American International University-Bangladesh (AIUB)

SDG Activity Report on

SDG 11:
Sustainable Cities and Communities

SDG Activity Report on

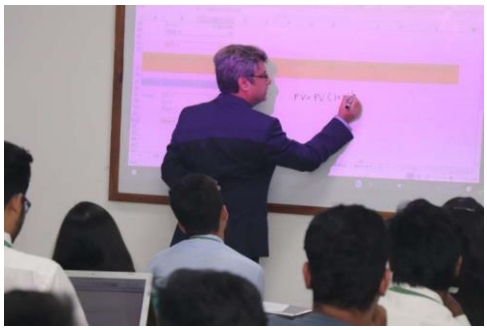
SDG 11: Sustainable Cities and Communities

Contents

University Activities

Innovation Exposition by Department of Architecture

As part of the collaboration between American International University-Bangladesh (AIUB) and Habitat for Humanity Bangladesh under the research project titled "Adaptive Solutions in Climate Resilient Dwelling for Slum Dwellers", an Innovation Exposition was conducted by the Department of Architecture on 23rd July, 2019, with the slum dwellers as participants. The event was conducted by M. Arefeen Ibrahim (Head, Department of Architecture), Ashik Vaskor Mannan (Associate Professor), Saiful Hasan Tariq (Assistant Professor) and the student researchers from Department of Architecture, AIUB. Mr. Mothi Mondol (Senior Project coordinator-Urban, HFHB) and others were present from Habitat for Humanity International-Bangladesh. Mr. Hamidur Rahman (Project manager-Urban DRR, CARITAS Switzerland) was also present as a representative of the donor Organization. The main objective of the event was to exhibit and explain the innovative design ideas among the slum dwellers about the adaptive solutions to improve the light and ventilation condition of their existing households, addressing the impact of climate change. The event was spontaneous and interactive. The student researchers from AIUB explained the design proposals in the first session. The second session was Q&A session, where they answered all the relevant questions from participants, regarding innovations and mechanism of the designed modules. The session was fruitful and successful with the spontaneous participation of guests, conductors, students and spectators. The experts from Habitat for Humanity International- Bangladesh and CARITAS Switzerland gave their in-depth opinion and feedback on the design solutions, and slum dwellers accepted and welcomed the innovations along with relevant suggestions for betterment, which were the key achievement of the session.

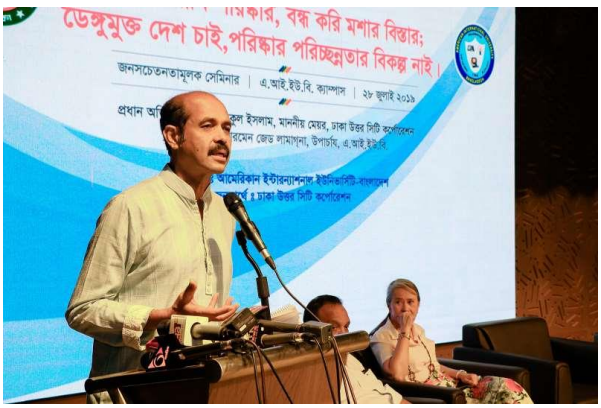


AIUB and DNCC awareness program on the prevention of Dengue and Chikungunya

The American International University-Bangladesh (AIUB) and Dhaka North City Corporation (DNCC) jointly organized a public awareness program to promote the prevention of Dengue and Chikungunya on 28th July 2019 at 11:30 am in the AIUB Auditorium. The Mayor of Dhaka North City Corporation (DNCC), Mr Md. Atiqul Islam was the Chief Guest and the program was chaired by the Vice Chancellor of AIUB, Dr. Carmen Z. Lamagna.

The Honorable Mayor provided valuable insights regarding the measures to be taken to reduce the breeding of aedes mosquitoes, the carrier of Dengue and Chikungunya disease. He urged the students of AIUB, to spread public awareness and to reach out to their community regarding the prevention of breeding and reproduction of the aedes mosquitoes. The Chief Health Officer, DNCC, Brig. General Mominur Rahman Mamun and the local ward commissioner, Dr. Zinnat Ali delivered their views on the topic. University officials, teachers, students, representatives of the local government, and members of the community attended the seminar.

The VC of AIUB presented plaques of appreciation, Dengue preventing awareness communication materials to the Mayor of DNCC and the special guests. The honorable Mayor also presented AIUB with CDs containing informative computer animated videos regarding Dengue and Chikungunya. A vibrant and colorful rally commenced after the seminar, along Kuratoli Road while distributing information leaflets and stickers, with the participation of the students, teachers, the VC along with the honorable Mayor of DNCC.



The Vice Chancellor attended the Asia Cooperation Dialogue-University Network (ACD-UN)

The Vice Chancellor attended the Asia Cooperation Dialogue-University Network (ACD-UN) high level meeting in Hotel Sapporo Garden Palace, Hokkaido, Japan last June 28, 2019. Discussed was how to advance a common agenda among decision-makers at a regional level that will improve educational access and quality, promote global citizenship and foster competitive workforce.

On June 29, 2019 in Rusutsu Villa, Rusutsu, Hokkaido, a meeting was held of the International Association of Universities-HE on Sustainable Development Research Cluster on SDG #11 (Sustainable cities and communities). It was a learning-sharing of good practices session.

'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 chance and its impact on the sum dwellers. The second session was the questionnaire session, where all the participants responded on multiples 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

An Appearance-based Approach to Detect the Wrong-way Movement of Vehicles Using Deep Convolutional Neural Network

Author: Tohedul Islam et al.

Brief Description:

To guarantee the enforcement of traffic rules, the identification of traffic rule violators is an exceptionally alluring yet difficult assignment to implement and the detection of the wrong-way movement of vehicles is one of them. In this paper, an appearance-based approach is proposed which detects the front and back side of the vehicles on a highway with the help of a deep convolutional neural network and decides whether a vehicle is moving along the wrong-way or not based on the user expectation to see the side of a vehicle on each side of the highway using a handcrafted region divider algorithm. The effectiveness of this strategy has been assessed on a primary data-set built on real-time traffic videos captured from several significantly busy highways of Dhaka Metropolitan City and proven quite productive with an accuracy of 96% on successful detection of wrong-way movement of vehicles.

Source: https://doi.org/10.1145/3377049.3377118

Evaluation of TSP for Emergency Routing

Author: A. G. M. Zaman et al.

Brief Description:

The paper considers the symmetric traveling salesman problem and applies it to sixty-four (64) districts of Bangladesh (with geographic coordinates) as a new instance of the problem of finding an optimized route in need of emergency. It approached three different algorithms namely Integer Linear Programming, Nearest-neighbor, and Metric TSP as exact, heuristic, or approximate methods of solving the NP-hard class of problem to model the emergency route planning. These algorithms have been implanted using computer codes, used IBM ILOG CPLEX parallel optimization, visualized using Geographic Information System tools. The performance of these algorithms also has been evaluated in terms of computational complexity, their run-time, and resulted tour distance using exact, approximate, and heuristic methods to find the best fit of route optimization in emergence thus contributing to the field of combinatorial optimization.

Source: https://www.mecs-press.org/ijitcs/ijitcs-v13-n1/IJITCS-V13-N1-3.pdf

Predictions for 'Purbachal': Learning from 'Dhanmondi'

Author: Saiful Hasan Tariq et al.

Brief Description:

Township planning was introduced from early '50s in Dhaka, the capital city of Bangladesh having a current population of 14 million approximately. To meet the demand of growing number of population, Dhaka has witnessed different new township projects from the '60s to '90s. Example of some of these similar developments by government includes Dhanmondi, Banani, Gulshan, Uttara, Baridhara etc. Hence, old Dhaka city is expanding its civic facilities by urbanizing in the vicinity of city. Under this scenario, a new township project, Purbachal New Town, was planned by concerned government organization namely "Rajdhani Unnayaan Kortipokkha" (RAJUK) which was previously called "Dhaka Improvement Trust" (DIT). This new township is much larger than any other previously planned ones in Dhaka city. This paper aims to compare Purbachal New Town with a previous Development, Dhanmondi Residential Area, which was designed by the same Capital Development Authority (RAJUK/DIT) in early '50s. The comparison takes place in terms of road network and land-use. Future possible impact of traffic situation on newly designed master plan in Purbachal is also sought for. Findings from the study show some similarities in master plan of Purbachal with existing Dhanmondi, which may create similar situation of current Dhanmondi in proposed Purbachal New Town too.

Source: https://doi.org/10.53799/ajse.v16i1.27

Introducing Refined Agile Model (RAM) in the context of Bangladesh's Software Development Environment Concentrating on the improvement of Requirement Engineering Process

Author: Md. Anwarul Kabir et al.

Brief Description:

The Software Companies of Bangladesh are using different types of agile models for software development. Although theoretically these models are worthy for small and medium projects, in practical case they are not so effective. In doing so, this paper tries to find out why do the agile models not suitable for Bangladesh's Software Companies and how do the problems that the Software Companies face for using the models can be solved. To reveal the answers, this study is based on survey and interview methods. Findings of this paper show that Bangladesh's Software Companies are facing different problems for implementing traditional agile models, such as, Communicational gap, lack of Documentation, unavailability of Prototype, Customer's lack of knowledge in the area of IT and many more. The study shows that if the Requirement Engineering Process is perfectly managed and some rules are modified in the traditional agile models, these problems can be solved. In doing so, a new model has been proposed by the study named Refined Agile Model (RAM) which is claimed to be better for Bangladesh rather than the traditional Agile

Models. This model proposes a process flow which consists of Prototyping Cycle, Development Iteration Cycle and Additional Development Iteration Cycle. This new model also ensures a Requirement Engineer at Client End, sufficient documentation, preparation of prototype and presentation of frequent Demos. After ensuring these requirements in several real time projects, it was found that those projects were completed more effectively compared to all other old project experiences. Eventually, the paper concludes by mentioning that the Refined Agile Model (RAM) is the best model in the Bangladeshi software environment.

Source: https://aircconline.com/ijsea/V10N4/10419ijsea02.pdf

Automated Parking System using Graph Algorithm

Author: Shahrin Chowdhury et al.

Brief Description:

The system proposed in this paper aims to reduce time complexity while parking vehicles in automated parking systems through the generation of an algorithm and subsequent code using Breadth First Search (BFS). The proposed system utilizes the mechanism of the BFS algorithm which is such that it enables nodes to be traversed breadthwise in graph data structures. This proposed algorithm is supported by mathematical analyses and study of existing automated parking systems. The premise of the study is rooted in the growing global population and, consequently, the tumultuous increase in the number of vehicles worldwide. Despite the surge in number of vehicles, owners are troubled by a myriad of problems owing to most parking systems being manual. With this in view, it is imperative that people have proper parking systems which ensure that they can park their vehicles efficiently while not having to concede the opportunity of receiving proper security facilities. Although in recent years there are many automated parking system concepts that have been proposed, not all such automated parking system concepts are efficient. In order to establish the algorithm, calculations of several aspects of prior existing models were compared. On the basis of the analyses, this paper proposes a system which will help people to find empty parking spaces with the least time complexity along with also proposing actions to take during emergency cases.

Source: https://dl.acm.org/doi/abs/10.1145/3377049.3377097

A review on the Imaging Approaches in Agriculture with Crop and Soil Sensing Methodologies

Author: Nafiz Ahmed Chisty et al.

Brief Description:

Climate change, droughts, and growing food demands due to overpopulation are the rising problems for agriculture. Agricultural methodologies need acclimatization to these growing problems with technological innovations. The infrared and visible imaging approaches are substantial to ascertain crop health, temperature and humidity distributions, salinity, water stress, and visible pattern recognition for the widespread areas of agricultural lands. The paper has put forward a review on the viable image processing methods incorporating computer vision, machine learning, infrared and visible imaging, and complex crop and soil nutrient sensing technologies, which are being used to detect the pivotal elements required for the monitoring systems. The discussed approaches and analyses, if implemented, have the prospects of expanding the field of agriculture with the emerging technologies to be able to adapt to the rising demand for quality food productions.

Source: http://www.researchnetwork.ma/icds2021/

IoT Based Smart Self Power Generating Street Light and Road Safety System Design: A Review

Author: Nafiz Ahmed Chisty et al.

Brief Description:

Technology's extensive use in the twenty-first century has a negative impact on the environment. Researchers are making more progress on renewable technologies to mitigate global warming, while demand for advanced technology is also gaining greater interest for safety purposes. Traditionally, most high-energy consumption street lights have been operated manually. Also, road accidents cannot be easily identified in real-time due to a lack of immediate data to the authorities. Numerous solutions have been taken to solve these problems but none of them ensures an optimum solution. Internet of Things and AI-based integrated control system can be implemented to solve this problem that can monitor street light intensity, identify car accidents with name-plate detection, and identify the face in unusual situations when someone presses an emergency push button. This automated system will ensure protection and power consumption in this way. This paper will illustrate the existing automated system and the suggested system.

Source: https://ieeexplore.ieee.org/document/9550937

IoT Based Smart Street Light For Improved Road Safety

Author: Nafiz Ahmed Chisty et al.

Brief Description:

The new age cannot be imagined without advanced technology. In many aspects of our lives, automated systems have taken over traditional systems. IoT plays a significant role in all

automated devices. Road accidents have become a major concern today. In several occasions, persons have died because of not receiving emergency treatment services following an injury. This paper mentions a cost-effective IoT-based innovative system to track the accident from the authority's control room. The system can detect road accidents and notify the concerned authority by sending the location and car number. Additionally, an emergency push button with face detection has been incorporated to help anyone in distress. The self-powered system can remotely monitor the street light and increase or decrease its light intensity. Deep learning has been used for implementation, and the system can be operated by a mobile application from anywhere at any time, and the data will be updated periodically on the server. It is believed that this project will have a massive impact on society and will bring positive results.

Source: https://smartcom.sched.com/event/inyA/iot-based-smart-street-light-for-improved-road-safety

Design and Implementation of a Vault Security System

Author: Nafiz Ahmed Chisty et al.

Brief Description:

In the era of technology, humankind is now looking for a rapid and prominent solution for day to day problems which can meet the demand and makes life easier. As security is an essential perspective with the end goal to protect our secret belongings, people are looking for an advance, unbreakable and user-friendly solution. However, considering a vault security system, we have to think a step further, as vaults usually used for higher security purposes. Security system using facial recognition, fingerprint scanner, password lock and RFID reader is going popular and common these days because of the availability and trustable security. The main goal is to implement a security system including all of these four sensors in single hardware which is able to provide much stronger security. The system is able to detect multiple human faces and also able to monitor the area continuously using one single camera sensor with the help of real-time video processing using OpenCV method. The system implemented in such a way that anyone who wants to enter the vault has to pass through all of these four (facial recognition, fingerprint, password and RFID scanner) steps. Neither one can be skipped. All the sensors are connected with Raspberry Pi to achieve the goal.

Source: https://ieeexplore.ieee.org/document/8934658

Design and Evaluation of a SWB Decagonal Patch Textile Antenna for WBAN Applications

Author: Farhadur Arifin et al.

Brief Description:

The aim of this paper is to present a Super Wide Band (SWB) antenna design and its performance evaluation. This antenna is made of textile material for body area network applications. The antenna covers from 3.45 GHz to 46.15 GHz which is termed as SWB frequency and is intended for textile applications. A radiating patch is of decagonal shaped along with ground (partial) plane with a semi-circle notch. For wearable applications, the textile materials that are used and the planer shapes provide a smooth integration into clothing while preserving the properties of the textile. It is compact in size with dimensions 32 mm × 32 mm × 1.05 mm and the achieved bandwidth is 42.7 GHz.

Source: https://ieeexplore.ieee.org/document/9230812

Design and implementation of a hand movement controlled robotic vehicle with wireless live streaming feature

Author: Farhadur Arifin et al.

Brief Description:

This paper illustrates the design and implementation of a robotic vehicle that can be controlled from all directions by using the hand movement with a wireless camera that is installed at the top of the vehicle to broadcast wireless live streaming to the user end. Therefore, it removes the hassle of gesture recognition and image processing technique or even the use of switches or joysticks to control the movement of a robot in different directions and provides a wireless surveillance facility to the user. There are mainly three parts of this propose system; the transmitter, the receiver and the live streaming section. The transmitter section detects the movement of the hand in x and y axis by using an accelerometer sensor, processed by Arduino Uno, and transmits those signals to the receiver section by using RF module. The receiver section receives those signals via RF module, decoded by the Arduino Uno, and the motor driver, which is connected to the Arduino Uno and moves the robotic vehicle in all directions according to the decoded signals. Finally, in order to perform live streaming operation - a common network (Wi-Fi), a laptop, Raspberry pi, and two software, namely Virtual Network Computing (VNC) and Foundation Internet Nouvelle Generation (FING) are used to ensure the surveillance feature for the user.

Source: https://ieeexplore.ieee.org/document/8878837

Design and performance analysis of a miniaturized implantable PIFA for wireless body area network applications

Author: Farhadur Arifin et al.

Brief Description:

A novel and miniaturized implantable PIFA (Planar Inverted-F Antenna) operates at the industrial, scientific and medical (ISM) band (2.4-2.4835 GHz) is proposed in this paper for wireless body area network applications. The actual dimension of the proposed implantable antenna is 8 mm × 6 mm × 1 mm (48 mm 3) with a slot-less ground plane which reduces the design complexity. The tiny dimension of the proposed antenna makes it perfectly suitable for wireless body area network (WBAN) applications. Copper is used as the patch material and Rogers RO3210 is used as the substrate material of the proposed antenna. Biocompatible material Rogers RO3035 is also used to encapsulate the antenna to avoid direct contact with the human body. Different performance parameters of the antenna such as operating frequency, S 11 parameter, Voltage Standing Wave Ratio (VSWR), directivity, total efficiency have been analyzed both in planar and bent conditions on the three-layer human tissue model by using CST Microwave Studio. Finally, Specific Absorption Rate (SAR) is evaluated to satisfy the antenna safety concern on the human body.

Source: https://ieeexplore.ieee.org/document/8644216

A smart and cost-effective fire detection system for developing country: An IoT based approach

Author: Dr. Razib Hayat Khan et al.

Brief Description:

Disaster caused by sudden uncertain fire is one of the main reasons for a great loss of properties and

human lives. In our paper, we have developed a smart and cost-effective fire detection system based on the IoT that can detect the sudden uncertain fire in a quick succession to reduce the significant loss. The device houses a sensor-based smoke detection system and a camera which could be accessed by the user from anywhere through the use of internet for taking necessary preventive actions based on the reliable assessment. The notification system takes advantage of an online short message service which is connected to the Raspberry Pi module that gets triggered when the smoke sensors detect the smoke and informs the users about the predicament. The device also has a buzzer connected to central module to notify the nearby users.

Source: https://www.mecs-press.org/ijieeb/ijieeb-v11-n3/IJIEEB-V11-N3-3.pdf

Service Development of Smart Home Automation System: A Formal Method Approach

Author: Dr. Razib Hayat Khan et al.

Brief Description:

We are living in a world where almost every system is getting smart and automated in the industry, in business sectors, and also in homes. In smart home automation system, it involves of controlling various home appliances automatically with the help of exploiting technologies over desktops, laptops, smart phones, or tablets. The home automation system attains great popularity in the last decades and it improves the life of the people by providing the people to feel comfort as well as to feel safe. In this paper, we are developing services for a smart home automation system that will monitor the air quality, water quality, security system, fire system as well as control the temperature, lights, and access control of home. Precise semantics of the service specification is necessary to develop the service accurately. Thus, we use UML activity to provide the service specification and formalize our service specification by the temporal logic cTLA so that verification can be done before implementing this in the real setting.

Source: https://dl.acm.org/doi/10.1145/3372422.3372437

Instant Gas Concentration Measurement Using Ultrasound from Exterior of a Pipe

Author: Dr. Mahjabin Taskin et al.

Brief Description:

Concentration of a gas flowing inside a pipe was measured by using ultrasound from the exterior of a pipe without extracting the gas from the pipe. The concentration of the gas can be measured based on speed variation of the ultrasound traveling inside the pipe. Drilling a hole in the pipe to extract the gases is not necessary for the gas concentration measurement. In this paper, the concentration of hydrogen gas in the air was measured accurately while the air was flowing inside the pipe. Various airflow speeds were examined, and it was estimated that it is possible to measure the gas concentration for more than about 60 m/s of the airflow rate. The response time for measuring gas concentration was less than 0.1 s.

Source: https://ieeexplore.ieee.org/abstract/document/8635548

Observation of ultrasonic signal and measurement of H2 concentration from the exterior of a metal pipe

Author: Dr. Mahjabin Taskin et al.

Brief Description:

Concentration of H2 gas in a stainless steel (SUS) pipe is measured by using ultrasound from the exterior of a pipe without making a hole. Gas concentration is calculated by the variation of ultrasound speed detected. A sound absorbing material is put on the outer surface of the SUS pipe to reduce the ultrasonic signal noise circulating through the shell of the SUS pipe. Then it is possible to measure the gas concentration by observing the airborne signal passing through the SUS pipe. Propagation of ultrasound wave in SUS pipe is also simulated by the finite-difference-time-domain method that could explain the ultrasound propagation signals in the SUS pipe.

Source: https://www.sciencedirect.com/science/article/abs/pii/S0360319919324590

Ultrasound propagation in two-layer gas flow

Author: Dr. Mahjabin Taskin et al.

Brief Description:

The ultrasonic signal propagation in two-layer gas flow was studied. The intensity degradation of the signal was observed while the signal was propagating through the air-hydrogen-air two-layer gas flowing system. The concentration of flowing hydrogen (H2) gas was measured using ultrasound from the exterior of the pipe, and it was calculated that the intensity degradation of signal did not simply depend on the H2 concentration, however, the intensity varied every second. Schlieren photography was taken to visualize the motion of H2 gas after injecting into the flowing air of 2 m/s. It was observed that high concentration H2 gas was flowing in the middle of the airflow without quick diffusion into the air. A two-dimensional air-H2-air gas flow model was considered where 100% H2 was flowing in the middle of the airflow, and the gas layers were separated by two fluctuated interfaces. According to the calculation using this model, only limited conditions of the signals can reach to the receiver due to the refraction at the fluctuating air-H2-air gas interfaces while propagating. It was found that the receiver could hardly detect the signals; hence, the intensity of the signal looked degraded.

Source: https://www.sciencedirect.com/science/article/abs/pii/S0360319919332112

Observation of Ultrasound Propagation in Air-H2-Air Gas Flow

Author: Dr. Mahjabin Taskin et al.

Brief Description:

The ultrasonic signal propagation in air-H2-air two layer gas flows was studied successfully. The intensity degradation of signal was observed while the signal was propagating through the air-H2-air gas flowing system. A 2D air-H2-air gas flow model was considered where 100% H2 was flowing in the middle of the airflow, and the gas layers were separated by two fluctuated interfaces. According to the calculation using this model, only limited conditions of the signals can reach to the receiver due to the refraction at the fluctuating air-H2-air gas interfaces while propagating. It was found that the receiver could hardly detect the signals; hence, the intensity of the signal looked degraded.

Gas Detection in Airflow using Ultrasound from Exterior of the Pipe

Author: Dr. Mahjabin Taskin et al.

Brief Description:

The concentration of a gas, which is flowing inside a pipe, was measured successfully by using ultrasound from the exterior of a pipe without extracting the gas from the pipe. Measurement of gas concentration using ultrasound utilizes difference of sound velocity in various gases travelling inside the pipe. Ultrasound is a unique method where drilling a hole in the pipe to extract the gases is not necessary for the gas concentration measurement. Therefore, there is no risk of explosion for explosive gases such as hydrogen and methane. In this study, concentration of hydrogen gas in a flowing air was measured accurately inside the pipe. By the examination of various airflow speed, it was found that measuring hydrogen gas concentration variation for more than 60 m/s of the airflow rate is possible. The maximum error in the hydrogen concentration at 39 m/s flow was about 0.32% due to the noise from the airflow. The response time of measuring the gas concentration was less than 0.1 s, which is so far the fastest response time among all sensors.

Observation of Hydrogen Gas Replacement in a Pipe Using Ultrasonic

Author: Dr. Mahjabin Taskin et al.

Brief Description:

Replacement of He gas from N2 in a new gas pipeline was observed using ultrasound from exterior of a pipe. Measurement of gas concentration using ultrasound utilizes difference of sound velocity in various gases. At the time of new hydrogen pipeline construction, the air in the pipe is first replaced with N2 and then with H2 to prevent from explosion. In this study, N2 was

replaced with He instead of H2 for safety reason. It is found that the progress of gas replacement depends on the pipe inclination and the outlet. When the outlet direction was facing upward, it was difficult to replace 100%, however, the replacement can be considerably achieved by creating a flow resistance at the outlet. By using this ultrasonic method, the transporting gas concentration in the pipe can be safely monitored from the outside of the pipe without making a hole. The amount of N2 and H2 gas required for replacement can be minimized. This study will be useful for establishment of a safe H2 gas concentration measurement and efficient gas replacement in the gas pipelines.

Ultrasonic Observation of H2 Gas Replacement in a Pipe

Author: Dr. Mahjabin Taskin et al.

Brief Description:

Replacement of H2 (or He) gas from air (or N2) in a new gas pipeline was observed using ultrasound from exterior of a pipe. In this study, experiments of He gas replacement in a straight pipe was conducted under several conditions. It was found that the progress of replacement in the pipe depends on the inclination of the pipe, the flowing resistance, and shapes of the pipes. Furthermore, it was also found that, depending on the exit resistance conditions, air or N2 may remain in the pipe. Measurement of gas concentration using ultrasound utilizes difference of sound velocity in various gases. In practice, air in the new pipe is replaced with N2, and then with H2 in sequence. Using the ultrasonic method, the gas concentration in the pipe can be safely monitored from the exterior of the pipe without making a hole. The required N2 amount before H2 gas replacement can be minimized. In the case of the upward inclining pipe, gas replacement is difficult, but comparison of experimental results with multiple types of outlet attachments revealed an efficient replacement method. This study will help to establish a safe H2 gas concentration measurement and efficient gas replacement for the gas pipelines.

Design Proposal of an Automatic Smart Multi-Insect (Mosquito) Killing System.

Author: Susmita Ghosh et al.

Brief Description:

The aim of this work is to create an automatic and low-cost mosquito killing device which will help to save human life from mosquito bite which is responsible for creating non-invented medicine diseases. This paper illustrates an idea of simple but smart mosquito catching window system. Due to the electrocution between the mesh structures of the device, mosquitoes as well as insects will be instantly killed when they will try to make their way through the window. Compared to available mosquito killing bat in the market, this system will hold up very low voltage that is enough to kill mosquito and concurrently not harmful for human being. This

process uses microcontroller, ATmega328p that receives data from the adapter and helps to measure the input current and voltage which is displayed in an LCD Display (16*2) by using a logic algorithm code. It also consists of a power supply unit which is mainly used to charge the battery. The controls are made by a mini switch and have one LED power indicator.

Source: https://ieeexplore.ieee.org/abstract/document/8869472

Design Proposal of a Renewable Energy Based Farming System.

Author: Susmita Ghosh et al.

Brief Description:

This project will be both cost efficient and environmentally friendly at the same time. This design system will be fully powered by solar energy. By using solar energy, it will help the course of farming in developing countries and secure economic benefits for the farmers. Due to the energy crisis, most of the rural areas in developing countries don't get sufficient electricity to power this type of automated and modernized farming system. In developing countries like Bangladesh, farmers are affected by the labor cost and energy consumption cost. Moreover, it can be said that the proposed farming system will automate away the daily tasks done by the farmers which will bring the cost down of agriculture products. A renewable energy-based farming system allows the farmers from both urban and rural areas to benefit and encourage the society to use the sustainable energy source in their day to day life.

Smart Waste Management System for Bangladesh

Author: Md. Saniat Rahman Zishan et al.

Brief Description:

Waste management is one of the biggest concerns in our day to day livings and environment. The traditional method of our waste management carries lacking in some particular areas such as garbage overflows causing environmental pollution and unhygienic living conditions. Besides the amount of time and manpower requires in this field is extensive. This research proposes an advanced method in which waste management is more likely to be automated and saves time as well as cost. By using this advance method, a Smart Bin has been designed and implemented. Microcontroller is used to form the heart of this system interfacing with sensors to detect waste levels and a GSM for data transmitting and receiving purposes. This proposed system would have an automated waste level detection process and also a smart monitoring and overall management process. The technologies that have been used in this system is good enough to prevent the garbage overflow and ensures the partial and perfect waste management and monitoring system maintaining the green environment.

Source: https://ieeexplore.ieee.org/abstract/document/9331159

Design and Development of Uncapped Manhole Detection System for Waterlogged Roads

Author: Md. Saniat Rahman Zishan et al.

Brief Description:

Hazard monitoring system has been an attractive subject for researchers in recent years. Advances in electronics and decreases in the cost of sensors and electrical components have made smart hazard monitoring system into reality. There is no device or precaution notice in the streets of Dhaka city to detect an uncapped manhole under water. Hence, severe accidents happen in the rainy season when streets get flooded and these manholes become death wells. So, the target of our proposed system was to protect people from falling into these accidents. Most of the papers published on manhole detection have only been done by image processing under normal conditions with a camera or satellite images. To our knowledge, this is the first published work for manhole detection in a waterlogged road using RF technology. It provides a smart system which is able to monitor uncapped manhole and easily notify the user as well as nearby municipal corporation. If it finds any unusual condition it shows the message on an OLED display and a buzzer makes noise to notify the user. There is no doubt that, this device can greatly enhance the safety of the people. It is also one of the cheapest and user-friendly solution among all the systems that we have reviewed before.

Source: https://ieeexplore.ieee.org/abstract/document/9331141

YOLO-Based Enhancement of Public Safety on Roads and Transportation in Bangladesh

Author: Md. Saniat Rahman Zishan et al.

Brief Description:

In order to upgrade the efficiency level of multiple tracking like face, actions, characters, a deep learning method is introduced to reduce the accidents occurred in roads for carelessness and also to capture the criminals in Bangladesh. This paper presents a faster processing multiple detection method with the best possible outcome under the framework of YOLOv2 algorithm in the event of car accident, crossing foot over bridge and using the zebra crossing in Bangladesh. Different layers are added to the YOLOv2 algorithm to pass the information in various convolutional layers to detect multiple objects with actions. In this paper YOLOv2 algorithm under DarkFlow framework is used to achieve higher ratio of confidence value as the max

convolutional layers reorganize the feature map so that other layers feature map can be matched with the bottom layers to achieve the expected output of the indicated events. By removing the noise from the unrelated area, the detection of the training video and test video adopt quite parallel confidence ratio.

Source: https://www.researchgate.net/publication/344460680_YOLO-Based_Enhancement_of_Public_Safety_on_Roads_and_Transportation_in_Bangladesh

An Automatic Traffic Rules Violation Detection and Number Plate Recognition System for Bangladesh

Author: Md. Saniat Rahman Zishan et al.

Brief Description:

The traffic controlling system in Bangladesh has not been updated enough with respect to fast improving technology. As a result, traffic rules violation detection and identification of the vehicle has become more difficult as the number of vehicles is increasing day by day. Moreover, controlling traffic is still manual. To solve this problem, the traffic controlling system can be digitalized by a system that consists of two major parts which are traffic rules violation detection and number plate recognition. In this research, these processes are done automatically which is based on machine learning, deep learning, and computer vision technology. Before starting this process, an object on the road is identified through the YOLOv3 algorithm. By using the OpenCV algorithm, traffic rules violation is detected and the vehicle that violated these rules is identified. To recognize the number plate of the vehicle, image acquisition, edge detection, segmentation of characters is done sequentially by using Convolution Neural Network (CNN) in MATLAB background. Among the traffic rules, the following traffic signal is implemented in this research.

Source: https://ajse.aiub.edu/index.php/ajse/article/view/97

Unmanned Aerial Vehicle for Cleaning the High Rise Buildings

Author: Md. Saniat Rahman Zishan et al.

Brief Description:

This paper represents a design of an ardupilot mega (APM) based remote-controlled unmanned aerial vehicle system for cleaning the high rise buildings windows. The design is developed with the remote-controlled system, which allows the workers to give security and maintenance of a surrounding area. The project used a Quad copter that contain with a frame, 4 motors, 4 electronic speed controllers, 1 APM development board, and sensor boards. Batteries, a transmitter, a receiver, and a GPS module were interfaced with the Quad copter's frame.

Individual components were tested and verified to work properly. The aim of this project was to build and program a Quad copter that can be used for cleaning the high rise buildings windows. After water is sprayed from the drone, microfiber brush washes the windows. This system is applicable for almost every window size and window form. A secondary goal of this project is to use this platform for future innovative projects that could include stabilization, image processing, and artificial intelligence. Moreover, the developer of UAV for cleaning the high rise buildings glass is relatively simple and cheaper in comparison to other existing techniques.

Source: https://ieeexplore.ieee.org/abstract/document/8644476

Design of a cost-effective customized Electronic Health Record system to handle patient management during Covid-19 pandemic

Author: Dr Mohammad Hasan Imam et al.

Brief Description:

Healthcare is one of the basic needs for human beings. Unfortunately, a densely populated country like Bangladesh has always struggled to provide adequate healthcare to all of its people, especially to the rural population. To handle with huge amount of data and coordination between the doctors and patients, electronic health record system (EHR) has become a necessity. During this Covid-19 pandemic, face to face consultation between frontline workers like doctors, and nurse and patients has become difficult. As a result, many patients are having difficulty in getting treatment from doctors. In Bangladesh's perspective at this moment, a cost effective, energy efficient and portable device system is needed to build up a customized Electronic health record system. The proposed system can reduce medical errors about patient identification and treatment, increase effectiveness and timeliness of doctors and overall improve the health care of people of the rural area. Therefore, an easy to use, affordable, user-friendly E customized EHR system design is proposed in this paper by utilizing recent wireless communication techniques that will give the rural people better health service.

Source:
https://scholar.google.com/citations?view_op=view_citation&hl=en&user=N2DHysAAAAAJ&sortby=pubdate&citation_for_view=N2DHysAAAAAJ:9ZlFYXVOiuMC

Dilemma of Dwelling in Dhaka

Author: M. Arefeen Ibrahim et al.

Brief Description:

Dhaka tops chart being the most densely populated megacity in the world. We have a staggering population density of 45,700/square kilometer, with a total population of 16.8 million; whereas the closest contender is Mogadishu, Somalia with a density of 26,800 per square kilometer

[Demographia: World Urban Areas, 2017]. For comparison, this rate is 26,000/sqkm for Mumbai and 25,700/sqkm for Hong Kong. Providing urban essentials like mobility for this huge number of ever increasing population of Dhaka is a daunting task if not impossible. As a result 8 million working hours are lost daily due to traffic congestion in Dhaka alone and the yearly loss due to traffic congestion is approximately USD 3 billion (Osman, 2011). For a city which produces more than one third of the nation's GDP [Dhaka Structure Plan (Draft) 2016-2035], an efficient mobility mechanism for the inhabitants would mean huge reduction to this wastage and more addition to the national economic growth. On the other side of the coin, certain features of Dhaka are very optimistic indeed. Dhaka has a high rate of pedestrian traffic (20%) which is extremely positive in terms of urban design. The population is adequate to support mass transit systems. Natural water channels around the city periphery make it only logical to utilize it as alternative means of communication through waterway. Existing rail line runs through the city- which can be utilized efficiently as for commuting. Change in policy and change in physical infrastructure both are required to reduce these hurdles of commuting in Dhaka. Proper implementation of both policy and physical features too needs to be ensured.

Source:
https://www.researchgate.net/publication/353210120_DILEMMA_OF_DWELLING_IN_DHAKA

Communities in a Growing Megacity: A Pathway to Urban Sustainability for Uttara, Dhaka

Author: M. Arefeen Ibrahim et al.

Brief Description:

Dhaka is witnessing a process of urban expansion at sheer scale and speed. With the growing influx of population, the geographical boundary of Dhaka is also expanding. Satellite towns are planned at the fringe and outskirt of the city to meet the housing demand of increased population. Realizing that-in absence of efficient commuter facility this vision of decentralization of the city may be futile-a strategic transport plan (STP 2005) has been prepared recently proposing metro & bus rapid transit and construction of new link roads, circular roads and flyovers for connecting the satellite towns with the rest of Dhaka. If these towns are not (re)designed or (re)qualified to be transit oriented, the benefits of proposed transit system at community level cannot be ensured. The research finds neighbourhood TOD (transit oriented development) can be a planning approach to create more liveable neighbourhoods in suburbs of Dhaka city by reducing private car dependency while providing alternative public transport choices, safe and comfortable pedestrian pathways for fast and convenient access to transit stops and community facilities. Following that vision, this study attempts to rethink Uttara Model Township-a satellite town located at the northern end of Dhaka, with a goal to present a community vision that best utilizes the opportunity created by the proposed transit specifically,

MRT, BRT, elevated express way and Western Bypass while creating new local transportation options, pedestrian-friendly environments and recreational opportunities.

Source:
https://www.researchgate.net/publication/352437803_Communities_in_a_Growing_Megacity_A_Pathway_to_Urban_Sustainability_for_Uttara_Dhaka

Mobile Phone Enabled SCM: The Bangladeshi RMG Sector

Author: Dr. Md Taimur Ahad et al.

Brief Description:

Relatively little is known about mobile phone use in a Supply Chain Management (SCM) context, especially in the Bangladeshi Ready-Made Garment (RMG) industry. RMG is a very important industry for the Bangladeshi economy, but is criticized for long product supply times due to poor SCM. RMG requires obtaining real-time information and enhanced dynamic control, through utilizing information sharing and connecting stakeholders in garment manufacture. However, a lack of IT support in the Bangladeshi RMG sector, the high price of computers and the low level of adoption of computer based internet are obstacles to providing sophisticated computer aided SCM. Alternatively, explosive adoption of mobile phones and continuous improvement of this technology is an opportunity to provide mobile based SCM for the RMG sector. This research presents a mobile phone based SCM framework for the Bangladeshi RMG sector. The proposed framework shows that mobile phone based SCM can positively impact communication, information exchange, information retrieval and flow, coordination and management, which represent the main processes of effective SCM. However, to capitalize on these benefits, it is also important to discover the critical success factors and barriers to mobile SCM systems.

Source: https://ibima.org/accepted-paper/mobile-phone-enabled-scm-bangladeshi-rmg-sector/

IoT (Internet of Things) -Based Smart Garbage Management System: A Proposal for major Cities of Bangladesh

Author: Abhijit Bhowmik et al.

Brief Description:

IoT –internet of things has become a buzzword nowadays. There are many IoT based researches but researches on garbage management system based on IoT are not sufficient. Insufficient and inefficient garbage management system causes severe environmental problem. It also makes the air toxic. This problem has become a common problem in the world especially in Bangladesh. Dhaka city, the capital of Bangladesh lacks well organized and efficient garbage management system. Maximum roads of Dhaka city are surrounded by garbage. The bad smell of garbage

affects people's mental health, inhaling toxic causes many diseases. Lack of dustbins, throwing of garbage here and there, misuse of dustbins are making city life very unhealthy and also causes a threat to environment. The dustbins are being stolen or damaged which is also a great problem. In this paper, we proposed about an efficient garbage management system based on IoT. This research works aims to provide a minimal solution to this problem using the IoT technology. We propose for a smart garbage system, which consists of sensors, RFID, IR sensors, admin and user website, Wi-Fi module etc. These smart bins will monitor the level of garbage when it will reach 75% of its capacity, it will give notification to the admin website, so the authority concerned can collect the garbage from the bins timely and there will be no overflow of garbage as the authority will get notified earlier. There will be a feature in user website that will let the user know about the nearest smart garbage bins current condition, so if there is any condition that the garbage bin of their place is full they can use the nearest bin. This research work also aims to have secured smart garbage bins, as there is chance the bins to be stolen and damaged so in this research we talk about security of the sensors and the bins will have cement body. So this research is for implementing an efficient garbage management system which will reduce expense on this sector, misuse of bins. Making a clean country, pollution free environment with an efficient and well organized garbage management system can bring a new era. It is expected that the proposed garbage management system will reduce financial cost in this sector as well as reduce problems related to waste management.

Source: https://doi.org/10.53799/ajse.v19i1.55

The Fundamentals of Brick Manufacturing

Author: Md. Faruque Hossain et al.

Brief Description:

Over the recent years, the brick industry of the state has been facing competition from several other building materials. These include cement and cement blocks. In most developing countries, brick makers make only a unique type and color of brick, leaving the user very little choice. As a result, substitute products enter the market which have the same function but are cheaper, more regular and pleasing in look. These substitutes satisfy the consumers more than bricks do. Although in general, the output of bricks is quite elastic, in the sense that increased construction activities are closely followed by an increase in brick production, the brick industry does have certain challenges posed by competition from substitutes. It is evident from the fore going discussion that bricks face stiff competition from alternative building materials. Therefore, in order to remain competitive, the clay brick industry will have to contain cost, increase module size, reduce mortar usage and improve ease of layering in order to retain and increase market share in the building and construction industry. Bricks in general are preferred, even if they are of low quality, because of their inherent and perceived characteristics of strength and moisture resistance. The industry will therefore have to emphasize if positive characteristics and options

in order to compete with the alternative building materials which have a similar function. The brick industry, being ancillary to the construction industry, is intimately connected with the growth of the latter. Any attempts for market assessment should therefore focus on estimation of demand, supply and price position in the construction industry. There is little doubt that in the foreseeable future there will be an increasing demand for housing, particularly in cities and urban areas. To provide shelter for all, all construction sectors, including traditional sectors should be involved in providing affordable housing for the urban as well as the rural poor people. If these poorer sections of the population are to be assisted to build durable as well as affordable housing, the focus of attention will have to be placed on the provision of suitable and affordable building materials. Unfortunately it appears that in developing countries, the major thrust in the building materials industry has been placed on the more modern building materials. However, in most countries there is a need for cheap and good quality local building materials such as bricks, wood, bamboo etc. These are the materials most people of these countries can afford. If locally produced materials using local resources are utilized, which are often renewable, the cost will be low and income will be generated at the local level. Therefore, the development of the local building materials industry must receive close attention and utmost care. The objective of the local building materials industries should be not only to make available the materials traditionally used by the low income sections of the community but also to modify production processes and construction techniques to enable construction of houses which are structurally more durable and functionally more adequate. However, this books deals with brick manufacturing and its history details to provide updated information to the readers. Therefore, throughout the book, different authors present very interesting works related to the brick manufacturing in home and abroad. There is no doubt buyers will benefit by getting an excellent piece of this book.

Source:
https://www.researchgate.net/publication/342144204_The_Fundamentals_of_Brick_Manufacturing_Nova_Science_Publishers_NY_USA