



23.06.2021

Trichy.

To

Dr.P.Sathyabharathi, M.B.B.S,

Jeyaram Clinics,

Nachallur, Kulithalai,

Trichy Road, Karur- 639104

Dear Sir/Madam,

Sub: Requisition letter for short-term project -Reg.

Greetings!

Indra Ganesan College of Engineering, Manikandam, Tiruchirappalli, Tamil Nadu was established with a noble vision of providing higher education in the field of Engineering for the student community, especially from the rural areas.

Indra Ganesan College of Engineering, Trichy is one of the institutions affiliated with Anna University, Chennai. Our institution promotes and encourages the students to undergo short-term projects to cultivate their practical knowledge to bridge the gap between industry and academic curriculum.

Students of the Electronics Communication Engineering department are fascinated to do short term project related to biomedical field with the facilities available in our college. We had conversance with faculty members had completed many short term project and already we had completed the project in your organization in previous year. I request you to accept our request and guide them to achieve their goal.



Dr.S.BHARATHI RAJA
PRINCIPAL

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal

Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

Madurai Main Road,
NH-45B, Manikandam
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ஜெயராம் கிளினிக்

நச்சலூர், குளித்தலை வட்டம், திருச்சி ரோடு, கரூர் மாவட்டம் - 639110. தொடர்புக்கு : 9585726268

Dr.J.ரமேஷ், M.B.B.S.,ACMDC

பதிவு எண் : 80120, அரசு மருத்துவர்

சரிக்கமர நோய், குழந்தைகள் மற்றும்

வளாத்நல மருத்துவர்



Dr.P.சத்யபாரத், M.B.B.S.,

பதிவு எண் : 149287

பணி மருத்துவர்

Trichy

28.06.2021

To

The Principal,

Indra Ganesan College of Engineering,

Madurai Main Road (NH-45B), Manikandam,

Trichy – 620 012

Dear sir/Madam,

Sub: Invitation to collaborate on a Short term project endowment “ECG Signal Analysis with Edge and IOT Devices.”

We are accepting your invitation from Electronics and Communication department of Indra Ganesan College of Engineering, Trichy to collaborate with us on a short-term project on “ECG Signal Analysis with Edge and IOT Devices” in time period of Six weeks. Leveraging each other's strengths can indeed lead to great outcomes. By working together effectively, you can achieve more than what each of you could accomplish individually. Let us know your early convenient to explore the budget details to complete the “ECG Signal Analysis with Edge and IOT Devices” consultancy development. We are open to scheduling a meeting to discuss the project details in person or via a virtual platform.

For Jeyaram Clinics

With Best Regards

Managing Director

Dr. G. Balakrishnan, M.E., Ph.D.,

Principal

Indra Ganesan College of Engineering

IG Valley, Madurai Main Road

Manikandam, Trichy-620 012.



30.06.2021

Trichy.

To

Dr.P.Sathyabharathi, M.B.B.S,

Jeyaram Clinics,

Nachallur, Kulithalai,

Trichy Road, Karur- 639110

Respect Sir/Madam,

Sub: Submission of Short-term project endowment quotation – Reg

Ref.: Your Letter Dated 28.06.2021.

We would like to thank for considering our short-term project proposal. To follow up on your letter, the ECE Department has assigned team of 3 students with Project Investigator Dr.R.Raja Mohamed to carry out the consultancy endowment for your esteemed organization. We would like to bring to your kind notice that the quotation for the consultancy endowment “**ECG Signal Analysis with Edge and IOT Devices.**” and may cost **Rs 80,200/-**. The quotation details and time line for each stage of work is presented below.

FINANCIAL DETAILS

S.NO	DESCRIPTION	TIME DURATION IN WEEKS	COST IN Rs
1.	Circuit Design	1 Week	15,000/-
2.	Sensor purchase	1 Week	18,200/-
3.	Development Phase	2 Weeks	25,000/-
4.	Product Testing and Delivery	1 Week	21,000/-
5.	Training and Documentation	1 Weeks	4,000/-
Total		6 Weeks	80,200/-

We commit to provide technical assistance from our end to ensure successful completion of project with prompt delivery and we are looking forward to your kind consideration of our consultancy endowment proposal. In this regard, we request you to contact us with any queries about the design and delivery of the project.


Project Investigator

[**Dr.R.Raja Mohamed**]


Dr. G. Balakrishnan, M.E., Ph.D.,
Principal

Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.




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வளாதாநல மருத்துவர்



Dr.P.சத்யபாரதி, M.B.B.S.,

பதிவு எண் : 149287
பணி மருத்துவர்

Trichy

02.07.2021

To

The Principal,

Indra Ganesan College of Engineering,

Madurai Main Road (NH-45B), Manikandam,

Trichy – 620 012

Dear Sir,

Sub.: Sanction of Fund for “ECG Signal Analysis with Edge and IOT Devices”-reg.

We really appreciate all of your hard work in making this short term project endowment, and We are pleased to inform you that, we are accepted and approving a sum of Rs.80,200/- (Rupees Eighty Thousand two hundred Only) towards the “ECG Signal Analysis with Edge and IOT Devices” project work. It is essential that the work is to complete within the stipulated time.

For Jeyaram Clinics

With Best Regards

Managing Director

Dr. G. Balakrishnan, M.E., Ph.D.,

Principal

Indra Ganesan College of Engineering

IG Valley, Madurai Main Road

Manikandam, Trichy-620 012.



Indra Ganesan

COLLEGE OF ENGINEERING

Madurai Main Road (NH-45B), Manikandam, Tiruchirapalli- 620 012
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

SHORT TERM PROJECT ENDOWMENT REPORT

ECG Signal Analysis with Edge and IOT Devices

Submitted to

Dr.P.Sathyabharathi, M.B.B.S,

Jeyaram Clinics,

Nachallur, Kulithalai,

Trichy Road, Karur- 639104

Delivery Date: 25.08.2021

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.


PROJECT REPORT

Objective:

The electrocardiogram (ECG) is a widely accepted technology employed for investigation of CVDs of the person. The proposed solution deals with an efficient internet of things (IoT) enabled real-time ECG monitoring system using cloud computing technologies. AWS cloud uses HTTP and MQTT servers to provide data visualization, quick response and long-live connection to device and user. Bluetooth low energy (BLE 4.0) is used as a communication protocol for low-power data transmission between device and mobile gateway. It offers an analysis of ECG signals to detect various parameters such as heartbeat, PQRST wave and QRS complex intervals along with respiration rate. The proposed system prototype has been tested and validated for reliable ECG monitoring remotely in real-time.

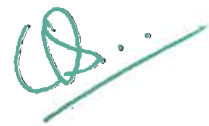
Project Description:

The volume of the data generated by the ECG module is very high which necessitates the use of cloud computing platform. The storage of the data in cloud platform enables rapid storing of high-volume data in a very convenient way. Data storage in cloud platform also provides real-time analysis and remote monitoring of the patient. The implemented system works on a conventional request-response method, where the HTTP server is able to receive the request from the client and respond accordingly. HTTP server provides only GUI of the ECG signal. Message Queuing Telemetry Transport (MQTT) protocol is used for the transmission of the ECG signal from ECG module to the application installed in smartphone acting as a mobile gateway. MQTT protocol maintains a long-lived connection between the device and the remote supervisor. It requires less communication overheads and helps to save bandwidth, because of these advantages; it is the most suitable server for providing real-time ECG data to the users. Extraction and analysis of the information bearing signal are sophisticated due to the noise and multiple ranges of frequencies present in the initial ECG signal caused by distortions due to interference. These distortions could also be mechanical, that is produced due to motion of the ECG monitoring device or electrode or also due to the relative wrong placement of the electrode on the body Using advanced digital signal processing, and this task will be resolved. The existing literature recommends that the Pan-Tompkin's algorithms are one of the most accurate and widely accepted approaches for QRS complex detection.


Dr. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
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Conclusion:

The proposed work engrossed to solve the problem of lack of healthcare facilities and proper apparatus for diagnosis of CVDs in rural and remote locations. The proposed system has reached to solution for rural and remote patients where it is difficult to use ECG system and ECG signal for analysis. So, an IoT-enabled ECG monitoring system with cloud storage facility has been satisfactorily implemented. The system uses medical-grade 5 lead ECG sensor to accurately acquire real-time ECG data from patient and transmitted through BLE with reliable accuracy. For data visualization AWS cloud has been used which uses HTTP and MQTT for data transmission from device to gateway (mobile phone) and the gateway to cloud. QRS wave along with P and T wave is detected satisfactorily by using Pan Tompkin's algorithm. Finally, time interval of ECG signal and heartbeat through RR interval has been calculated with good accuracy. At last, the proposed system is validated and compared with standard ECG signal taken from MIT/BIH database . The result obtained from the proposed system reveals satisfactory performance in real-time ECG monitoring for primary intimation of CVDs.



Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.



31.08.2021

Trichy

UTILIZATION CERTIFICATE

Certified that the amount of Rs.80, 200/- (Eighty Thousand Two Hundred Only) was sanctioned by Jeyaram Clinics during the academic year (2021-2022), in favor of department of Electronics Communication Engineering, Indra Ganesan College of Engineering, Manikandam, Trichy for short term project endowment titled “**ECG Signal Analysis with Edge and IOT Devices**”. The purpose of amount sanctioned has been fulfilled and delivered as per conditions of grant were satisfied.

Project Investigator
[Dr.R.Raja Mohamed]



Dr.S.BHARATHI RAJA
PRINCIPAL

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
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