



THENI MELAPETTAI HINDU NADARGAL URAVINMURAI

NADAR SARASWATHI COLLEGE OF ENGINEERING & TECHNOLOGY



Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Vadapudupatti, Annanji (po), Theni - 625 531,
Tamilnadu, India.

3.1.1 Grants received from Government and non-governmental agencies for research projects / endowments in the institution during the last five years

Academic Year : **2022-2023**

Name of the Project Application : Machine Learning techniques for liquid level estimation using float sensor arrays

Name of the Principal Investigator : **Mr. R.Rajaprasanna**
Assistant Professor,
Department of EEE
Nadar Saraswathi College of Engineering and
Technology, Vadapudupatti, Theni.

Name of the Funding Agency : **Tamil Nadu State Council for Science and Technology**

Amount Sanctioned : **Rs. 7500/-**

Duration of the project : Six Months

Flow Control and Measurement using Machine learning Techniques from Sensor arrays

Suthersen T, Sundaramahalingam S and Shanmugapandian M

Abstract:

This project mainly focuses on the liquid level measurement and control using machine learning algorithms. Level and flow of volatile liquids/fluids are subjected to change mass and during transportation and consume for public needs pose a series problem in quantity. This work comes with the new idea using machine learning concepts such as regression and least square analysis to find the liquid level accurately in the tank as well as the flow. This work takes raw data from the container attached with float as well as flow sensors which gives liquid level and flow measurement accurately. The data has been feed in to the raspberry Pi-3 and using Thony python, the necessary instructions has been done. The work is validated using the previous approaches of handling flow and liquid level measurement empirically.

Introduction:

Flow control and measurement are the crucial one in all industries and residential areas. If the liquid/fluid is high-volatile, its mass shall be reduced considerably. Therefore, its quantity has been reduced significantly which leads to uncertain in deliver the liquid/fluid to consumers/Consumers. In order to monitor and maintain the liquid level at desired rate, this work come with machine learning approach-Supervised machine learning algorithm, named regression analysis coupled with least square estimation to estimate the parameters associated with liquid and flow measurement. This typical work uses regression analysis using python modules to obtain the results. The data are rendered from the sensors housed at the tank for measuring flow/liquid.

Methodology:

Regression is the one of the types of supervised learning in which the outcome is a continuous one. i.e., Numeric. It normally works on the mathematical equation for which the weights (variance) are updated using the optimization concept and makes the observed data close to the desired data. If the data is linearly separable, linear regression is the best choice. But if the data is not linearly separable, then, logistic regression is the best choice. The collected data for this work from the Kaggle platform shows are not linearly separable. So, logistic regression method is used in this work. The weights are updated using gradient-decent algorithm. Any discrepancies in actual liquid level or flow with the obtain liquid level or flow are minimized using the cost/loss function with constraint on the maximum flow as the liquid level using numeric optimization. The data are feed in the minicomputer-Raspberry pi 3 with 1 GB internal RAM. Software used to perform machine learning algorithm is Python 3.8.10 using Sypder IDE. The modules used in python are pandas, scikit-learn etc. The results are validated with the previous work based on this work.



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Results:

The optimal results are the minimization of generalized results which is the quantification of observed flow/liquid with the actual flow/liquid. The metrics involved in the minimization of errors are the Minimum Mean Square (MME), Root Mean Square Error (RMSE), Mean Square Error (MSE) etc. These metrics are compared with the previous studies and claim that this work yields better results. The data from the sensor readings are pre-processed using pandas and matplotlib libraries.

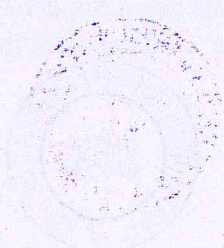
Conclusion:

Using machine learning algorithm, this work found an efficient and optimal way to measure the flow rate/liquid-level using Raspberry pi and Thonny Python. The results are quantified using various time domain metrics and validated with other works. The obtained results are used to control the flow as well as maintain the level at desired set points.

Project Guide: Rajaprasanna R/AP/EEE/NSCET/THENI




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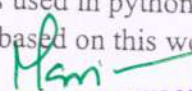
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Results:

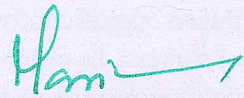
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தமிழ்நாடு அறிவியல் தொழில்நுட்ப மாநில மன்றம்
TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

(Established by Government of Tamilnadu)
Directorate of Technical Education Campus, Chennai – 600 025.
Ph : 044-22301428, www.tanscst.nic.in

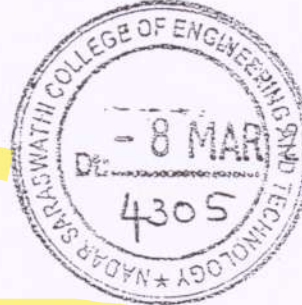
Dr.R.SRINIVASAN, M.Sc., Ph.D.,F.I.C.S., M.A.C.S.(USA),
Member Secretary

Lr.No.TNSC-ST/SPS/BS/2022-2023

03.03.2023

To
The Principal

Nadar Saraswathi College of Engineering and Technology,
Theni –625 531



Faculties Concerned
9/3/23

Sir/Madam,

Sub: TNSCST – Student Project Scheme – 2022-2023 – approval intimation–grant release- reg.

With respect to the above scheme, the list of projects approved by the State Council is enclosed along with terms and conditions. You are requested to adhere to terms and conditions such as submission of UC and Seminar Paper on Time.

1.	Mr.Rajaprasanna.R, Assitant Professor, Department of EEE, Nadar Saraswathi College of Engineering and Technology, Theni –625 531	Machine learning techniques for liquid level estimation using float sensor arrays	T.Sutharsan, M.Shanmugapandian, S.Sundaramahalingam,	EEE-1228	The Principal	Rs 7500/-
2.	Mr.R.Santhaseelan, Assistant Professor, Department of Mechanical Engineering, Nadar Saraswathi College of Engineering and Technology, Theni-625 531	Design and fabrication of affordable economical e- bike	V. Uthaya, M. Raja Ganesh, V. Venkateshwaran, C.S. DineshBabu	EME-0509	The Principal	Rs 7500/-
Total						Rs 15000/-

Herewith enclosed the cheque for the approved grant and disburse the grant to the concerned students through the guides at the earliest

Kindly send the utilisation certificate (format enclosed) and seminar paper (Ref.T&C) on completion of the project.

Thanking you,

Yours faithfully,

3/3/23
Member Secretary.

- Encl: a) Terms & Conditions (T&C)
b) Format of Utilisation Certificate (UC)
c) Cheque for Rs.15000/- Cheque No:574915 dt.03.03.2023

Copy to: Individual Guides



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FLUID LEVEL CONTROLLER AND MEASURING TEMPERATURE, HUMIDITY

SHANMUGA PANDIAN¹, SUNDARAMAHALINGAM², SUTHARSAN³

Final Year Electrical and Electronics Engineering Students
Nadar Saraswathi College of Engineering and Technology Theni.


ABSTRACT

Now a day's people need everything happen smarter other than olden days techniques used. Now everyone has overhead tank at their homes and Industries use big size of boilers to processing liquids and store the high temperature fluids. Keeps on pumping water to the tank and the water starts spilling out from the tank. Industry processing liquid high pressure and temperature the monitor the correct level and control on same time. There is wastage of time, electricity, and separate equipment to measure so maintenance is high. This project to solve the all above problems using IOT based method. In this paper Internet of Things (IOT) Based on the concept that to define energy conservation in tank (sense and monitor). The Main objective is to have a sensor which detects the level of water and it should notify the user about the level which is currently available in the tank. The Float Sensor is placed at the top of the tank in which we will measure the level of fluid and the if the distance of the fluid from the sensor gets increased, it means that the fluid in the tank gets low and finally after reaching to an extent the system should notify a warning message to the user. And the DHT11 sensors measure the temperature and humidity of a fluid. The Major requirement would be Float sensor which senses level of liquid (in distance) from the top of the tank to the bottom of the tank. The sensor is connected to the system using the Wi-Fi of NODEMCU (ESP8266). The Blynk library and Thingspeak is installed and connected in the arduino. The Blynk or other online application application is used to get the values and the notification sends to the mobile for the user purpose.

MERITS

- ☐ Save energy, Low Cost
- ☐ Reduces the chances of water spillage
- ☐ Increases the overall efficiency of the plant processing
- ☐ Fast response




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Required Materials (using TNSCST fund)

S. No.	Elements	Quantity No.	Cost in Rs.
1	Raspberry pi 4 1GB Ram	1	4500/-
2	Float Sensor	4	400/-
3	DHT11 Sensor	1	250/-
4	LCD Module Display	1	335/-
5	NodeMCU	1	400/-
6	Jumper Wire	30	105/-
7	Raspberry pi Official USB-C Power Supply	1	950/-
8	HDMI port	1	500
	Total	39	7440/-

R. Rajasekara
Project Supervisor
(R. Rajasekara / AP/EEE)

S. Ch. I.
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[K. MALAR
AP/EEE]



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STUDENT PROJECT SCHEME 2022-2023
UTILISATION CERTIFICATE

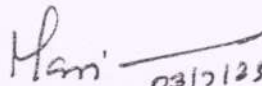
(TWO COPIES)

1. Name of the guide and address : Mrs. R. Rajapooranna / AP / EEE
Nadar Saraswathi College of Engg. and Tech
Theni - 625531
2. Name of the student(s) : T. Sutharsen / IV Year / EEE
Mr. Shanmuga Perliyan / IV Year EEE
S. Sundaramahalingam / IV-Year EEE
3. Title of the project : Machine learning techniques for Liquid
level estimation using float sensor
arrays
4. Project code : EEE-1228

It is certified that a sum of Rs. 7500 (Rupees Seven thousand five hundred only) sanctioned by the Council for carrying out above mentioned student project has been utilized for the purpose for which it was sanctioned and sum of Rs. remaining unutilized is refunded.


Signature of the Guide


Signature of the HOD


Signature of the
REGISTRAR / PRINCIPAL / DEAN
with seal




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