



**American International University-Bangladesh (AIUB)**

**SDG Activity Report on**

# **SDG 13: Climate Action**

**13** CLIMATE  
ACTION



**Take urgent action  
to combat  
climate change  
and its impacts**

## SDG Activity Report on SDG 13: Climate Action

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## University Activities

### A Smart Wearable Air Quality Monitor Using MEMS Ultrasound Technology

As a part of the "Dr. Anwarul Abedin Lecture Series", a regular development initiative of the American International University-Bangladesh (AIUB), the Faculty of Engineering (FE) at AIUB organized a webinar titled "A Smart Wearable Air Quality Monitor Using MEMS Ultrasound Technology" on Thursday, August 19, 2021 in Dhaka from 10:30 AM to 12:00 PM.

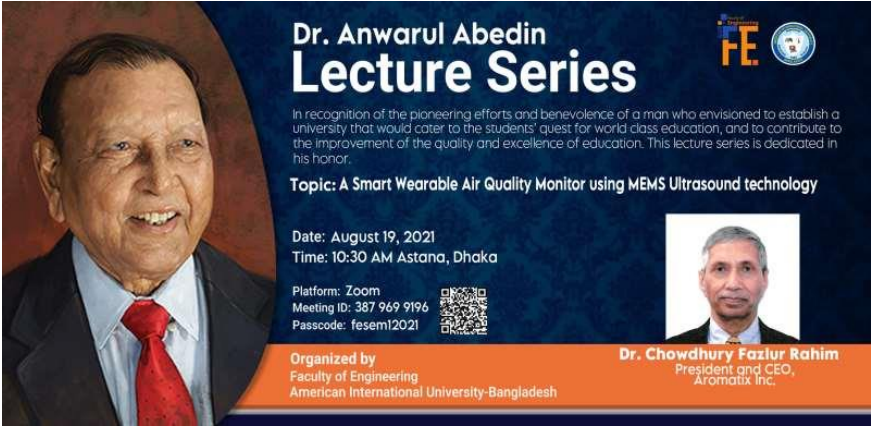
The webinar was inaugurated with a welcome address by Dr. ABM Siddique Hossain (Professor and Dean, Faculty of Engineering, AIUB). He started by paying gratitude to Dr Anwarul Abedin, AIUB's Founder- Chairman, who contributed significantly to the development of the university. He then presented a quick overview of the need to monitor air quality in human society and highlighted the need of engineering skills development.

The esteemed guest speaker of this webinar was Dr. Chowdhury Fazlur Rahim, President and CEO, Aromatix Inc. During his lecture, Dr. Rahim shared his experience of 35 years at companies such as Intel, Bell Labs, MicroLinear, and 24 years at Maxim integrated. He served as an Executive Director of Design a Maxim integrated products developing and commercializing analog mixed-signal semiconductors and sensor products and has extensive industry contacts for developing gas sensors, among several other positions while at Maxim. He has successfully commercialized 30 innovative integrated circuits relating to sensor and sensor interfaces and many more derivative products. He has 15 patents and a dozen papers in internationally recognized journals. Since founding Aromatrix, he has assembled a unique team of engineers who were instrumental in developing a portable ultrasound gas sensor solution. He has also filed three patents to date on a unique innovative technology, viz. a fully solid-state ultrasound gas sensor, uniquely suited for a first-of-its-kind medical device to facilitate COPD and asthma patients monitor their health while at home or on the road. He is now actively involved with raising capital to develop the final product.

One in every six people on the planet suffers from respiratory problems such as COPD, asthma, or hyperventilation. His world-first solid-state portable gas sensor system is the only one that can assist these individuals in determining the quality of the air in their local proximity and decide whether to go out or take effective treatment. Aromatrix demonstrated the viability of high selectivity and sensitivity gas sensors in a variety of environmental circumstances, including humidity and temperature. For carbon dioxide, this breakthrough was accomplished by the combination of machine learning with a high-resolution ultrasonic MEMS sensor. The speaker discussed the difficulties inherent in developing portable air quality sensors. It involves integrating four disciplines: MEMS ultrasonic sensor, application-specific integrated circuit, gas sensing functionalization, and finally, machine algorithm to improve gas sensing precision in real-world settings.

Following the presentation, the moderator, Dr. M. Tanseer Ali (Senior Assistant Professor, Department of EEE, AIUB), announced the start of a Q&A session, during which Dr. Rahim enthusiastically answered to questions from faculty and students in the audience. Dr. Md. Abdul Rahman (Professor and Associate Dean, Faculty of Engineering, AIUB) concluded the session by expressing gratitude to Dr. Rahim for the enlightening session on a highly technical concept. Prof. Rahman announced opening one elective course for the undergraduate student conducted by Dr. Rahim from the Fall 2021-22 semester. Later, Prof. Rahman presented a digital token of Appreciation to Dr. Rahim as a token of gratitude for sharing his valuable time and insight

The webinar was held on Zoom online platform and was attended by about 266 local and foreign participants. Additionally, the video was also live-streamed on the AIUB Facebook page. Dr. Md. Abdul Mannan (Professor and Director, Faculty of Engineering, AIUB), Mr. Nafiz Ahmed Chisty (Associate Professor and Head In-Charge, Dept. of EEE, AIUB), Mr. Md. Saniat Rahman Zishan (Associate Professor and Head, Dept. of CoE, AIUB), Mr. Chowdhury Akram Hossain (Senior Assistant Professor and Special Assistant of OSA, Faculty of Engineering, AIUB) co-hosted the event.



**Dr. Anwarul Abedin Lecture Series**

In recognition of the pioneering efforts and benevolence of a man who envisioned to establish a university that would cater to the students' quest for world class education, and to contribute to the improvement of the quality and excellence of education. This lecture series is dedicated in his honor.

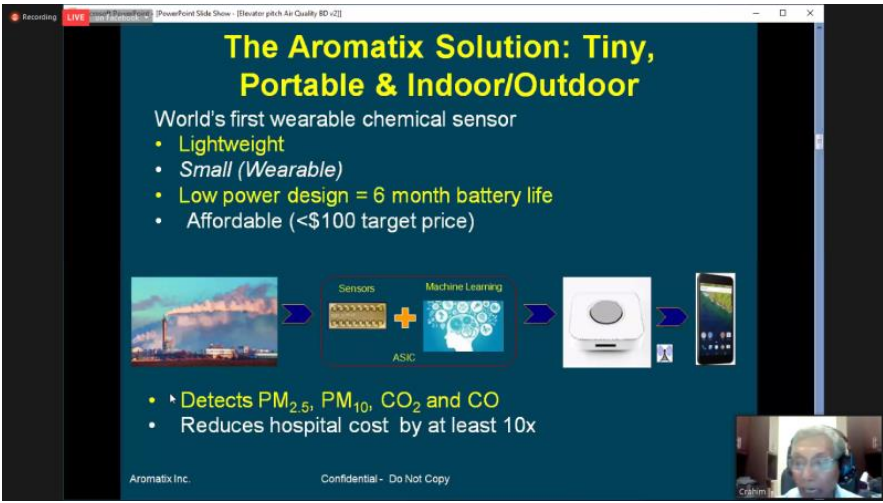
**Topic: A Smart Wearable Air Quality Monitor using MEMS Ultrasound technology**

Date: August 19, 2021  
Time: 10:30 AM Astana, Dhaka

Platform: Zoom  
Meeting ID: 387 969 9196  
Passcode: fesem12021

Organized by  
Faculty of Engineering  
American International University-Bangladesh

**Dr. Chowdhury Fazlur Rahim**  
President and CEO,  
Aromatix Inc.



**The Aromatix Solution: Tiny, Portable & Indoor/Outdoor**

World's first wearable chemical sensor

- Lightweight
- Small (Wearable)
- Low power design = 6 month battery life
- Affordable (<\$100 target price)

Diagram illustrating the Aromatix solution: Sensors + Machine Learning (ASIC) → Wearable Device → Smartphone

- Detects PM<sub>2.5</sub>, PM<sub>10</sub>, CO<sub>2</sub> and CO
- Reduces hospital cost by at least 10x

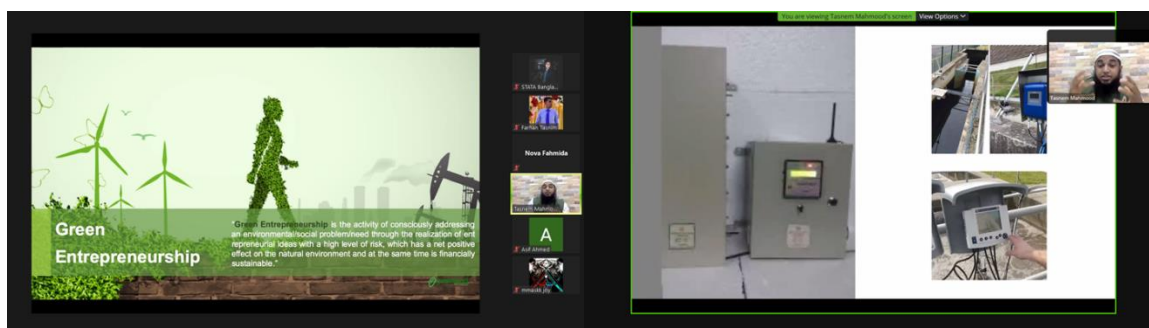
Aromatix Inc. Confidential - Do Not Copy

## Webinar On “Save Your Planet using the Power of Science: IOT Automation and Environmental Engineering”

On 8<sup>th</sup> July 2021, the IEEE AIUB Student Branch successfully organized the webinar session titled “Save Your Planet using the Power of Science: IOT Automation and Environmental Engineering” hosted by IEEE Computer Society AIUB Student Branch Chapter in collaboration with STATA IT Limited and GREENBUD. Amid the ongoing COVID-19 crisis, when everyone is locked down in their homes, the IEEE AIUB Student Branch organized this webinar session through the ZOOM Meeting platform. This webinar mainly focused on the basic and brief concepts of IoT Automation and Environmental Engineering. The session was inaugurated by honorable Prof. Dr. ABM Siddique Hossain, *Dean, Faculty of Engineering, AIUB; Advisor, IEEE AIUB Student Branch* who welcomed the respected speakers Mr. Alve Rahman Akash and Engr. Syed Tasnem Mahmood to the event. Prof. Hossain talked about the importance of IoT and discussed the impacts and greenhouse effect due to rapid industrialization.

The 1<sup>st</sup> session was started with the opening remarks from Mr. Alve Rahman Akash, *Public Relations Manager; Electrical Project Engineer; STATA IT Ltd.* The speaker started the session by showing his gratitude towards the participants along with the IEEE AIUB Student Branch and introducing STATA IT Ltd and its’ functions and objectives. He discussed in brief how home automation can control items around the house and make our life easier. After that, the speaker showed some references to Machine Machine (M2M) communication technology and showcased various smart devices from their automation industry.

The 2<sup>nd</sup> session began with the opening remarks from Engr. Syed Tasnem Mahmood, *Environmental Engineer; Chief Executive Officer, GREENBUD.* The speaker *also* started the session by showing his gratitude towards the IEEE AIUB Student Branch and the participants. He discussed the impacts and global pollution and climate change. Next, Mr. Mahmood showed some examples of Elon Mask’s Tesla ft green entrepreneurship. He talked about the vertical wind turbines & the road made of waste plastic as an example of creative environmental entrepreneurship. He discussed the impacts of energy management, supply chain management, and the functions of GREENBUD in brief. Mr. Mahmood concluded his presentation by showcasing a platform for a young entrepreneur named “GREENOVATIVE” to work for Green & sustainable industries. He encouraged members to approach them if they are interested in working in this field. The session was concluded and graced by the presence of Mr. Kawshik Shikder, *Motivator, IEEE AIUB SB, Asst. Professor, Faculty of Engineering, AIUB* along with 75+ registered participants and executive branch members and volunteers.



### Special lecture on Fossil Fuel and Environment: Development Conundrum in Bangladesh

Rokan Uddin, Senior Reporter of NTV, delivered a special lecture on 'Fossil Fuel and Environment: Development Conundrum in Bangladesh' in the Department of Media and Mass Communication (MMC) on Tuesday, November 12, 2019 at the American International University-Bangladesh (AIUB).

Mr. Uddin is a renowned reporter who has been covering the energy beat for more than a decade.

The special lecture was arranged for the 'Environmental Journalism' course students, and it was held at the Media Studio in the university's permanent campus.





‘SETTLEMENT FOR LOW-INCOME PEOPLE: IMPACT OF CLIMATE CHANGE’ - Workshop  
Conducted by Department of Architecture

As a part of collaboration between American International University-Bangladesh (AIUB) and Habitat for Humanity International Bangladesh under the research project titled “Urban Innovation: Adaptive Solutions in Climate Resilient Dwelling for Slum Dwellers”, a workshop was conducted by the Department of Architecture on 17th December, 2018, with the slum dwellers as participants. The workshop was conducted by M. Arefeen Ibrahim (Head, Department of Architecture), Ashik Vaskor Mannan (Associate Professor), Ajmeri Nusrat Shoma (Senior Assistant Professor) and Saiful Hasan Tariq (Assistant Professor). Representatives from Habitat for Humanity International Bangladesh too participated in the workshop. Main objective of the workshop was to create awareness among the slum dwellers about the climate change and its impact on their daily life and livelihood.

The workshop was divided into two sessions. First session was conducted by the presentation titled ‘SETTLEMENT FOR LOW-INCOME PEOPLE: IMPACT OF CLIMATE CHANGE’, which elaborated the reasons behind the climate change and its impact on the slum dwellers. The second session was the questionnaire session, where all the participants responded on multiple questions, to help assess their existing living condition, problems faced due to climate change and tentative solutions for betterment.

The workshop is expected to play a vital role in raising awareness among the participants on the issues of climate change relevant to their living conditions and also in discovering ways to minimize the adverse effects. Cooperation and assistance from HFHIB and AIUB administration as well made this event a success.



## Faculty Research and Publication

### Environmental factors of climate change in Bangladesh over the years

Author: Md. Mortuza Ahmmed et al.

#### Brief Description:

Bangladesh is in danger of losing some of its regular seasons because of ever-increasing global warming and other environmental factors. Some unusual patterns have been being noticed for last couple of years in case of seasonal cycle. The winter is getting shorter and shorter whereas the summer is lengthening more and more. The objective of this study is to assess the variation patterns of climate in the country over the years along with some related environmental factors like urbanization, deforestation, and carbon di oxide (CO<sub>2</sub>) emissions based on historical data available. Data on average monthly temperature, rainfall, forest area coverage have been collected from World Bank's website. Deforestation data have been collected from mongabay.com whereas urbanization data have been collected from banglapedia.org. Data on CO<sub>2</sub> emissions have been assembled from World Bank's website and ychart.com. Temperature and rainfall have been found to have strongly positive ( $r = 0.80$ ) and highly significant relationship, while forest area percentage and CO<sub>2</sub> emissions have been found to have strongly negative ( $r = -0.95$ ) and highly significant relationship. The results of the study have significance in policy making since variations in climate pattern have its consequences on the overall economy and livelihood of people of the country.

Source: <https://www.facebook.com/justuni.bd/photos/dear-allgreetings-and-best-wishes-from-international-conference-on-materials-ene/2435365263382363/>

### Solid Waste Disposal and its Impact on Surrounding Environment of Matuail landfill Site, Dhaka, Bangladesh

Author: Dr. S. Mosaddeq Ahmed et al.

#### Brief Description:

An investigation was conducted to assess the impact of solid waste disposal on surrounding environment of Matuail landfill site of Dhaka city. Three different locations such as current dumping, abandoned and its surrounded agricultural areas of Matuail landfill were selected for soil and plant samples, leachate from active dumping and fish samples from treated leachate pond. The Cu, Zn and Pb concentrations were high in the dumping (360  $\mu\text{g g}^{-1}$  Cu, 806  $\mu\text{g g}^{-1}$  Zn



and 382  $\mu\text{g g}^{-1}$  Pb) and abandoned (199  $\mu\text{g g}^{-1}$  Cu, 452  $\mu\text{g g}^{-1}$  Zn and 519  $\mu\text{g g}^{-1}$  Pb) areas that exceeded the permissible limits. The heavy metal concentrations in plant samples did not show any significant contamination except Cu, Zn and Pb that also exceeded the permissible limits. On the other side, the organic matter and nutrient concentrations such as N, P, K and S of both soil and plant samples are within desirable value in the studied area. The concentrations of DO, BOD, COD and TDS of the untreated leachate were found 1.34 mg L<sup>-1</sup>, 96 mg L<sup>-1</sup>, 1343 mg L<sup>-1</sup> and 7120 mg L<sup>-1</sup>, respectively that exceeded inland surface water standard but after treatment the concentrations of DO, BOD and TDS in the treated leachate pond were found within the permissible limit. The presence of heavy metal in leachate is not contaminated as it is below the toxic limit. The bioaccumulation of fish from treated pond is extremely high of Fe, Mn, Pb and Ni that exceeded the WHO's permissible limit.

Source: <https://doi.org/10.3844/ajessp.2018.234.245>

### In Search of an Eco-space in the Age of Anthropocene: Exploring the Horizon of Ecocinema

Author: SHIBAJI MRIDHA et al.

#### Brief Description:

Contoured by the spirit of ecocriticism, ecocinema has become a unique platform, especially since the last two decades, developing an ecocentric sensibility in the epoch of the Anthropocene. Prominent ecocinema critics such as David Ingram, Scott MacDonald, Paula Willoquet-Maricondi, Adrian Ivakhiv, Pat Brereton, Stephen Rust, and Salma Monani foreground the cognitive and emotive value of ecocinema in furthering both environmental imagination and discourse. To contribute to the promising discourse of ecocinema, this essay intends to propose an idea of eco-space that ecocinema can potentially create in the human psyche, allowing us to perceive the non-human world from an ecocentric perspective. Investigating the contemporary ecocinema theory to situate the concept of eco-space in a broader critical context champions the pluralistic and translational eco-aesthetics of cinema by forming an alternative media-spectatorship. In so doing, it seeks to draw secondary references on four films, taking into consideration the usual censure- anthropomorphism, sentimentalism, kitsch- against ecocinema. In the process, this paper espouses the efficacy of ecocinema in creating an evolving eco-space in our collective sub-conscious, transcending the limitations of our customary anthropocentric vision.

Source: DOI: 10.15655/mw/2021/v12i2/160149

## Analysis of DDT and its metabolites in soil and water samples obtained in the vicinity of a closed-down factory in Bangladesh using various extraction methods

Author: Dr. Farzana Khalil et al.

### Brief Description:

This study was conducted to monitor the spread of dichlorodiphenyltrichloroethane (DDT) and its metabolites (dichlorodiphenyldichloroethylene (DDE), dichlorodiphenyldichloroethane (DDD)) in soil and water to regions surrounding a closed DDT factory in Bangladesh. This fulfillment was accomplished using inter-method and inter-laboratory validation studies. DDTs (DDT and its metabolites) from soil samples were extracted using microwave-assisted extraction (MAE), supercritical fluid extraction (SFE), and solvent extraction (SE). Inter-laboratory calibration was assessed by SE, and all methods were validated by intra- and inter-day accuracy (expressed as recovery %) and precision (expressed as relative standard deviation (RSD)) in the same laboratory, at three fortified concentrations ( $n = 4$ ). DDTs extracted from water samples by liquid-liquid partitioning and all samples were analyzed by gas chromatography (GC)-electron capture detector (ECD) and confirmed by GC/mass spectrometry (GC/MS). Linearities expressed as determination coefficients ( $R^2$ ) were  $\geq 0.995$  for matrix-matched calibrations. The recovery rate was in the range of 72–120 and 83–110 %, with  $<15$  % RSD in soil and water, respectively. The limit of quantification (LOQ) was  $0.0165 \text{ mg kg}^{-1}$  in soil and  $0.132 \text{ } \mu\text{g L}^{-1}$  in water. Greater quantities of DDTs were extracted from soil using the MAE and SE techniques than with the SFE method. Higher amounts of DDTs were discovered in the southern ( $2.2\text{--}936 \times 10^2 \text{ mg kg}^{-1}$ ) or southwestern ( $86.3\text{--}2067 \times 10^2 \text{ mg kg}^{-1}$ ) direction from the factory than in the eastern direction ( $1.0\text{--}48.6 \times 10^2 \text{ mg kg}^{-1}$ ). An exception was the soil sample collected 50 ft (15.24 m) east ( $2904 \times 10^2 \text{ mg kg}^{-1}$ ) of the factory. The spread of DDTs in the water bodies ( $0.59\text{--}3.01 \text{ } \mu\text{g L}^{-1}$ ) was approximately equal in all directions. We concluded that DDTs might have been dumped randomly around the warehouse after the closing of the factory.

Source: <https://link.springer.com/article/10.1007/s10661-015-4965-9>

## Climate Financing Through the Adaptation Fund: What Determines Fund Allocation?

Author: Dr. Md. Nasir Uddin et al.

### Brief Description:

There is an ongoing debate about criteria based on which allocation of climate finance, particularly financing adaptation, is made. This article aims at investigating the determinants of fund allocation and the consequences of rearrangement considering the case of the Adaptation Fund (AF). This research conducts a mixed method approach including binary logistic regression and multiple regressions to analyze the factors that influence access to and volume of funding from the AF, respectively, along with a qualitative assessment of the AF's institutional features. The findings suggest that the level of vulnerability of a country is likely to affect accessibility to

and the volume of funding from the AF. Besides, low-income countries are more likely while least developed countries are less likely to access the fund. Readiness of country is not significant for accessing the AF; however, it affects the volume of funding. Funding allocation rearrangement may put the AF on pressure for effective use of the readiness program.

Source: <https://doi.org/10.117/1070496519877483>

### Pyrolysis oil production using different plastic wastes and subsequent usage in power generation

Author: Dr. Nadia Anam et al.

#### Brief Description:

It is our intention to design a project that will be capable of generating electricity from different plastic wastes. Waste plastics are currently a global environmental issue and has many associated hazards; additionally, it is not possible to reuse all of the produced plastic through the process of recycling. The generation of electricity through melting of plastic would be very beneficial, but this would require high levels of purity and refinement for commercial use. Following the specific gravity test, we will be able to determine the characteristics of the produced fuels and compare their performance in both diesel and petrol engines. It is hoped that using a generator powered by a diesel or petrol engine, it will be possible to generate electricity from this oil in an innovative manner. At the same time, it might be possible that the gas obtained can be utilized to power a gaseous engine by compression, which is capable of generating electricity as well as creating heat.

### Solar Power Driven Automatic Railway Crossing System with Obstacle Detector to Prevent Accidents in Bangladesh.

Author: Susmita Ghosh et al.

#### Brief Description:

In Bangladesh, accidents are happening frequently at the railway crossing due to the use of typical manual railway crossing systems/ boom gates. The main reasons are likely having these accidents in the railway crossings due to not possible to stop the train engine mechanism system automatically or instantly such as cars and other vehicles as well as for fewer safety measures in the railway crossing. Currently, there are very few automatic railway crossing systems (without any obstacle detector, just runs with the schedule of the trains crossing) are available, however, all of them are dependent on the national power grid that has no backup plan for any emergency

cases. As Bangladesh is running a bit behind in the power generation of its consumption, hence it is not possible to have a continuous power supply at all times. This paper aims to design and develop a railway crossing system with a smart obstacle detector to prevent very common types of accidents in the railway crossing points in Bangladesh. In the railway system, time consumption is the biggest issue that leads to having most of the accidents in the railway crossings. In this research, we design to use two infrared (IR) sensors for opening and closing the railway crossing systems/ gates and the whole system to be controlled by the Arduino. To run the process without having any interruption, we propose to use renewable energy i.e., mainly the solar photovoltaic (PV) power systems which are economic friendly and apply under the national green energy policy towards achieving the sustainable goal.

Source: <https://www.izdas.org/physics>

### Hybrid Renewable Energy System Based Water Pumping System.

Author: Susmita Ghosh et al.

#### Brief Description:

Hybrid energy is a type of energy source where two or more renewable energy system is used to produce energy. The name of the project is Hybrid Renewable System Water Pumping System. In this project both wind turbine and solar panel has been used to generate power. The main purpose of this project is generating power through hybrid renewable system and running water pump using that power. This project is made to reduce the use of power from power grid. It is known that power grid produces huge amount of carbon dioxide. They use fossil fuels which is very dangerous for environment because burning of fuels create huge amount of carbon dioxide. Also generation of power through this process takes less time because both wind turbine and solar panel works together to generate power. The goal of this project was to make it both environment friendly and money saver at the same time. Rural areas of Bangladesh still don't get enough power supply. So this system can be used in those places so that people in rural areas can get enough water. This project will produce a good amount of electricity which will be stored in a battery. When the water pump will be turned on the pump will take power from the battery. This project will be used in a huge amount in future. This project can be made more useful in future by making the design more simple and implementation of the project easier.

## Inner Relationship among Rapidity, Velocity and Geometric Approach to the Wigner Rotation

Author: Dr. Md. Tarek Hossain et al.

### Brief Description:

Rapidity is a hyperbolic angle that differentiates two frames of reference in relative motion. We demonstrate how this space can be calculated to get various effects resulting from the successive application of non-collinear Lorentz boosts and the relativistic addition of non-collinear velocities. We are going to observe the relation between rapidity and velocity of a moving particle. It has been explained how rapidity space provides a geometric approach to the Wigner rotation and the Thomas precession. We have also explained that Thomas- Wigner rotation occurs due to boost angle  $\theta$  and velocity.

Source: 10.14445/23500301/IJAP-V5I3P106

## Status of the Wigner Rotation near the Event Horizon of Black Hole

Author: Dr. Md. Tarek Hossain et al.

### Brief Description:

We have explained the different types of black holes on the basis of their mass, magnetic field and spin. We have also derived the line element of the Schwarzschild black hole. We have clarified the line element of Schwarzschild de- sitter black hole, Schwarzschild Anti-de sitter black hole, Kerr black hole, Kerr de sitter black hole, Kerr Anti-de sitter black hole, Reissner-Nordstrom black hole, Reissner-Nordstrom de- sitter black hole and Reissner-Nordstrom Anti-de sitter black hole. Wigner rotation near the event horizon of black hole has been explained.

## Numerical Calculations of Wigner Rotation in Hyperbolic Space and Schwarchild Black Hole

Author: Dr. Md. Tarek Hossain et al.

### Brief Description:

We have introduced the Wigner rotation. We represented special and most general Lorentz transformations. The velocity addition formula for special and most general Lorentz transformations are clearly explained. We have derived the formula of Wigner rotation in two different ways. We have calculated the numerical values of Wigner rotation for different cases. The graph of the Wigner rotation with respect to different velocities has plotted.

## Dye-sensitized solar cell with plasmonic gold nanoparticles modified photoanode Publication

Author: Dr. Mohammad Mahbub Rabbani et al.

### Brief Description:

The depletion of fossil fuel and environmental anxieties has led to a greater interest in renewable forms of energy. To a large extent, the most prevalent form of renewable energy presently is solar energy. The Dye-sensitized solar cell (DSSC) is a promising substitute for all too familiar silicon solar cells. DSSC uses dyes as light-harvesting pigments in the conversion of solar energy to electric energy. This study is about the fabrication of DSSC using a photoanode made up of TiO<sub>2</sub> fused with gold nanoparticles. Gold nanoparticles enhance the performance of DSSC due to the plasmonic effect. The gold nanoparticles were made by the citrate method and characterized using UV–visible spectroscopy and dynamic light scattering. The performance of the solar cells was accessed via photocurrent and photovoltage measurements. The solar-to-electric power efficiency of the solar cells with gold nanoparticles was found to be about 50% higher than those without gold nanoparticles.

Source: <https://www.sciencedirect.com/science/article/abs/pii/S2352507X21000172>