PAYEL BHATTACHARJEE

Associate Software Engineer, Robert Bosch Engineering and Business Solutions PVT LTD. (RBEI)

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AFFILIATION

Associate Software Engineer
Robert Bosch Engineering and Business Solutions PVT LTD. (RBEI)

📅 July, 2021 – present

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Project Intern
Robert Bosch Engineering and Business Solutions PVT LTD. (RBEI)

📅 March, 2021 – June, 2021

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Bachelor of Technology in Electronics & Telecommunication Engineering
Kalinga Institute of Industrial Technology (KIIT), Bhubaneswar, Odisha, India

📅 July 2017 – May, 2021   📍 C.G.P.A: 9.43 (On a scale of 10)

PROJECTS

Project : Sleep and Sedentary Behaviour Analysis from Physiological Signals with Machine Learning

About: We have attempted to find a reasonable correlation between the physiological input variables acquired from commercially accessible wearable devices and the sleep, sedentary, moderate or light behavior. The influence of heart rate, burned calories, steps, and distance over time, and even height and weight on inactive and sleeping behavior has been taken into consideration. We applied various machine learning algorithms to predict sleep and sedentary behavior from the Apple Watch and Fitbit data-set. We observed that the XGBoost algorithm gives the best accuracy. Though the accuracy with Random forest algorithms is reasonably good for the Apple Watch data set, but the XGBoost approach performs well in both situations.
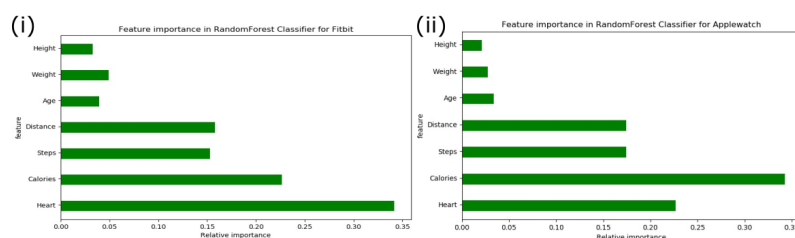

Figure 1: (i) Importance of input variables in Random Forest for FitBit data-set (ii) Importance of input variables in Random Forest Classifier for AppleWatch data-set.

Project: Detection of Severity of Pneumonia Caused by COVID'19 with Image Processing and Machine Learning Algorithms

About: We have analyzed the chest CT or X-ray scans to differentiate the findings generated by Pneumonia and COVID-19 using Image processing and Machine Learning algorithm. Image prepossessing is done to remove the noise, histogram equalization, and image segmentation. Several Machine Learning modules (pandas, sklearn, sklearn.metrics, sklearn.tree, and sklearn.model selection) are used to analyze the features and properties of the processed pictures. Applying these algorithms and regression models, we can distinguish between pneumonia caused by COVID'19 and pneumonia caused due to some other reagents. The ML model is almost 82% accurate while predicting the COVID'19 pneumonia cases.
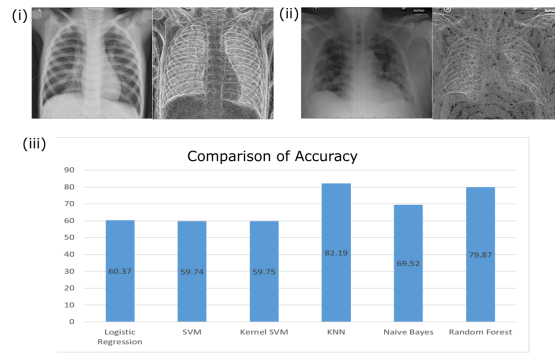
Figure 2: (i) Chest X-Ray report of a COVID'19 negative pneumonia patient and entropy of X-Ray image (ii) Chest X-Ray report of a COVID'19 positive pneumonia patient and entropy of X-Ray image (iii) Comparison of accuracy obtained from the various Machine Learning algorithms and Regression methods.

Project (Ongoing) : Numerical Modelling and Performance Evaluation of SnS Based Hetero-junction Solar Cell with Machine Learning Algorithms

About: The performance of heterogeneous thin film SnS based solar cell is analyzed with several buffer layers. Factors like defect density, doping density, series resistance, and shunt resistance control the solar cell's functionality. The results such as efficiency, J_{sc}, V_{oc} and fill factor will be analyzed with Machine Learning algorithms, and we expect to get a good understanding of the function of the cell.
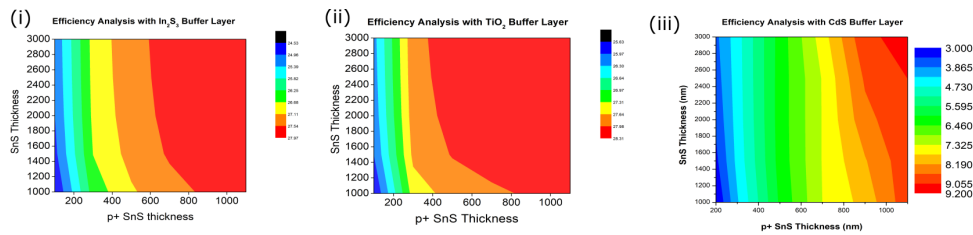

Figure 3: Efficiency variation due to the change of thickness in SnS and p+SnS layers of the hetero-junction solar cell(i) Efficiency Variation in In_2S_3 buffer layer based solar cell (ii) Efficiency Variation in TiO_2 buffer layer based solar cell (iii) Efficiency Variation in CdS buffer layer based solar cell.

Project (Ongoing) : Numerical Modelling and Performance Evaluation of SnS Based Hetero-junction Solar Cell with p+ SnS BSF Layer

About: Efficiency, open-circuit voltage (V_{oc}), Fill Factor, short circuit current (J_{sc}) widely depends upon the cell structure of Cadmium sulfide and Back surface field (BSF) based solar cell. We look at the impact of various factors like carrier concentration, thickness of cell layers, radiative recombination, defect density (figure 4). By combining all the results, we expect to portray a complete picture of the major factors that enhance the performance of a thin-film solar cell.
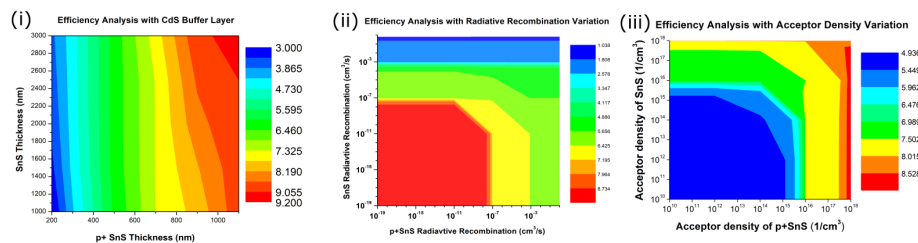

Figure 4: Variation in Efficiency due to the varied cell parameters (i) Efficiency Variation of CdS buffer layer based solar cell for the increasing thickness of SnS and p+SnS layer (ii) Efficiency Variation of cell for the alteration in Radiative Recombination (iii) Efficiency Variation of the cell for the change in Acceptor Density.

Project : Social Distancing and Face Mask Recognition Warning System

About: The key principle behind creating this model is to keep one's health and social discipline in check. In this prototype, machine learning and Python have been used as interpreters to recognize people who had maintained face masking and social distancing during human involvement. We used Keras and tensor flow libraries to construct and train the model, which included a data-set of people wearing and not wearing masks.

PUBLICATIONS

Conference Paper

- P. Bhattacharjee, S.P Kar, N.K Rout, *Sleep and Sedentary Behavior Analysis from Physiological Signals with Machine Learning*, , IEEE Xplore Digital Library, April 2020

Journal Paper

- P. Bhattacharjee, R. Garain, A. Basak, U.P. Singh, *Numerical Modeling and Performance Evaluation of SnS Based Heterojunction Solar Cell with p+ SnS BSF Layer*, , (Manuscript submitted for review)

INTERNSHIPS

Winter Training
Topic : Embedded and Robotics Basics

📅 January, 2019   📍 R.C.P.L India

Summer Training
Topic : Embedded and IoT Training with hands on Experience on Cypress Semiconductor Board, Embed and Microchip board with Introduction to LoRa Communication

📅 May, 2019 - June, 2019   📍 Eduvance, India

SKILLS

● Computational & Technical Skills

C   C++   Python   Machine Learning   Matlab   Embedded System   Internet of Things   Robotics   Latex   Xilinx ISE   Vivado

● Languages

- Bengali (*Native*)
- English
- Hindi

RELEVANT COURSES TAKEN

- Programming in C
- Computational Intelligence
- Object Oriented Programming
- Data Structures and Algorithms
- Introduction to Operating Systems
- Information Theory and Coding
- Mathematics (Linear Algebra)
- Signals and Systems
- Digital Signal Processing
- Digital Electronics
- Analog Electronic Circuits
- C Programming and Data structure Laboratory
- Machine Learning A-Z: Hands-On Python (Udemy certified Course)

ACADEMIC ACHIEVEMENT

🏆 **KIIT Merit Scholarship for Securing 1st position in University with 10 CGPA (2018)**

TEACHING EXPERIENCES

1. Course coordinator and project instructor (Volunteer) in ELabs, KIIT DU (*2019-2021*).

SEMINAR & CONFERENCES

- International Conference on Innovative Mechanisms for Industry Applications (ICIMIA), 2020

EXTRA CURRICULUM

Photography Drawing and Arts Cooking

REFERENCES

1. Prof. Amlan Datta
💼 Associate Dean in School of Electronics Engineering, KIIT, Bhubaneswar, India

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2. Dr. Arindam Basak
💼 Associate Dean of Training and Placement, KIIT, Bhubaneswar, India

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