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Blood Glucose Level for Early Detection of Diabetes and Diabetic Retinopathy Using Machine Learning

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ABSTRACT:

Strict control of blood glucose and blood pressure is critical for reduction of the incidence and progression of diabetic retinopathy (DR). Follow-up of patients with diabetes mellitus is protocol based and not based solely on the presence of symptoms. Staging of the level of DR (mild, moderate, or severe non proliferative vs. proliferative DR, PDR) drives thefollow-upinterval.the most diabetic patients is diabetic macular edema (DME). The results of multicenter, randomized studies suggest that the best visual results for DME currently are achieved with intra vitreal ranibizumab injections focal laser photocoagulation. Results using bevacizumab seem quite comparable to those with ranibizumab. In addition to treating DME, this approach also seems to reduce the likely hood of progression of DR. Selected patients also may benefit from intravitreal steroid treatment focal laser therapy, but there is a relatively higher rate of glaucoma and cataract formation.Panretinal photocoagulation is currently the most effective treatment for high-risk PDR. Panretinal photocoagulation also should be considered for patients with severe non proliferative DR and early PDR, particularly if follow-up cannot be assured and/or if the patient has type2 diabetes mellitus. Parsplanavitrectomy is used to manage severe complications of DR such as non clearing vitreoushemorrhage, severe fibro vascular proliferation, and retinal detachment.

Keywords— EARLY DETECTION OF DIABETES

1. INTRODUCTION

Diabetic retinopathy also known as diabetic eye disease is when damage occurs to the retina due to diabetes. It can eventually lead to blindness. It is an ocular manifestation of diabetes, a systemic disease, which affects up to 80 percent of all patients who have had diabetes for 20years or more. Diabetic retinopathy often has no early warning signs. Even macular edema, which can cause rapid vision loss, may not have any warning signs for some time. In general, however, a person with macular edema is likely to have blurred vision, making it hard to do things like reader drive. In some cases, the vision will get better or worse during the day. In the first stage which is called non-proliferative diabetic retinopathy (NPDR) there are no symptoms, the signs are not visible to the eye and patients will have 20/20vision. The only way to detect NPDR is by fund us photography, in which micro aneurysms (microscopic blood-filled bulges in the artery walls) can be seen. If there is reduced vision, fluoresce in an geography can be done to see the back of the eye. Narrowing or blocked retinal blood vessels can be seen clearly and this is called retinal ischemia (lack of blood flow). In the second stage, abnormal new blood vessels (neovascularization) form at the back of the eye as part of proliferative diabetic retinopathy (PDR); these can burst and bleed (vitreous hemorrhage) and blur the vision, because these new blood vessels are fragile. The first time this bleeding occurs, it may not be very severe. In most cases, it will leave just a few specks of blood, or spots floating in person's visual field, though the spots often go away after a few hours. Leakage of blood, which blurs the vision. In extreme cases, a person may only be able to tell light from dark in that eye. It may take the blood anywhere from a few days to months or even years to clear from the inside of the eye, and in some cases the blood will not clear. These types of large hemorrhages tend to happen more than once, often during sleep

2. PROBLEM STATEMENT

In India, public transportation is an essential a part of anyone's life. Buses are the maximum common sort of public transportation utilised by Indian individuals to get to their destinations on a day by day foundation. Because it is so extensively used, the Indian bus system has some of issues, such as no specific foreign money, which means that each the tourist and the conductor are probably to be quick on cash. In those instances, the conductor may additionally refuse to reimburse the passenger for the ultimate sum. The passenger may additionally every so often misplace the paper price tag, necessitating the purchase of a brand new ticket or the Payment of a penalty. The goal of this initiative is to alter the cutting- edge scenario to keep away from the troubles produced by way of it and to offer a better tour for the passengers; an android application become applied to transform the bus ticketing device right into a digitalized and green method. This idea could allow Indian residents move cashless without having to fear about sporting change or taking it out in a packed bus. To enforce and design a web software which may be a large answer for the bus ticketing device in day after day lifestyles and the development to wards the digitalization of the Metro politicianmetropolis.

3. EXISTING METHOD

Algorithms were categorized into 5 groups (image preprocessing, localization and segmentation of the optic disk, segmentation of the retinal vasculature, localization of the macula and fovea, localization and segmentation of diabetic retinopathy pathologies).

4. LITERATURE SURVEY

A method of detecting heartbeat locations in the ballis to cardio graphic signal from the fiber opticvital signs sensor MariuszK rej, Lukasz Dziuda, FranciszekWojciech Skibniewski A Review on Glucose Monitoring Using Enabling Technologies of Internet of Things 217th International Conference on Advanced Computing and Communication Systems(ICACCS) Design and Implementation of a Wearable System for Non Invasiveclucose Level Monitoring 2019 IEEE International Conferenceon Biomedical Engineering, Computer and Information Technology for Health(BECITHCON)28-30November,2019, Dhaka, Bangladesh

IoT Based Emergency Health Monitoring System 2020 InternationalonferenceonIndustry4.0Technology(I4Tech)VishwakarmaInstituteofTechnology,Pune,India.Feb13-15,2020Remote Measurement of Short-Term Heart Rate WithNarrowBeamillimeterWaveRadarInstituteofElectricalandElectronicsEngineers(IEEE)Published:2021Issue:Volume:9 ISSN:2169-3536 Ference on Computational Intelligence and Knowledge Economy (ICCIKE), Dubai, United Arab Emirates,17–18March2021.Saranya, P.; Devi, S.K.; Bharanidharan, B. Detection of Diabetic Retinopathy in Retinal Fund us Images using Dense Net based Deep Learning Model. In Proceedings of the 2022 International Mobile and Embedded Technology Conference(MECON), Noida, India,10–11March20

5. PROPOSED SYSTEM
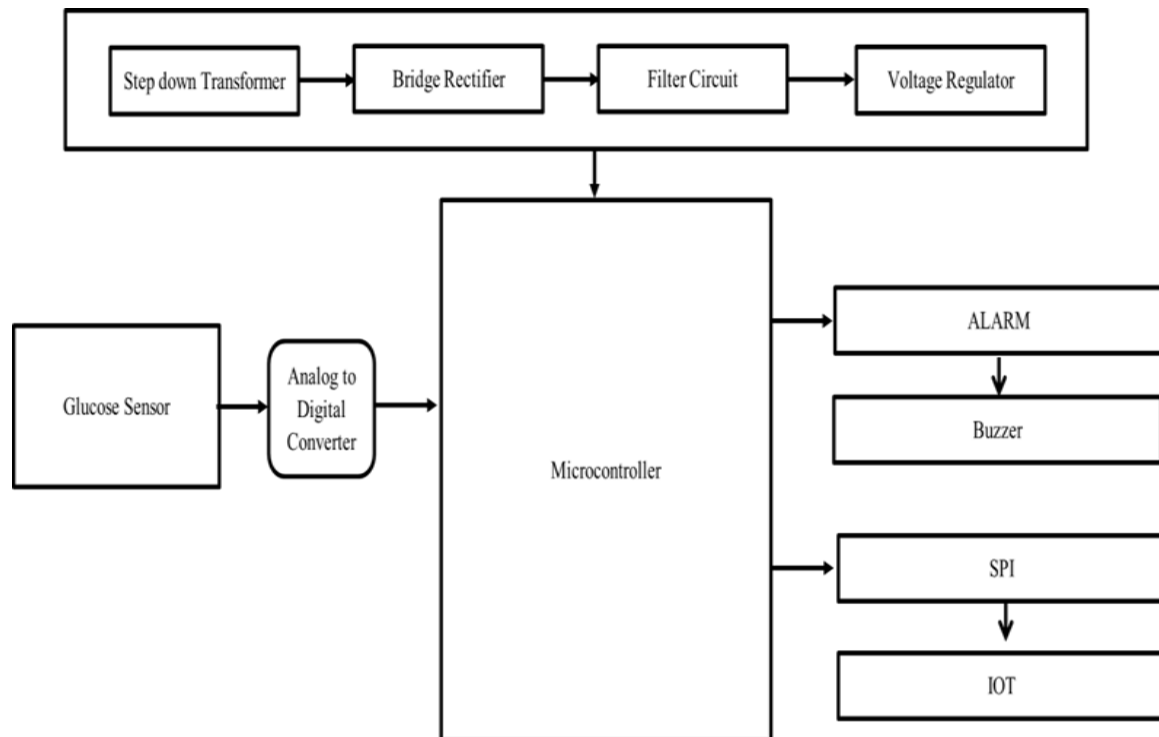
Proposed system grew out to keep track of patient's glucose level to detect diabetic and diabetic retinopathy using machine learning in a much comfortable and better way. Today the e-healthcare system generates a massive amount of sensitive data. Due to its voluminous amount these data are being outsourced to manage storage capability. Internet of Things is being an essential paradigm today. The glucose sensor which is used here sense the glucose level of the patients. If the sensor sensed any abnormal value then that information will be send to microcontroller through SPI protocol , and the buzzer which is used to alert the concerned person through making noise and shares the information through Blynk App through mobile using IOT. Diabetic Retinopathy cause changes in eye damage the blood vessel. Image will undergo a standard method of applying image processing which include image acquisition ,pre-processing, feature extraction followed by exact identification of disease.

6. LIST OF MODULES:

GLUCOSE SENSOR Glucose sensor uses a filament coated in glucose sensing enzymes to detect glucose in the interstitial fluid (the fluid between your cells). As a wearable sensor, a CGM automatically detects and measures glucose levels 24 hours a day.

BUZZER Also known as a sounder, audio alarm or audio indicator, a buzzer is a basic audio device that generates a sound from an incoming electrical signal. Buzzers come in two primary forms — piezo buzzers and magnetic buzzers

NODE MCU MICROCONTROLLER Node MCU is an open-source Lua based firmware and development board specially targeted for IoT based Applications. It includes firmware that runs on the ESP8266 Wi-Fi SoC from Express if Systems, and hardware which is based on the ESP-12 module.

SPI The SPI is most often employed in systems for communication between the central processing unit (CPU) and peripheral devices. It is also possible to connect two microprocessors by means of SPI.

7. HARDWAREOVERVIEW

POWERSUPPLYUNIT Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones,and rarely to others.

LINEARPOWERSUPPLY An AC powered linear power supply usually uses a transformer to convert the voltage from the wall outlet (mains) to a different, usually a lower voltage.If it is used to produce DC, rectifiers used. A capacitor is used to smooth the pulsating current from the rectifier. Some small periodic deviations from smooth direct current will remain, which is known as ripple. These pulsations occur at a frequency related to the AC power frequency(forexample,amultipleof50or60Hz)

supply voltage. For critical electronics applications a regulator will be used to stabilize and adjust the voltage. This regulator will also greatly reduce the ripple and noise in the output direct current. Linear regulators often provide current limiting ,protecting the powersupply and attached circuit from over current.Adjustable linear power supplies are common laboratory and service shop test equipment, allowing the output voltage to be set over a wide range. For example, a benchpower supply used by circuit designers may be adjustable up to30 volts and up to 5amperes output.Some canbe driven by an external signal,for example,for applications Requiring a pulsed output.

TRANSFORMER Transformers work only with AC and this is one of the reasons why main electricity is AC. Step-up transformers increase voltage; step-down transformers reduce voltage. Most power supplies use a step-down transformer to reduce the dangerously high mains voltage (230Vin UK) to a safer low voltage. The input coil is called the primary and the output coil is called the secondary. There is no electrical connection between the two coils; instead they are linked by an alternating magnetic field created in the soft-iron core of the transformer. The two lines in the middle of the circuit symbol represent the core. Transformers waste very little power so the power out is (almost) equal to the power in.Note that as voltage is stepped down current is stepped up. The ratio of the number of turns on each coil, called the turn's ratio, determines the ratio of the voltages. A step-down transformer has a large number of turns on its primary (input) coil which is connected to the high voltage mainssupply,and a smallnumber of turns on its secondary(output)coil to give a low output voltage.The low voltage AC output is suitable for lamps, heaters and special AC motors. It is not suitable for electronic circuit unless they can include a rectifier and smoothing capacitor.

RECTIFIER There are several ways of connecting diodes to make a rectifier to convert AC to DC. The bridge rectifier is the most important and it produces full-wave varying DC. Afull-wave rectifier can also be made from just two diodes if a center-tap transformer isused, but this method is rarely used now that diodes are cheaper. A single diode can be used as a rectifier but it only uses the positive (+)parts of the AC wave to produce half-wave varying DC The varying DC output is suitable for lamps, heaters and standard motors. It is not suitable for electronic circuits unless they include a smoothing capacitor.

BRIDGERECTIFIER A bridge rectifier can be made using four individual diodes, but it is also available in special packages containing the four diodes required. It is called a full-wave rectifier because it uses the entire AC wave (both positive and negative sections). 1.4V is used up in the bridge rectifier because each diode uses0.7V when conducting and there are always two diodes conducting, as shown in the diagram below. Bridge rectifiers are rated by the maximum current they can pass and the maximum reverse voltage they can withstand(this must be at least three times the supply RMS voltage so the rectifier can withstand the peak voltages).Alternate pairs of diodes conduct,changing over the connections so the alternating directions of AC are converted to the one direction of DC.

NODEMCUCONTROLLER
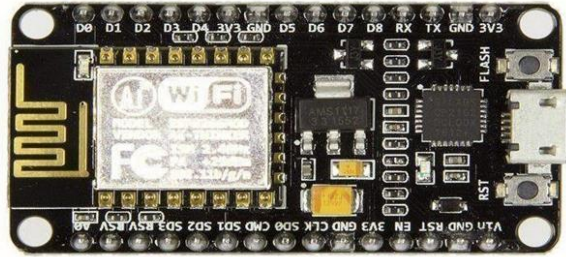
NODEMCUV3PINOUT
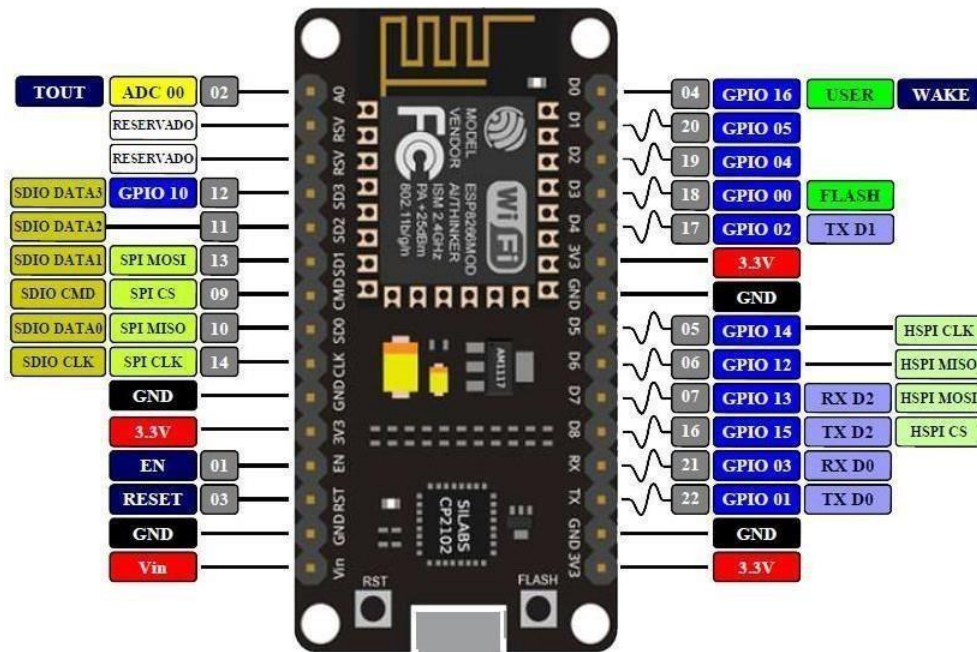
8. CONCLUSION & FUTURE WORK

Proposed system presented the importance of designing IoT based health caresystems for patients health monitoring. Comparative non-invasive technique has many advantage from an invasive or minimally invasive technique. This technique will be affordable as a painless and easy portable device. Infection free device. We developedandprospectivelyvalidatedan automatic image algorithm for HEs detection. Thealgorithm detects HE lesions based on color, using a statistical classification; and by thesharpness of its edges, applying a Kirsch operator. Our results demonstrate that thesystem is well suited to complement the screening of DR and may be use to help theophthalmologistsin theirdailypractice.

9. REFERENCE

[1] A method of detecting heartbeat locations in the ballistocardiographicsignal fromthefiber-opticvitalsignssensorMariuszKrej,LukaszDziuda,FranciszekWojciech Skibniewski

[2] A Review on Glucose Monitoring Using Enabling Technologies of InternetofThings 20217thInternationalConferenceonAdvancedComputingandCommunicationSystems(ICACCS) |978-1-6654-0521-8/20/$31.00©2021IEEE

[3] Design and Implementation of a Wearable System for Non-Invasive GlucoseLevelMonitoring2019IEEEInternationalConferenceonBiomedicalEngineering, Computerand Information Technology for Health(BECITHCON)28-30November,2019, Dhaka,Bangladesh

[4] IoT Based Emergency Health Monitoring System 2020 International ConferenceonIndustry4.0Technology(I4Tech)VishwakarmaInstituteofTechnology,Pune,India.Feb13-15,2020 Remote Measurement of Short-Term Heart Rate With Narrow Beam MillimeterWaveRadarInstituteofElectricalandElectronicsEngineers(IEEE)Published:2021Issue:Volume:9 Page:165049-165058 ISSN:2169-3536

[5] Vega Pradana Rachim, Wan-Young Chung, Wearable-band type visible- nearinfraredoptical biosensor for non-invasive blood glucose monitoring, Sensors andActuators:Chemical286(2019)173-180.

[6] Mohamed Elsherifa, Muhammad Umair Hassan Ali K. Yetisend, HaiderButte,Hydrogelopticalfibersforcontinuousglucosemonitoring,BiosensorsandBioelectronics.

[7] Kolla, M.; Venugopal, T. Efficient Classification of Diabetic Retinopathy usingBinaryCNN.InProceedingsofthe2021InternationalConferenceonComputationalIntelligenceandKnowledgeEconomy(ICCIKE),Dubai,UnitedArabEmirates,17–18March2021.

[8] Pamadi,A.M.;Ravishankar,A.;Nithya,P.A.; Jahnavi,G.;Kathavate,S.DiabeticRetinopathy Detection using MobileNetV2 Architecture. In Proceedings of the2022InternationalConferenceonSmartTechnologiesandSystemsforNext

    i. GenerationComputing(ICSTSN),Villupuram,India,25–26March 2022.

[9] Saranya, P.; Devi, S.K.; Bharanidharan, B. Detection of Diabetic Retinopathy inRetinalFundusImagesusingDenseNetbasedDeepLearningModel.InProceedingsof the2022InternationalMobileandEmbeddedTechnologyConference(MECON),Noida,India,10–11March2022.

[10] Mudaser, W.; Padungweang, P.; Mongkolnam, P.; Lavangnananda, P. DiabeticRetinopathyClassificationwithpre-trainedImageEnhancementModel.InProceedingsof the 2021 IEEE 12th Annual Ubiquitous Computing, Electronics &Mobile Communication Conference (UEMCON), New York, NY, USA, 1–4December2021.

[11] A Survey on Diabetic Retinopathy Disease Detection and Classification usingDeepLearning Techniques (2021),IEEE papers,journals.

[12] Pre-diagnosisofDiabeticRetinopathyusingBlobDetection(2021),IEEEpapers,journals

[13] Diabetic Retinopathy Detection using Prognosis of Micro aneurysm and EarlyDiagnosis System for Non - Proliferative Diabetic Retinopathy Based on DeepLearningAlgorithms(2021),IEEEpapers,journals.

[14] A Review on Glucose Monitoring Using Enabling Technologies of Internet ofThings(2021),IEEEpapers,journals.

[15] Design and Implementation of a Wearable System for Non-Invasive GlucoseLevelMonitoring(2019),IEEEpapers,journals.