood and it causes the blockage in eye nerves and it majorly causes the blindness or vision loss and it controls the new blood vessels originating. In early stages of retinopathy identification has enormous treatment strategies have applied via drugs and regular eye examinations. In type-2 or severe diabetic mellitus has contained minimal ways to approach into complete excavation form the disease. In this treatment, the doctors do immediately close-off the damaged blood vessels as well as control the damaged blood vessels or area with the help of high heating element or device.

Wet-field Bi-Polar device is a device is used to treat the type-2 diabetic retinopathy. In recent years, the treatment of diabetic retinopathy has emasculated n-number of devices to constraint the damages in human eye. So, the proposed system has designed a device to reduce the human eye defects using Wet field Bi-Polar cautery. It generates a huge temperature at the time during the operation. Some Novel deep learning and optimization techniques has increased the performance and avoid the normal eye tissue damage. The performance and effectiveness of the proposed system has exemplified through the upcoming sessions.

II. LITERATURE SURVEY

The detailed survey has enlightened the entire features of the electro surgery as well as benefits of the various surgical instruments. The usage of cautery has deliberated in various tissues depletion or coagulations.

Kazuhiro et al (2023) recommended a wet-filed bi-polar cautery device for the treatment of brainstem cavernous malfunctions. This treatment has laid with the aid of endoscopic transsphenoidal transclival approach to create alternative for ventral brainstems. This operation has operated

for the 4-5 patients in an effective manner with the aid of Wet-field bi-polar cautery.

Rania et al (2022) described and implemented a device of an Electro-surgical generator. It generates a high frequency electrical current to remove the particular coagulate tissue. Electro-surgery has classified into Electro-cautery, Electrolysis based electro surgery. This high frequency generator has employed to remove the coagulated tissue or small superficial veins.

Maliya et al (2023) elaborated a stepwise anatomy reviews for neurosurgery. Homeostasis is crucial in preventing cranial neurosurgical procedures and maintaining visualizations of surgical field. In this vast survey deliberates totally seventy-one hemostasis agents, techniques, tools and devices. Mohsen et al (2020) imitated safety and precautions of electro-surgery device usage during the surgery. Electrosurgical is a method to dissect the particular tissue into damaged as well as healthy tissues. It includes vaporization, desiccation and coagulation of tissues. Surgeons can avoid all delimits behind the functions of electro-surgery.

From the above mentioned survey has wretched the importance of cautery in electro-surgery. This cautery design and implementation in diabetic retinopathy treatment has implied in the upcoming sections.

III. MATERIALS AND METHODS

This Proposed surgical cautery has designed and implemented with the aid of controller and data acquiring sensor modules. The structural design and architectural design has visually explained in the following fig.1.

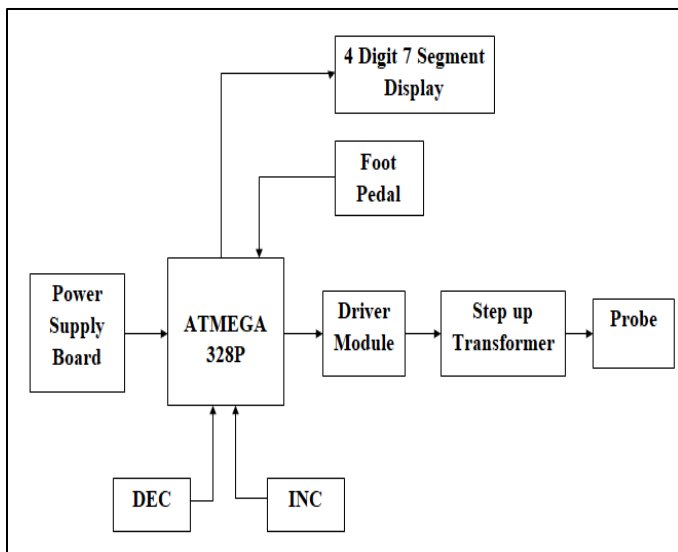


Fig.1 Block Diagram of Wet Field Bi-Polar Cautery

➤ ATMEGA 328P Microcontroller

This ATMEGA 328P microcontroller has a fulfilled controller unit when the system needs low power autonomous and optimized cost effective. This microcontroller unit has not deeply depends upon the any software field orientations. It just plays and acts the particular function of controlling and communicating with the other common devices. The schematic diagram of the ATmega 328P has portrayed in the fig.2.

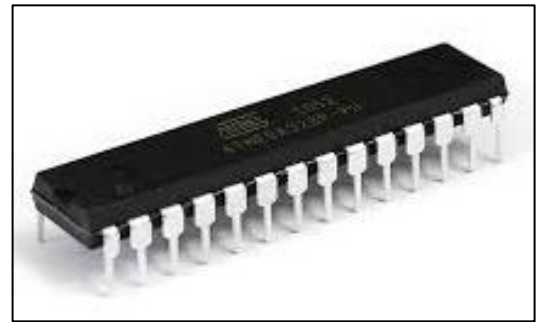


Fig.2 ATMEGA 328P Microcontroller

➤ Foot Pedal Switch

Food pedal switch is a device that controls the particular action either increment or decrement via the user feet. This device is used to operate an extra handling capacity and gave the extra power to the user hands. This Food pedal is also otherwise known as Foot lever or Foot treadle. This Foot lever or Pedal has figured in a figure as Fig.3.



Fig.3 Foot Pedal Switch

➤ Step-Up Transformer

This Step-up transformer has higher secondary voltage compared than primary voltage. This transformer has booster up the particular voltage value into higher value. It can transform the voltage value into hundred KV. It has highly eliminates or minimizes the power lost in transmission lines. This transformer continuously stepped up the voltage and minimizes the current value. This transformer has figured as in fig.4.



Fig.4 Step-Up Transformer

IV. PROPOSED SYSTEM

This proposed Wet field Bi-polar Cautery has implemented with the aid of effective microcontroller units and varying temperature and controller units to predict the necessary heat value using various controlling devices. This microcontroller has sequentially interfaced with the increment and decrement units for adjusting the particular voltage value. This Foot pedal switch is a device is used to varying the exact temperature the operation needs. This foot pedal switch has most useful for the operation oriented purposes. The small variation the voltages using Foot pedal has stepped up with the aid of Step-up transformer. The LCD display has biased with the proposed system has delivered the current voltage and temperature value in terms of percentage and it is most useful for the doctors to know the current temperature and the temperature needed the particular situation. The final probe has used to deliver the exact temperature we want for the particular operation. This proposed system has deliberately functioned in a most effective and efficient manner. This exact temperature is used to eliminate the excess retinal membranes. The flow and data operation of Wet Field Bi-polar cautery.

V. RESULT AND DISCUSSION

ATmega 328P microcontroller based Wet Field Bi-polar Cautery designed and implemented for the purpose of removing coagulated eye tissues due to diabetic retinopathy. The proposed device has generated huge temperature element via probe like architecture. Initially the system or microcontroller unit has interfaced with the Foot pedal switch, Increment and decrement unit, LCD display and step up transformer.

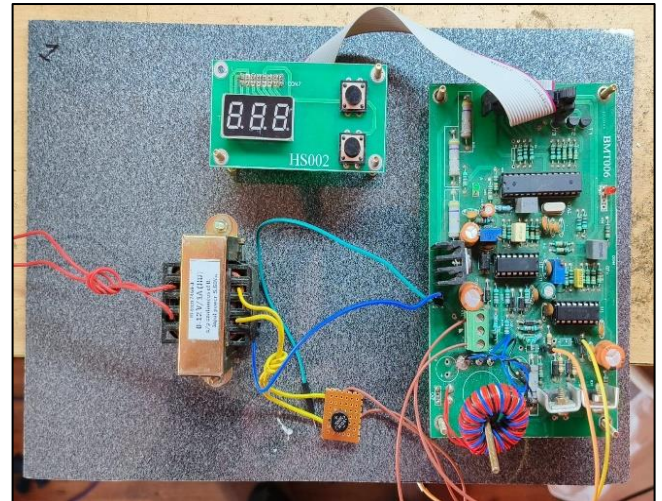


Fig.5 Interfacing Diagram Between Microcontroller 7 Segment Display and Step up Transformer.

After the successful interface between the required components and it generating huge required temperature biased with the manually controlled pedals. Increment and decrement units are used to modify the temperature need by the doctors or operators. Foot Pedal is used to adjust the temperature with the aid of our foot. It has more useful to access the device individually as well as improves the performance and effectiveness.

Table-1 Parameters ensample the wet field Bi-polar cautery module

| S.No | Patient Name | AGE | Temperature Degree C | Tissue excavation level |
|------|--------------|-----|----------------------|-------------------------|
| 1 | Karthick | 35 | 60 | High |
| 2 | Bhuvanesh | 56 | 52 | Medium |
| 3 | Prabhu | 12 | 45 | low |

The complete Wet Field Bi-polar Cautery device has implemented and structured a device like architecture. The hardware and prototype architecture has shown in fig.7.

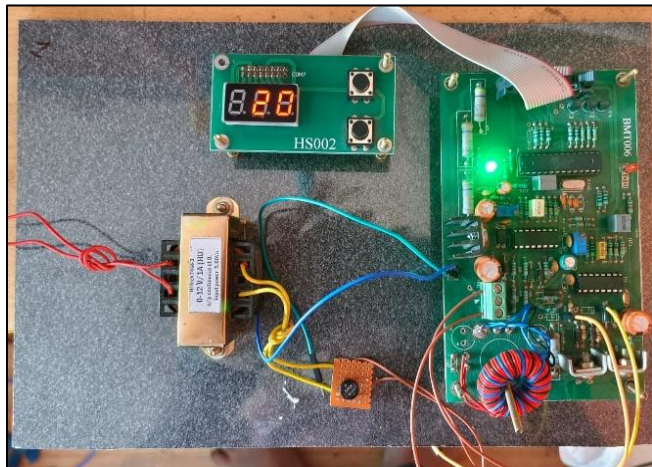


Fig.6. Prototype Model for Wet Field Bi-Polar Cautery

VI. CONCLUSION

The Wet Field Bi-polar cautery has successfully designed and implemented for the exact operation and function. This system has probably huge compared than other retinal surgical devices. The controller and heat generating devices has performed in an effective manner. The accuracy of temperature generation is used to eliminate the excess membranes and it clearly differentiates the coagulated tissue as well as ordinary or non-affected tissues. This cautery based retinal solution has a permanent solution to remove the diabetes retinopathy. Moreover, this system has delightedly concern about the other side effects causing agents. In future, there are more number of deep learning and optimization algorithms to enhance the features and functionality of the cautery.

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