iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** IV **Month of publication:** April 2019

DOI: https://doi.org/10.22214/ijraset.2019.4663

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.177
Volume 7 Issue IV, Apr 2019- Available at www.ijraset.com

Designing and Experimental Analysis on Blood Groups Identification System using the Embedded System

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Abstract - In this fast world we should need to know the blood group and type. So quick and perfect identification of blood sample is very important during the urgent situation. This future proposal is to change the physical work in medical laboratories for identifying the blood sample. Usually, the blood group analysis is made in the laboratories and there are three types of blood group analyzing methods, they are ABO forward typing, ABO reverse typing and Rhesus type testing. In the laboratories ABO type and Rhesus type testing techniques are mainly used. In the ABO testing method is used to identify the blood sample group. In the Rhesus testing method is used to identify the positive and negative of blood group. Even though it is easy to identify the blood group of single sample blood, but when handling the large number of blood samples, it might lead to wrong analysis. In order to solve this problem and reducing the manual involvement and to get better reliable result, we design the machine which will automatically identify the blood group based on the application of Infra Red (IR) light source. When the IR light is focused towards the blood sample, the light intensity is changed due to the blood darkness. It will be sensed by the IR light detector. The blood group and type can be identified by the intensity value of the light.
Keywords – Blood Sample, ABO, Reagents, Sensors and Embedded.

I. INTRODUCTION

Blood identification is utmost important in this modern world because the huge population may lead to accident mainly in road transportation. Even though furnishing good facilities in transportation, accident is unavoidable due to the work load of humans, poor maintenance of vehicle and violates the transportation rules. Whatever the accident, blood loss is happened to human body. In order to compensate the loss of blood, we should give the blood to the damaged people. Immediately we cannot give blood to human. First we should analyze the blood group, because B-antibody will be high in A-blood group and A- anti body will be high in B- blood group. So we cannot give B-blood group to A-blood group body and vice-versa.

The 'O' blood group contains equal amount of A and B antibody, so we can use only O blood group to O blood group body and at same time O blood group can be used in any blood group. AB blood group contains no anti body, so we cannot use AB blood group to any other blood group body. But we can use any blood group to AB blood group body. So in that critical condition, fast identification of blood group is very important, then only we can arrange the respective blood group to the patient. Not only the accident, we should identify our blood group is very important for our emergency condition.

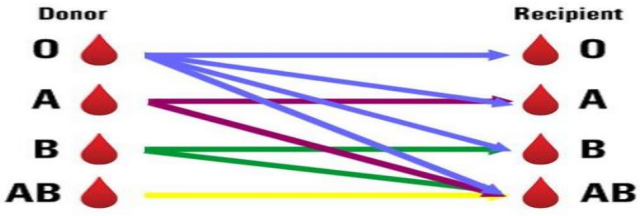

Fig.1. Type of Blood Groups

There are eight types in blood group, they are A+, A-, B+, B-, AB+, AB-, O+, O-.To identify the blood group in laboratory, they are using Anti Body Reagents solution. i.e., they are using Anti-A, Anti-B, and Anti- O or D solutions. The colour of Anti-A is blue, for Anti-B is yellow and for Anti-O or D is water colour.

II. EXISTING IDENTIFICATION METHOD

Nowadays manual method for blood group identification has been using in all laboratories. In this method, generally we use three glass plates and we put maximum 15 micro litter same blood samples on the each glass plate. Single drop of different Anti bodies (A, B, O or D) will be poured in each glass plate. After pouring the antibodies we should wait 30 to 60 seconds for mixing. Antibody is dissolved after completely with blood samples, the samples colour will be changed to RED colour. If it is

not dissolved completely with samples, the mixed (blood and antibody) is appeared as spots in glass plate. The given below chat for different types of mixing result is shown below and based on this result blood group is identified.

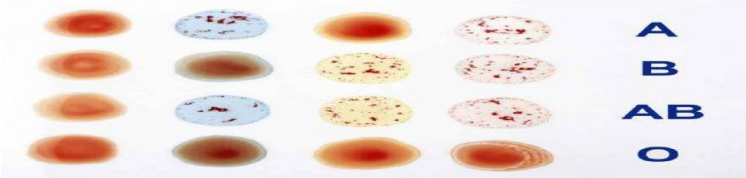

Fig.2. Testing blood groups

Even though blood group is found in manual method, when more samples are collected for testing, there is a chance for unknown errors and delay process. Because the work load of technician and there is chance to change the result. In order to overcome the above fault, the following methodology is used.

Image Processing
Fiber Optics
Laser Technology
Microscope Colour Image
MEMS Based Sensor

In all above mentioned methodology, Manual result will be taken in photo and this photo is uploaded to PC. This photo copy will be compared with reference photo. Based on this method, the blood group is identified.

A. Image Processing Operations

To get the carved output for the digital image processing, the image processing operations can be applied [4]. There are three types of image processing operations they are, 1. Output value of the coordinate and pointing the nature of the image depends on the same coordinate value of input. 2. Localizing the nature of the image and the output coordinate value depends on the coordinate value of the neighbourhood. 3. Global character of the image and the output coordinate value depends on the value of the image.

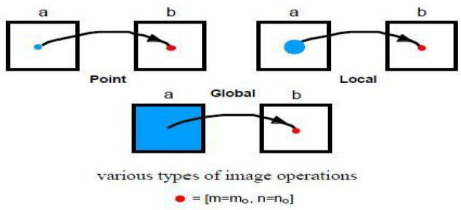

Fig.3. Image operations types

III. PROPOSAL METHOD FOR IDENTIFICATION

A. Working Principles

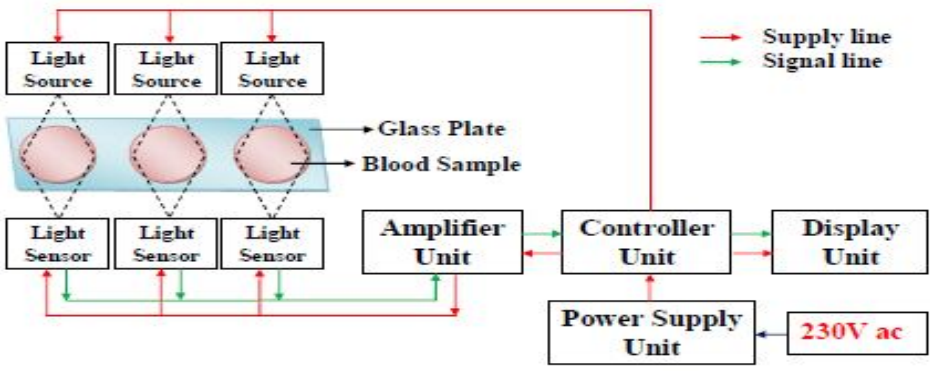

Fig.4. Functional block diagram

The diagram given in Figure 4 is a block diagram designed for the automated machine that detects the group of blood. Here are three pairs IR sensor transmitter and receiver placed on the block diagram. It is found that the blood plate on the blood vessels that can be used to detect blood group between these two couples is found.

In the Light sources is mounted above the sample glass plate and Light sensor is mounted in beneath of the samples glass plate. After adding and mixing process of samples with anti body in the machine. Light is focused on the blood samples and the light is passed through the samples. This light will be sensed by the photo sensor. Generally the photo diode gives the intensity value of light. If there is any change in light brightness, there will be change in intensity value of the photo diode accordingly. So when the light passed through the samples, there will be change in light brightness due to the mixing of samples and antibody. At the same time we must take the light intensity value for samples before mixing with antibody. So the controller determines the difference between the intensity value of samples and the samples mixing with antibody. Based on this result we can identify the blood group.

Amplifier unit will give either Low or High value and this value will be takes as "0" or "1" in controller. For example if the sample is dissolved with antibody fully, the amplifier will give "Low" value that means controller will take as binary value "0".If it is not mixed, the amplifier will give "High" value that means controller will take as binary value "1".This binary value is compared with the already programmed value. The programmed value is given in table – 1. Based on this comparison the controller will display the result in display unit as a blood group. Digital values given in the table below are the ones that can be used to identify the blood group. The values in here are three of the digital values to lose, ie the values from 000 to 111 are taken into consideration as blood groups.

The digital values in the table are sent to the controller. A group of blood transfusions of the digital value obtained is demonstrated as comparing digital values obtained from the IR sensor based on the code already written in the controller.

TABLE – I

BLOOD GROUP BINARY VALUES

Blood Groups	**Controller Binary value**		
O+	**1**	**1**	**0**
O-	**1**	**1**	**1**
A+	**0**	**1**	**0**
A-	**0**	**1**	**1**
B+	**1**	**0**	**0**
B-	**1**	**0**	**1**
AB+	**0**	**0**	**0**
AB-	**0**	**0**	**1**

IV. RESULT AND DISCUSSIONS

In this designing work it is very important to the identification of blood samples in the medical laboratory. This machine result is very reliable, accurate and very helpful for patient blood group identification. This machine is very needful in the government hospital because there are more patients are money based benefits. And then this blood identification machine is very useful for blood sample storing bank of the blood banks. And then this machine is easy to handled and movable.

V. CONCLUSION

This method is overcome the manual method. Output of this method is very accurate and easy to operate. We can get the very fast result than manual method. When we increase the sensor unit, we can handle the more samples for identification and we can get the fast results. And then, this machine can be connected with the personal computer (PC) for blood group data's, which can be updated in generalized system through wireless communication medium. So all the blood group and contact details will be available in generalized systems. It will be helpful to find out the required blood group during the emergency time.

ACKNOWLEDGMENTS

I express my utmost sincere thanks to the experts who have contributed towards development of the template.

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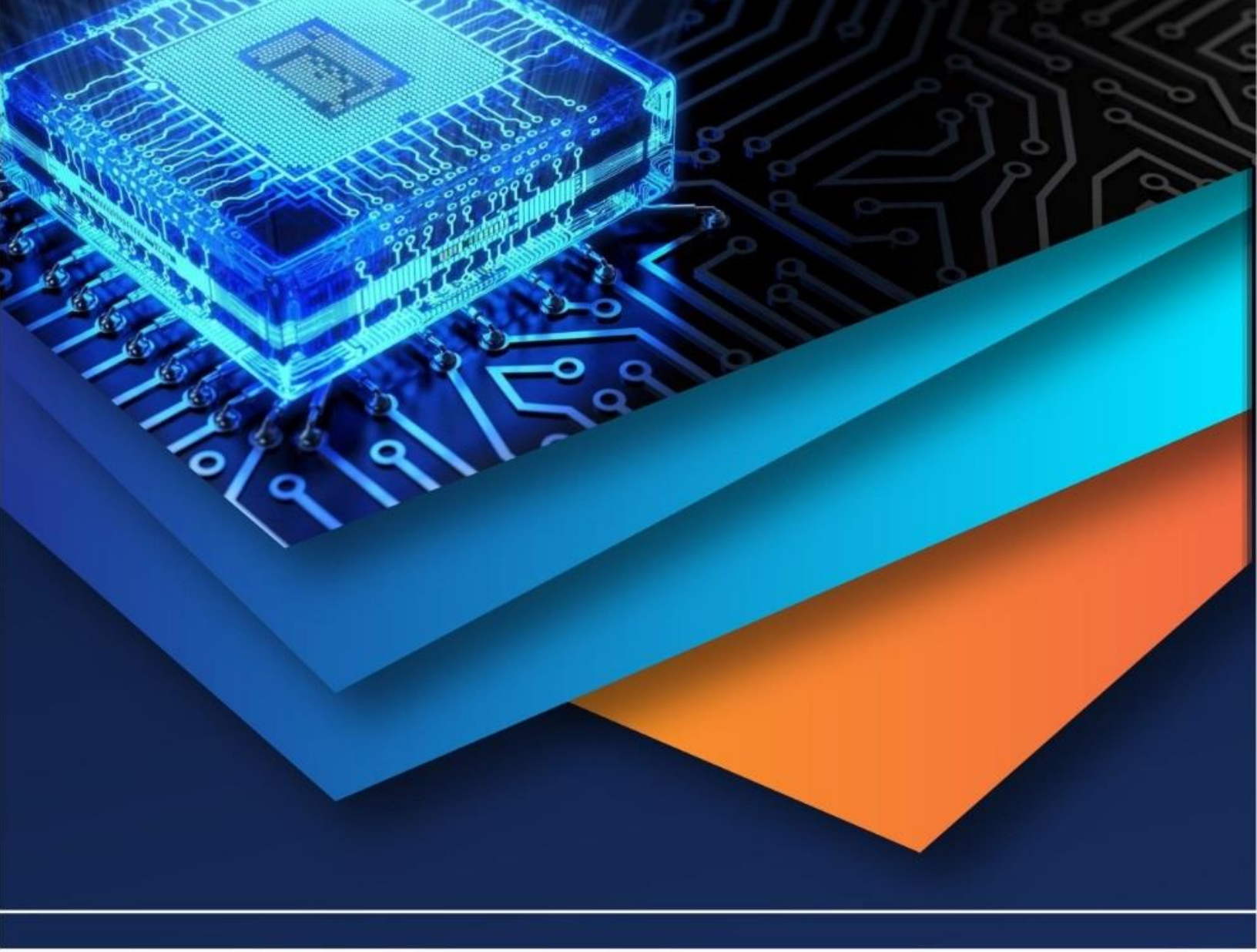

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