



Cluster
Innovation
Centre
University of Delhi

musé

Projects at a glance

VOLUME 1





Tell me and I'll forget;
Show me and I may remember;
Involve me and I'll understand.



Preface

“Breakthrough innovation occurs when we bring down boundaries and encourage disciplines to learn from each other.”

- Gyan Nagpal

Cluster Innovation Centre (CIC) houses innovative programmes launched by University of Delhi. These programmes enhance creative potential of students, have innovative curriculum, are more project oriented and tailored to the need of society and industry. They enable the students to relate themselves to the real world problems in all spheres and look for innovative solution for the problems.

As a part of their curriculum students are encouraged to get practical exposure through hands-on training and experience to be applied and implemented in society at large through various projects. These projects connect research with application for the benefit of society, support application oriented research to solve real world problems and focus on developing affordable innovations that can benefit a large number of people and at the same time commercially viable and sustainable. The projects also sensitizes the youth to different challenges faced by the nation and encourages them to participate effectively in the welfare of society, in addition to educating them about responsible citizenship. The projects taken up by the students act as a connect between the academia and the industry. They not only help the students to understand the industry requirements at large, but also help them to chisel their skills and prepare themselves for the entrepreneurs' world in a larger gamut.

The first volume of the Muse is a collection of represented projects that the students have carried out at Cluster Innovation Centre. The projects, mentored by faculty at CIC and also by external experts, have been classified under eight broad categories.

Innovation in Bits – Algorithm development, Modeling and Simulation, Systems and Analytics, Networks, Web Development, Graphics, Multimedia, Nanotechnology

Innovations in Atoms – Product development, Designs, Additive Manufacturing, Embedded Systems

Innovation in Economics and Management – Policy Decision, e-Commerce, Strategic IT Alignment, Econometrics, Logistics, Supply Chains

Innovation in Education Sector – Pedagogical Practices, Content Development, Facilitative Resource Material

Digital Humanities - Cultural Connection, Humanities Web of Data, Semantic Web, Narrative Development, Public Engagement, Text Encoding, Images

Social Engineering – Rural Development, Environmental Issues, Gender Sensitization, Needs and Challenges of Differently Abled, Preserving Indian Traditions

Unraveling History – Rich historical culture of Delhi

Delhi University Innovation Projects – Projects funded by Delhi University Innovation Scheme

We hope that this brochure will give an insight to the readers to the various applications and real world problems that the students are engaged in.

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#Innovation in Bits

Attendance management system for CIC

Student's Name/s

Puneet Kumar, Chandrani Kumari

Mentor's Name/s and Affiliation

Ms. Twisha (Cluster Innovation Centre, University of Delhi)

Abstract

At present CIC maintains attendance manually. It creates problems like: involvement of huge amount of paperwork, manual control, difficulty in report generating, time consuming. To avoid all these problems an Attendance Management Software called "ATTENSYS" was developed. This software aims to provide easy access to teachers to maintain the proper records of attendance for each and every student. This will reduce manual work and the time required for maintenance of the attendance records. It facilitates students to access their attendance related information of a particular paper. This system will also help the teachers in evaluating attendance eligibility criteria of a student and will also generate the report automatically at the end of the session or in between at the end of month.

Outcomes

ATTENSYS will automate and computerized the tradition way of taking attendance. It will be:

- User Friendly
- No paper work
- Reports are easily generated
- Computer operated control
- Backup and security
- Lesser chance of errors in calculating % and short attendance of student.

Future Prospects

Alpha version of the software was almost developed. Will have to implement it on server so that the bugs from our user ends (Teacher, Student, and Admin) will be improved and taken care soon.

Sentire – CIC Canteen Management System

Student's Name/s

Anurag, Mayank Jain, Vasundhara

Mentor's Name/s and Affiliation

Ir. Abhijeet Parmar (Cluster Innovation Centre)

Abstract

The CIC canteen is voluntarily run by a group of students and two employees who manually manage inventory and sale purchase of the canteen. During peak hours, the canteen counter gets crowded because the requirements of the customers prove to be too much to attend within time. The canteen also suffers from the problems of wastage of eatables due to irregular attendance of students.

To ameliorate these problems, a smart Canteen Management System is designed, that not only manages the inventory of the canteen but also handles the cash inflow and outflow. The Canteen Management System enables cash pay through DMRC smart card ID, thus reducing pressure from the canteen counter. Thereby, it manages and maintains record of every transaction of the canteen.

Outcomes

The system is still under alpha-testing procedure but is expected to make more profit for canteen just by regularizing the cash inflow. Furthermore, as it is designed considering the operability of user, and compatibility with existing DMRC smart cards, its acceptability is expected.

Future Prospects

Compatibility with internet – allowing customers to pre-place their orders. Also, customers can be provided with required information and other details via e-mail and SMS services.

After certain data collection and its run for several months, data can be analyzed to develop smart algorithms for Inventory Management and customer incentives generation.

#Innovation in Bits

Query by Humming

Student's Name/s

Avnish Kumar, Ananya Goel

Mentor's Name/s and Affiliation

Mr. Amit Kumar Singh (Cluster Innovation Centre)

Abstract

Audio and its utilities have been increasing day by day in today's time. Digital signal processing has been one of the most sought after tools to manipulate and modify audio signals as per requirement in various sectors. The project here deals with growing demand of audio songs applications which provide the user with real time delivery of songs they are humming. In a market where innovation takes place day by day in the sector, it is a significant step to reach to such an interactive module in the entertainment market.

The medium is analogous to the voice recognition systems that have been developed to take user input. The concerned project is such an implementation for the music audios.

Outcomes

Improved algorithms to inculcate a more exhaustive and diversified songs. The algorithm applied significantly decreases the computation time for audio manipulation and sea

Future Prospects

The application can be tested on a user base and improved to make it marketable as a web based or local platform.

Building our own computer: A noise removal system based on FPGAs

Student's Name/s

Divyanshu Srivastava, Shivek Khurana

Mentor's Name/s and Affiliation

Mr Amit Kumar Singh (Assistant Professor - Cluster Innovation Centre)

Mr Abdul Wahid Ansari (Assistant Professor - Cluster Innovation Centre)

Abstract

Field Programmable Gate Arrays (FPGA) is an Integrated Circuit with the ability to be programmed after manufacturing, using a hardware description language. It is due to its features, and the constantly growing popularity which led us to choose it as a starting point of our project. This paper revolves around Xilinx's Spartan 6 FPGA embedded on Numato Labs' Mimas development board, with VHDL as the preferred hardware description language. This paper serves as a starting point for a student in her course of trying a hand on experience on FPGA and VHDL. It includes various topics, like the basics of FPGA, the Spartan 6 general specifications, the Mimas board, and development environment and the testing environment. It also includes some successful implementations of basic programs.

Outcomes

Understanding and knowledge of FPGA, a working prototype of a noise removal system.

Future Prospects

This project could be extended to other forms of signal processing. Super slow motion cameras (200+ FPS) using normal cameras is an exciting prospect.

#Innovation in Bits

Image Encryption using Latin Squares and RGB Shuffling

Student's Name/s

Akshay Khunteta

Mentor's Name/s and Affiliation

Dr. S. K. Pal (D.R.D.O.)

Abstract

With a large number of digital images and media devices all over the world, the importance of image security has been noticed and emphasized in recent years. In this paper, a new technique for visual data encryption for color (RGB) images is introduced. In the proposed image encryption scheme, a key with 10 secret parameters out of which 6 are 64 bit, 2 are real numbers between 0 and 1, and the remaining 2 are real numbers between 3.56995 and 3.82843 is used. The use of multi-layer encryption tends to remove redundancy across all the visual planes and make this technique highly secure.

Outcomes

A new, efficient algorithm for image encryption was developed. Results of several experimental and statistical analysis tests show that the proposed image encryption scheme provides an efficient and secure way for secure communication & storage of visual data.

Future Prospects

This project can be extended to encryption of videos, which is one area of encryption which is the least explored. Efficiency of the algorithm can also be increased.

Automatic Speaker Recognition

Student's Name/s

Kaustubh Joshi, Mayank Malhotra, Harsh Tanwar

Mentor's Name/s and Affiliation

Mr. Amit Kumar (Cluster Innovation Centre)

Abstract

The aim of this project was to create an automatic speaker recognition system using the concept of Mel Frequency Cepstral Coefficients (MFCC). Moreover, the speaker recognition system will be text independent i.e. it will not be based on a certain speech by a speaker, but will create a training model database of the speakers' voice samples and will do matching in real time. The project also aims to include the concepts of Euclidean distances, K-Means Clustering, GMM probabilistic model so as to train the data and achieve higher accuracy in results.

Outcomes

Implementation of the complete project in MATLAB with 100% accuracy for a database of 50 people.

Future Prospects

Using ASR systems for attendance systems, in place of existing biometric which use fingerprint recognition.

#Innovation in Bits

Online Booking System

Student's Name/s

Mayank Malhotra, Natasha Sharma

Mentor's Name/s and Affiliation

Mrs. Suman Satija (PHD Chamber of Commerce)

Abstract

The main problem in PHD Chambers' current booking system is that users are unaware about how to book the conference halls and moreover, all of the conference booking work is manual.

In order to overcome the aforementioned problems, it was suggested to make software that would automate all the booking activities and thus provide a smoother and quicker workflow that is also accurate and gives no scope of any errors.

1. Notebooks and registers should be replaced by computerized databases.
2. All the forms and information flyers should be digitized and made available to public.
3. There would be two web portals- one for the customers who want to book a hall at the PHD Chamber and the other for the admin to view and manage these bookings.

Outcomes

A fully functional and friendly to use online booking system was developed for both the consumer end and the admin end.

Future Prospects

This web app could be deployed easily to various other companies' booking systems. Also a mobile version of this app can be created for easier access.

Evolutionary Multi-Objective Resource Optimization on a Multi-Threaded GPU Computing Platform

Student's Name/s

Nitin Agrawal, Shikhar Sharma

Mentor's Name/s and Affiliation

Mr. Manoj Agarwal (Department of Computer Science, University of Delhi)

Abstract

The study deals with understanding of Heterogeneous Parallel Programming concepts and implementation of Evolutionary Multi-objective optimization algorithms (EMOA) on many-thread GPUs for higher efficiency and computation throughput. The project involved designing and development of parallel code compliant with Nvidia Cuda environment for two prominent EMO algorithms namely Pareto-Archive Evolutionary Strategy (PAES) and Non-Dominated Sorting Genetic Algorithm (NSGA II). The code designing was generic in nature and was tested on two dual objective problems namely Facility Location Problem for a coffee distribution network and the Multi-robot Coalition Formation problem.

Outcomes

Designed & Developed GPU accelerated parallel algorithms for multi-objective optimization. Significant speed ups achieved over the serial counterparts

Future Prospects

Future work would essentially involve designing of a fault tolerant, fully distributed version of the algorithm.

GPU Accelerated Parallel Global Optimization using Basic Splines

Student's Name/s

Nitin Agrawal

Mentor's Name/s and Affiliation

Prof P.S.V. Nataraj (CUDA Centre of Excellence, IIT Bombay)

Abstract

The work aims at investigating use of Basic spline polynomial form in global polynomial optimization in an accelerated manner. The current work involves accelerated computation of B-spline coefficients corresponding to a polynomial in power form on a CPU environment. Furthermore the algorithm and methodology is accelerated on Graphics Processing unit for handling larger problem in substantially less time. The parallelized GPU based approach offers substantial speed-ups over the CPU implementation being run on a Dodeca-core processor.

Outcomes

Developed GPU accelerated novel parallel algorithm for B-spline coefficient Computation. Speed ups of 10-15x portrayed by the parallel variants in comparison to the serial variant.

Future Prospects

Future work involves conducting comparative experiments for benchmark problems in order to estimate the speedup on the GPU based implementation over C based serial CPU implementation. The algorithm thus designed needs to be incorporated into the optimization algorithm adopted for the purpose of global optimization

Fast & Dynamic Image Restoration using Laplace equation Based Image In-painting

Student's Name/s

Nitin Agrawal, Prashant Sinha, Avnish Kumar

Mentor's Name/s and Affiliation

Dr Shobha Bagai (Cluster Innovation Centre)

Abstract

Images tend to degenerate over time and are exposed to noises. These noises don't only affect the visual outlook but also hampers the allied significance to these images. Image in-painting is a phenomenon of de-noising the images that involves approximating the de-noised form of the image. The current study aims at developing an in-painting system for restoration of lost art, reconstruction of destroyed images and removal of unnecessary objects. The motivation for the same has been driven from Partial differential equation based anisotropic diffusion model or image in-painting. The steady state heat equation or the Laplace equation has been used to model and approximate the de-noised data for noised region of the image. The Laplace equation has been used clubbed with the Dirichlet boundary conditions in order to fill in the degenerated or the noised region which has portrayed significant speedups and presents a practicable in-painting strategy.

Outcomes

Achieved speed ups of over 150-200 times over the previously proposed strategies with similar qualitative results.

Future Prospects

The strategy proposed could be designed into a marketable product.

#Innovation in Bits

A graph based ranking strategy for automated text summarization

Student's Name/s

Nitin Agrawal, Shikhar Sharma, Prashant Sinha

Mentor's Name/s and Affiliation

Dr Shobha Bagai (Cluster Innovation Centre)

Abstract

This work presents an extraction based automatic text summarization algorithm. The methodology proposed involves constructing of a directed weighted graph out of the original text wherein each sentences is taken to be a node. The weights for each of the edges are determined by using a suitable distortion measure which analyses the semantic relation between the two adjacent nodes / sentences. A ranking algorithm is used to compute the most important sentences in the text and that should be present in the summary based on the weighted graph. This technique has been employed on multiple data sets and has performed well on the evaluation parameters laid down for such applications.

Outcomes

The strategy proposed coherent balanced summary in qualitative terms.

Future Prospects

The strategy proposed could be designed into a marketable product.

Real-time Speech Recognition Based Video Captioning

Student's Name/s

Prashant Sinha

Mentor's Name/s and Affiliation

Mr. Amit Kumar (Cluster Innovation Centre)

Abstract

The current process of captioning a video is very time intensive and requires a lot of manual intervention. The audio stream is manually heard and subtitles are painstakingly timecoded based on their start and stop times. This project aims to minimize the time consumed to subtitle a video and to remove any manual intervention. The program shall do the subtitling in real time which in effect will mean that the person watching the video will not have to wait for subtitle formation. The subtitles will be overlaid on the video while it is playing. Also, integrating a language translator will enable the person to view subtitles in any language without actually compromising on caption translation time. This can be further used for video based searching, which would mean searching using the contents of the video rather than the name, which would result in better search results.

Outcomes

A real time captioning system was implemented in java. The system can recognize voices and display subtitles with a high level of accuracy and with virtually no lag.

Future Prospects

Using ASR systems for attendance systems, in place of existing biometric which use fingerprint recognition.

#Innovation in Bits

Motion Tagging and Motion Control using sensors of a smartphone

Student's Name/s

Prashant Sinha, Shivek Khurana, Divyanshu Srivastava

Abstract

Motion control is a state of the art computer control technology deployed in many consumer products like Nintendo Wii™. In this project, we have created an app that converts a smartphone into a motion sensor, something similar to Nintendo Wii and an API that plugs in this functionality into existing applications (presentation viewers, games, media players etc.) and allows developers to further develop on this protocol. Native applications are controlled by mimicking the phone as a wireless sensor that communicates with controlled host via Bluetooth. Motion is first statistically analysed against a set of templates in a local database. Once a match above a certain confidence level is found, the corresponding mouse key or keyboard key click is emulated. The computer being controlled hosts a python application that connects to the client over Bluetooth. The client runs an android application which transmits sensor data to the host and hence the host is controlled.

Outcomes

A system capable of mapping gestures with an accuracy of ~85% was developed. The motion gestures were used to control functions on the laptop.

Future Prospects

The final stage of this project will be a working product, a motion control based presentation viewer software. The software will have a database of gestures which will be used to control a presentation on the projector screen.

Heart Rate based Biometric Scanner

Student's Name/s

Prashant Sinha

Mentor's Name/s and Affiliation

Ir. Abhijeet Parmar (Cluster Innovation Centre)

Mr. Amit Kumar Singh (Cluster Innovation Centre)

Abstract

Most of the biometric systems in use like Face Recognition, Iris recognition and Fingerprint recognition can easily be tampered with as they are based on external features. They are not reliable for high security systems. The project aims to make a totally secure biometric system that is based on internal inherent genetic makeup of the person. To achieve this, the heart rate signal is used for the pattern recognition for accurate determination of the identity of the person. A biometric system based on ECG signals is a viable alternative to the unsecure systems prevalent today. If implemented in security systems, it will be extremely reliable as an ECG signal cannot be faked.

Outcomes

The system works with an accuracy of 97.25 % which is better as compared to other matching techniques like neural network based pattern matching which gives only 89.6 % accuracy at best. The results over a few runs show promising results.

Future Prospects

Future work will be to investigate the on-line test to demonstrate the practicability of our verification system. Also, the work can be done to take into account Arrhythmia patients. Moreover, the ECG hardware recorder should be designed to be convenient for low cost, easy application ambulatory measurement as security tool in daily life.

#Innovation in Bits

Alert-Us

Student's Name/s

Rohan Bharadwaj, Himanshu Saini

Mentor's Name/s and Affiliation

Mr. Alok Nikhil Jha(Cluster Innovation Centre)

Abstract

Alert-Us is an android app that is an emergency app which sends the person's information to other people whose location are closer to him when the concerned person is in danger. It is a dynamic SOS system and different from apps emergency apps. It would track your location if you want assistance or any emergency. It provides an assurance that the people around you virtually & they can assist you if you need anything in an exigency situations. It is a reliable source to track the information of your well-wishers if you are unable to contact them.

Outcomes

This is a smart safety utility app. The app detects the changes in daily routine and initiates itself and sends your location to your dear ones. The app also displays a list of handy contacts. It displays a button which you can press to make a loud output siren noise to attract attention & help from your neighbor environment

Future Prospects

Implementing Machine Learning Algorithm and establishing server which would store the user location on server and try to figure out a pattern from user's daily movements in his/her geographical area. Using regression algorithm to make the data more specific to some mathematical function. Using speech recognition to look for specific voice input from user

A minimax approach to Wythoff's game

Student's Name/s

Deeksha Tandon, Md. Zurez Tuba, Shreya Khurana, Shubham Goel

Mentor's Name/s and Affiliation

Dr. Shobha Bagai (Cluster Innovation Centre)

Abstract

Wythoff's game is a variation of the NIM game, in which there are a number of piles of counters (stones, sticks etc.) and they are to be removed one by one such that none are left at the end of the game. The player can either pick any number of stones from one pile, or the same number of stones from both. The player who picks up the last stone is declared the winner. To solve this game, we used the minimax algorithm.

The game was designed in MATLAB in two ways.

Intelligent Wythoff game: The single-player game has been designed for human vs computer.

Two-player: In this mode, two players can play against each other. But at each point in the game they will be given an option to use the computer's help in order to win.

Outcomes

The game was designed in the two formats: Single player and Two-player. One used the properties of Wythoff pairs which generate safe pairs which are the positions from where the opponent is sure to win. The other used the minimax approach which creates a grid in which safe pairs are calculated. The games were created in MATLAB.

Future Prospects

The game is not available for users to play since it's been made on paid software. The next step is to make an applet and make it available to everyone by creating a similar game in Python/Java.

#Innovation in Bits

To Where it May Belong: A Geostatistical Approach to Geographic Knowledge Discovery

Student's Name/s

Madhulika Mukherjee

Mentor's Name/s and Affiliation

Ir. Abhijeet Parmar (Cluster Innovation Centre)

Abstract

This research is concentrated on classification of text into the country of their origin using geostatistical features. Text classification has long been practiced for various summarization applications, all of which mainly make use sentiments and topic extraction of a document. The novelty in this research lies in the feature representation of text documents, which is done using a geostatistical technique - variograms. With variograms determining the spatial correlation of words in the documents, the research has successfully classified texts from 7 countries across the globe.

Outcomes

Using this method, we were successfully able to classify raw text into 7 countries of origin, up to about 90% accuracy.

Future Prospects

We can now break down the features to capture higher level constructs of the English language. This will increase our resolution (hopefully up to state level) of classification.

Recommendation System using Psychometrics

Student's Name/s

Madhulika Mukherjee, Shreya

Mentor's Name/s and Affiliation

Ir. Abhijeet Parmar (Cluster Innovation Centre)

Abstract

Recommendations are most apt when they are a result of understanding the end user's personality. Hence, building a recommendation system essentially entails building an engine that understands personality. Guided by the onus taken up by Alex Pentland at MIT Media Lab, we used a novel method of taking cellphone usage data to predict personality using factor analysis. Further, we go on to define something we call eigenpersonality, which is a result of recursive tensor networks that map the user's eigenbehaviour (as coined by Pentland) to his Big 5 Personality Traits.

Outcomes

With this research, recommendations are stronger with more level of confidence. Though this is yet to be tested, related literature proves that since no method like this has been used before, recommendations made now will see a significantly steep decline in the time take to optimize a person's utility matrix.

Future Prospects

The recommender system has various business prospects, apart from being a pristine piece of research in itself. We would want to see how it performs in not just recommending surveys (as this project was taken up to power the survey recommendation for Survaider's web app), but various other things too, like books and music, or anything else that has business making potential.

#Innovation in Bits

TB-MOTIF and TB-PROMOTER: Identification of Mycobacterial Motif and Promoter

Student's Name/s

Chandrani, Pavitra

Mentor's Name/s and Affiliation

Dr. Asani Bhaduri (Cluster Innovation Centre)

Abstract

These two software programs identify mycobacterial protein motifs and promoter sequences.

Outcomes

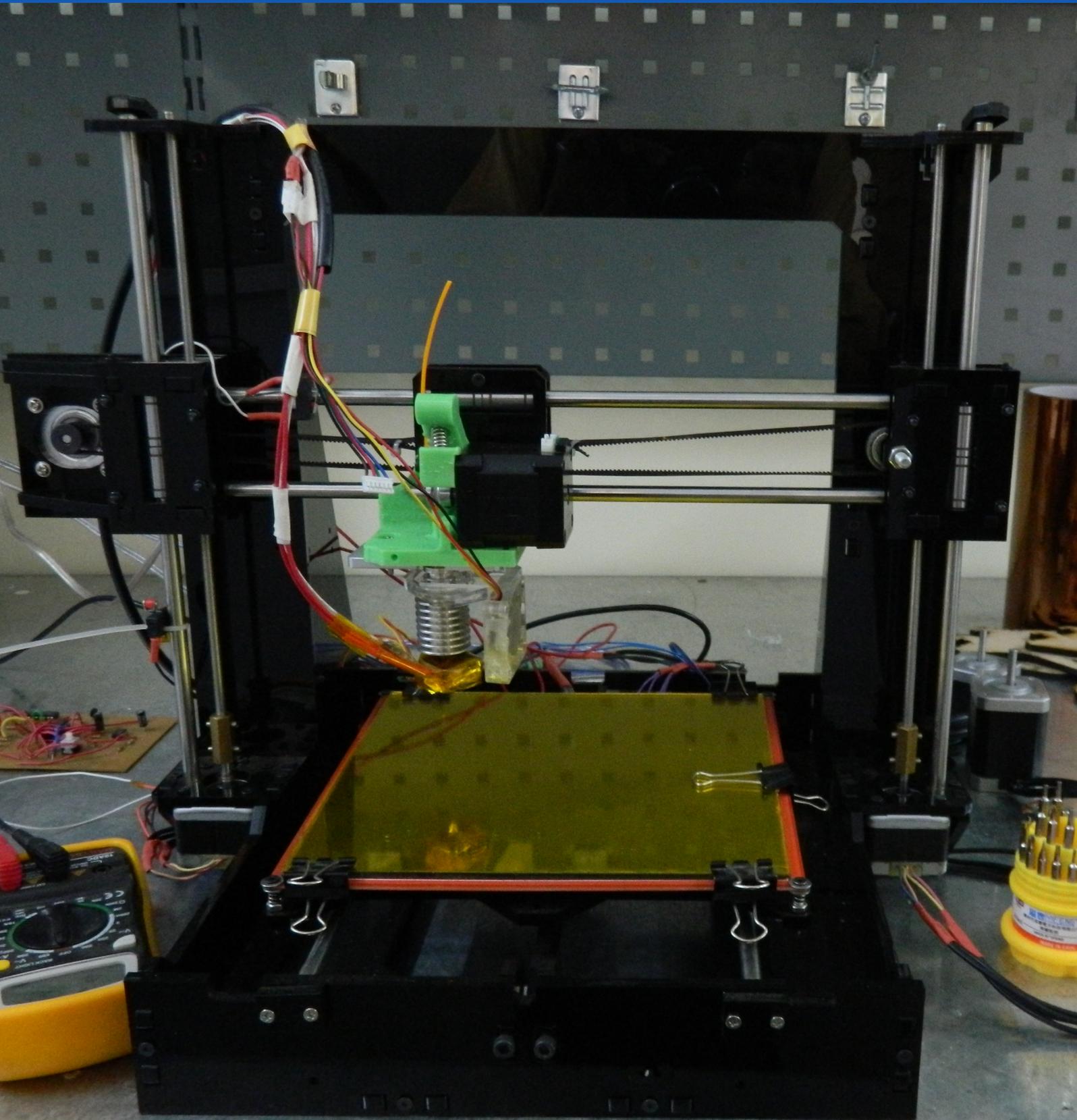
Mycobacterium tuberculosis, the causal organism of TB has unique nucleotide and protein sequences which are not found in other organisms. These two programs identify the unique signatures from any given nucleotide or amino acid sequences.

We have successfully detected all protein signal sequences of the Type Seven Secretion System (T7SS) of mycobacteria using the TB-MOTIF software.

Future Prospects

TB-MOTIF and TB-PROMOTER are under review for copyright protection and the web-pages will be uploaded after approval.

As part of curriculum, this project was for bioinformatics and in silico biology subject.



Innovation in Bits in progress.

#Innovation in Atoms

Intellinose: An automated smell monitor for public conveniences & garbage dumps

Student's Name/s

Nitin Agrawal, Shikhar Sharma, Prashant Sinha

Mentor's Name/s and Affiliation

Mr. Abdul W. Ansari (Cluster Innovation Centre)

Abstract

With increasing population and modernization in industrial sector, there is an increasing amount of waste accumulation in various domains. Wastes are found in public areas, discharged into rivers and also get accumulated as a result of defecation in open. The waste accumulated is hazardous for health as well as the environment. The current study aimed at developing a product employing electronic modules in conjunction with sensors that can be effectively used in various domains for prevention of waste accumulation, maintaining proper cleanliness and ensuring proper decomposition.

Outcomes

The project evolved a device that could be installed at garbage dumps and public conveniences for monitoring foul smell levels and employing complaint cum evidence dispatch mechanism on a civil request using a mobile based application.

Future Prospects

The product could be marketed / used in connivance with the municipal agencies.

Analysis and Preparation of Dihedral Group

Student's Name/s

Faizan Qadir, Mohd Junaid, Mahfooj Khan

Mentor's Name/s and Affiliation

Dr. Jyoti Sharma (Cluster Innovation Centre)

Abstract

This project is an analysis of Dihedral group by modeling the mirror using characterization theorem. The main purpose of the project is to find the linkage between Abstract Algebra symmetry and real world; the positive and negative aspects of the change in shape of any object. In which we used characterization theorem as a tool to generate a group which is isomorphic to corresponding dihedral group. Characterization theorem state that any group generates by pair of element of order two is dihedral. So if we use two pair of mirrors then the images produced due to the pair of mirrors is dihedral. In other words the group produced due to this is isomorphic to a corresponding dihedral group. And these are isomorphic image of dihedral group.

Outcomes

This project is an analysis and creating Dihedral group by modeling the mirror using characterization theorem. The main outcome of the project is to find the linkage between Abstract Algebra symmetry and real world; the positive and negative aspects of the change in shape of any object.

#Innovation in Atoms

Math Renaissance - The Revival of Mathematical Board Games and Toys

Student's Name/s

Era Kaila and Atul Anand

Mentor's Name/s and Affiliation

Dr. Jyoti Sharma (Cluster Innovation Centre)

Abstract

The current scenario of Mathematics Education in India is not too pleasing. There is an alarming decline of interest in Mathematical skills in age groups 6-14 years. This project is an attempt to make development in the current scenario. It is important to have a mechanism where learning is embedded in the lives of students such that they automatically absorb the concepts. This in a small way can be encouraged by board games which can help in making Mathematics learning a useful, fruitful and joyful endeavor. The true value and impact of board games designed for learning are unrecognized by most people. By a comprehensive research on Board Games, we have tried to develop resources for the Mathematics classrooms. These are our self-innovated and designed board games that facilitate rapid learning and retention and promote analytical and decision making skills.

Outcomes

We were successful in creating five board games for different topics of Mathematics.

Board games were created for Integer Understanding, Operations on Integers, Number System, Co-ordinate Geometry and Projectile Motion.

We were successful in venturing into a new prospect of alternate pedagogy through our self-designed board games and activities.

Future Prospects

Educational Board games along with other resources such as hands-on activities and tools will be a good source for rapid and concrete learning for students. These resources can be compiled as a kit which can be used as aids for students and teachers for better teaching-learning process. Various resources can also act as good tools for formative assessment of the students. All these things together can be used to construct a whole new methodology for teaching Mathematics which can act as better and much more practical way to teach Mathematics. This methodology can be a better way to achieve the higher aim of Mathematics education as stated in NCF 2005.

Math Land: A Mathematical Board Game

Student's Name/s

Arushi Kapoor, Gunjan Khurana and Priyanka Gupta

Mentor's Name/s and Affiliation

Dr. Jyoti Sharma (Cluster Innovation Centre)

Abstract

Mathematics has been a scary subject for most of the students around the world and it is being carried out as a very dull, theoretical and monotonous subject for students in school. So the project aims to excite the students to facilitate mathematical concepts through fun and leisure activities and thus removing the fear from the minds of the students through a mathematical game - Math Land. Math Land is a collection of 4 sub-games- symmetrical maze, haunted primes, capture the decimal and fraction froggy. The game is meant for the students of upper primary level. Mathematical concepts like operation on fractions, symmetry and rotation, operation on integers etc. can be strengthened through this game. Hence this project is an attempt to make a game which can be used to facilitate and incorporate many mathematical concepts on a single board for children.

Outcomes

The game comprises of 4 major sub games and dealing with 9-10 mathematical concepts at length. It can be used as a pedagogical and an assessment tool in a recreational manner. It serves as an important aid for interactive mathematical classrooms and labs as suggested by continuous and comprehensive evaluation (CCE).

Future Prospects

The game can be improvised using latest technologies in near future. In schools such real models of mathematical land can be prepared where a large area can actually be converted into a mathematical land and is served as a useful tool for schools. Textbooks of students can also be supported by such game kits where students learn and practice mathematical concepts in a friendly manner.

#Innovation in Atoms

Assessing Mathematical Ability through Cricket

Student's Name/s

Ashwani Yadav

Mentor's Name/s and Affiliation

Ms. Mable Josy (Cluster Innovation Centre)

Abstract

The study was conducted on a sample of two groups, one who liked cricket and the other who did not, however, all had studied mathematics till metric level. A questionnaire was used to probe the knowledge of cricket and mathematics. After this a self-constructed achievement test, which had some situation (containing mathematical concepts) of cricket was administered. In it, first a situation was defined and then some questions were asked on that situation. Then a Cricket Board Game which was developed by researcher was used to measure their engagement and whether they were able to identify concepts. Almost all liked the game, even the ones who had earlier stated that they hated cricket, found the game to be thoroughly engaging!

There are ample mathematical terms used in any game such as measurement of field, for instance, length of Cricket pitch is 22 yards, inner field circle is 30 yards; representation of scores by numbers; mathematical operations are used to find the characteristics of any player or team like run rate, strike rate, average, data are represented in statistical and graphical form.

Outcomes

People who have interest in Cricket are good in statistics. If mathematics would be taught by connecting it with Cricket, then the concepts of learners would become clearer. People use application of mathematical concepts even without having formal knowledge of the mathematical terms. If mathematics is taught through game, young learners can get more engaged in concept building.

Future Prospects

These types of studies could be done according to the popularity of a game in any particular geographical area and based on that research, educational games could be developed.

Basic Mathematical Kit for Children with Autism

Student's Name/s

Himanshi Vashishth and Sangeeta

Mentor's Name/s and Affiliation

Dr. Jyoti Sharma (Cluster Innovation Centre)

Dr. Pankaj Tyagi (Cluster Innovation Centre)

Abstract

Since, Mathematics is taught in highly abstract way, children with autism found it nearly impossible to do Mathematics. The present research focused on developing mathematical skills among children with autism. The research focused on understanding learning needs of children with autism by observing them in real time learning situations. During observation, the primary focus was on what they could learn and how they could learn instead of knowing what they could not learn. After identifying the learning needs, it was decided to develop 'Mathematical Kit' which included hand-on activities on fundamental mathematical concepts. The design and presentation of kit was also given due consideration as children with autism enjoy working with colourful motifs.

Outcomes

Most common challenges for children with autism in learning situation are: Lack of concentration, cannot work in groups, cannot conceptualize higher concepts and cannot abstract concepts easily, poor communication skills and poor social interaction

List of identified Mathematical Challenges for children with autism: Difficulty in conceptualizing higher order concept, difficulty in doing two digit or more digits arithmetical operations, difficulty in doing reversibility as an operation and difficulty in differentiating among geometrical shapes.

Most preferred learning styles are: Hands-on through touch and feel and resources that are colorful and visually attractive.

Future Prospects

Researchers have made this kit on only some of the basic concepts of Mathematics, the higher concepts still need to be explored and made easier for the children with autism. More abstract mathematical concepts need to be made simpler for them. This kit could be helpful for children without autism also. Teacher can teach shape, congruency, and similarity kind of mathematical concept through some of the material of this kit to children without autism.

#Innovation in Atoms

Mathematical Manipulatives for Visually Impaired Learners

Student's Name/s

Abhishek Kumar, Naim Akram, Rashid Malik, Garima Singhal

Mentor's Name/s and Affiliation

Dr. Jyoti Sharma (Cluster Innovation Centre)

Abstract

This project underscores the importance of doing qualitative research in the context of Mathematics education with a special group of respondents, the students with visual impairment.

We have prepared a mathematical kit for visually impaired learners which will help them in enhancing their mathematical skills of certain concepts. These models include the model for even and odd numbers, multiple of 2, 3, 5 and 7 which will help them in the understanding of number system. Other models are for the practical understanding of "how to plot points on a Cartesian plane". This model will help in eliminating the "abstractness" of Cartesian plane concept for the visually impaired learners. A special designed Snake and Ladder game is also a part of this project which is the main highlight of this project. This game is for the enhancement of logical reasoning of visually impaired learners.

It is true that the concepts of Geometry do not come readily to a blind person, because of its spatial content. Our main aim is to teach Mathematics (geometry) through hands-on activity as sighted student can do. This project seeks to find in what ways this can be done by developing innovative adaptive materials for visually impaired students.

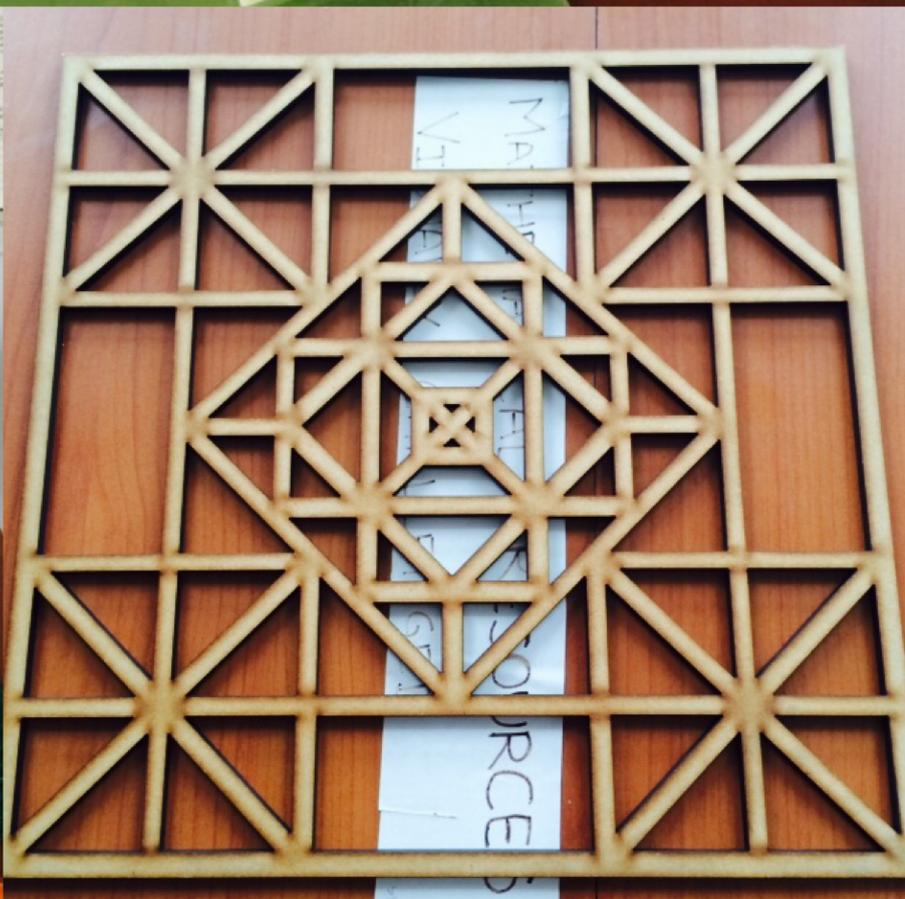
Outcomes

Through this project, we came up with a mathematical kit which includes models of certain concepts like even-odd numbers, multiple of 2, 3, 5 and 7, plotting of points on Cartesian plane, snake-ladder game and abacus. These models bring a change in the understanding of mathematical concepts to the visually impaired learners. Special designed compass, ruler and protractor for these learners help them in constructing geometrical figures more accurately.

Future Prospects

This project will bring a hope to visually impaired students for the better understanding of Mathematics. Government can invest and incorporate more models in the curriculum of visually impaired learners so that the other areas of Mathematics also become easy to them. Areas like trigonometry, fraction, and algebra also demands attention for these learners.

Mathematics Engineering Kitchen



#Innovation in Economics and Management

Value Chain Evaluation and Recommendation

Student's Name/s

Aditi Chawla, Akshee Jain, Parul Madaan

Mentor's Name/s and Affiliation

Ms. Pavneet Kaur (Khanna Paper Mills Limited)

Abstract

Project involved 'Value chain Evaluation and Recommendation' for Khanna Paper Mills Limited, India's leading 100 per cent recycle paper based manufacturing firm producing around 3, 30,000 MT of board and writing and printing paper per annum. Under the course of this project, learning about the global scenario of demand and supply of the paper and pulp industry, a SWOT analysis has been done for Chinese and Indian Paper Industry respectively. Then, learning about KPML's operations, its SWOT analysis has been prepared to better understand company's position in the Indian paper market. Further, team facilitated Vertical Integration of the company's supply chain with a special focus on Raw material sourcing tie up with an NGO 'Excelsior India' with an estimated sales turnover of 50 Lakh by the next quarter and conducted Market Research via Primary Survey for its Stationery Division and provided recommendations about the target segment and marketing mix to help company in penetrating the Indian Stationery market.

Outcomes

1. Documentation of overall view of the global paper industry
2. Partnership with NGOs like Excelsior India, Times Group and schools like GD Goenka
3. Analysis of the current customer behavior and formulation of strategies to enter the stationery market
4. Development of communication toolkit for promoting the KPML "GREEN" concept to the leading brand owners like P&G, Nestle, Philip Morris etc.

Future Prospects

The consumer survey analysis was based on 174 consumer restricted majorly to students in Delhi. The scope can be expanded to other states of India to get a better view of customer behavior and state-wise customization of products.

All Women Bank: A Feasibility Analysis

Student's Name/s

Adhiraj Singh Rawat, Mayank Arora, Parul Madan, Shreya Juneja

Mentor's Name/s and Affiliation

Prof. Charan Singh (Indian Institute of Management, Bangalore)

Abstract

The Bhartiya Mahila Bank (All Women Bank) was announced in the Union Budget of India for 2013–14 by Finance Minister, P. Chidambaram on 28th February 2013. The project aims at checking the feasibility of such a bank in an economy like India. A critical analysis of the proposal has been done using four major parameters: international experience of women banks, performance of women in the financial sector in India, performance of banks in India and objective of the All Women Bank. A debate/discussion was organized which laid out the pros and cons pertaining to the idea. A questionnaire was prepared and a survey was conducted to check the acceptance and requirement of women for such an all women institution. The sample of this survey was women from diverse economic and cultural backgrounds to provide a more generic empirical analysis.

Outcomes

1. There is a thin line between the proposed All Women Bank and commercial banks with all women branches sets back the proposed bank to answer what sets it apart from existing banks.
2. Using dedicated capital to set up a large number of all women branches for a nationalised bank like S.B.I or providing women specific schemes through Post Office Banks which have a wide network across the country could be good alternatives.
3. A small yet significant part of the society wishes to have a women bank (Survey results), insists it might not be a bad idea after all.

Future Prospects

1. Research on challenges faced by women customers, particularly women entrepreneurs in dealing at regular banks. The All Women Bank should try and overcome these challenges, in order to prove its true worth.
2. Discussion on the immediate objectives of the All Women Bank along with possible long term goals.
3. Compilation of products/perks that the All Women Bank should offer to its women customers, in order to remain true to its initialization aim, along with strategic placement of its branches.

Optimal Pricing Strategy in a Dual-channel Setting with Single-level Supply Chain

Student's Name/s

Shreya Khurana, Sarthak Veggalam

Mentor's Name/s and Affiliation

Dr. Abhijit Banerji (Delhi School of Economics)

Abstract

The retail business is widely and quickly going online. E-Commerce is gradually becoming more and more attractive for firms. How do the firms decide what pricing strategy is optimal? How do the retailers differentiate between the two channels? How do the firms decide whether it is worth to switch from an offline to an online distribution channel?

We analyzed the optimal pricing strategy of online and offline retailers in four different settings consisting of a manufacturer and an offline firm, an integrated firm of a manufacturer and a retailer (monopoly case), a manufacturer and two retailers--one offline and one online and the third case consisting of an integrated firm and an online retailer using the Hotelling model to model the consumer demand.

We compared the profits, demands and prices determined in order to determine the most profitable setting.

Outcomes

Although research has been done on such market settings, we have incorporated new ones to enrich our model. Contrary to popular perception; numerical analysis showed that vertical integration of a bricks and mortar retailer with a manufacturer doesn't lead to higher profits. Entry for an e-tailer in such a case is also not feasible.

Future Prospects

The model at this stage is an analytical model. We aim to extend this to an empirical model in order to validate our theoretical model.

We have taken some unrealistic assumptions like that of perfect information. We would like to rectify these shortcomings in our future model.

Probability and statistics' application on the working of casinos and principles of gambling

Student's Name/s

Mayank Arora, Madhulika Mukherjee, Akshat Bhattacharjee

Mentor's Name/s and Affiliation

Dr Shashi Aggarwal (Cluster Innovation Centre)

Abstract

The CIC canteen is voluntarily run by a group of students and two employees who manually manage inventory and sale purchase of the canteen. During peak hours, the canteen counter gets crowded because the requirements of the customers prove to be too much to attend within time. The canteen also suffers from the problems of wastage of eatables due to irregular attendance of students.

To ameliorate these problems, a smart Canteen Management System is designed, that not only manages the inventory of the canteen but also handles the cash inflow and outflow. The Canteen Management System enables cash pay through DMRC smart card ID, thus reducing pressure from the canteen counter. Thereby, it manages and maintains record of every transaction of the canteen.

Outcomes

1. Simulated different games played in a casino on Matlab.
2. Estimated the profit of a casino consisting of these games, tried to understand a gamblers' behavior using the results obtained from an online survey conducted by us.
3. Found out the best strategy out of given strategies for betting money.

We held an online 'Lucky 7' contest in class, and gave prize money to the winner. This helped us see that the player that uses the strategies that our research found as profitable, indeed wins.

We were able to understand the probabilistic computations that go behind the working of a casino.

Interaction of Fiscal and Monetary Policies of India

Student's Name/s

Deeksha Tandon, Mayank Arora

Mentor's Name/s and Affiliation

Ms. Parul Gulati (Cluster Innovation Centre)

Abstract

Each country's economy is governed by two major institutions – central bank and government that help it stabilize, absorb shocks and eventually grow.

This project deals with the study of various tools used by the central bank and the government and how in turn, these tools impact the GDP.

For the project, two factors – one from each policy segment – have been chosen. While there may seem to be no apparent short-term relation between the two variables, it was left to be determined whether they impacted the GDP together in the long run.

VAR and VECM techniques were used to correlate the tools and determine a long a term relationship between the three factors. It was learnt that their was significant impact of the tools as well as lags of past three years on the current GDP of the country.

Outcomes

A relation depicting impact of Taxes (w.r.t GDP) and Cash Reserve Ratio on our GDP was obtained.

This can be utilized for rough GDP forecasting.

Future Prospects

Can be extended to include more variables. Also, a more accurate model can be obtained in the coming year, assuming no major external shocks to the economy.

Economics of Entrepreneurship

Student's Name/s

Himanshu Grover, Shreya Juneja

Mentor's Name/s and Affiliation

Ms. Parul Gulati (Cluster Innovation Centre)

Abstract

The project aims at determining factors affecting entrepreneurial success by means of extensive literature review. In order to finalize the key determinants, the team made use of popular leadership theories. Post finalizing the determinants, a questionnaire was framed, such that each question was linked with a particular factor. The project suggests an evaluation scheme, based on the responses filled by the entrepreneur, such that higher score could indicate higher indication towards likely success.

The second half of the project looks at entrepreneurship macroeconomic point of view, which required the incorporation of econometric models. The team has used the Total Entrepreneurial Activity (TEA) index, provided by the Global Entrepreneurship Monitor (GEM) body to visualize the relationship between growth in economy and TEA, by graphical means. Finally, inspired by the Keynesian macroeconomic aggregate demand model, the team has suggested a preliminary model, linking entrepreneurial independent variables to the dependent, GDP.

Outcomes

There are five factors which determine the success of an entrepreneur on the micro level, namely, personal traits, innovation, environmental analysis, sociological impact and financial analysis. These factors were incorporated in a questionnaire. The responses were evaluated, such that entrepreneur tending towards greater success gets a higher score.

Future Prospects

Now, with the help of larger organizations, such as the Finance Ministry, or even the Global Entrepreneurship Monitor body, requisite data could be collected, to finalize the model. This model could be used for directing financial policies and governmental decisions, for the benefit of entrepreneurs and/or the economy as a whole.

Water Crisis at Kusumpur Pahari: Looking for Resolutions

Student's Name/s

Adarsh, Arun, Praveen, Shamrez, Subhash

Mentor's Name/s and Affiliation

Dr. Saleem Mir

Dr. Ashis Kumar Saha

Abstract

Kusumpur Pahari, the abode to the largest slum in South Delhi, is facing harsh water crisis because of the geology of the area and the policy of the government. This study attempts to bring out the ground reality of this crisis and provide possible resolutions to tackle the problem. It is opined that the changes in the water management policy in the area will help a great deal to address the problem. A sustainable model for waste water management was brought out to solve the problem in the long run.

Outcomes

Model of water supply was presented before Delhi Jal Board to provide equity in the distribution of water while at the same time negotiating the need for proper use of water. The students worked towards redesigning the distribution patterns of water. Henceforth, facilitating health and hygiene of the residents and smooth allocation of a precious resource.

Future Prospects

In future prospects other issues of common concerns in day to day life at Kusumpur Pahari can be looked into and worked upon.

Healthcare and Sanitation at Azadpur Mandi

Student's Name/s

Abhinav Sharma, Akshay Akash, Pragy Pandey, Ashish Suman, Nandlal Sumit, Santosh Kumar

Mentor's Name/s and Affiliation

Dr. Vikas Kumar Verma (Cluster Innovation Centre)

Abstract

Chaudhary Hira Singh Wholesale Fruit And Vegetable Market, Azadpur is the market of national importance as it has assumed the character of a National Distribution Center for important fruits like Apple, Banana, Orange, Mango etc. and vegetables like Potato, Onion, Garlic, Ginger etc. The Limica Book of world record also declared the Azadpur Market as the biggest distributing Centre of Fruit & Vegetables in the world.

For such a huge area where a large number of people interact and gather, it becomes important to know the sanitary condition of this area. Here people come from all walks of life to earn their livelihood; instead they go back with the lethal diseases which cause their premature death. The geographical location of Azadpur Mandi is also matter of great concern. It is situated in the north-eastern middle part of the of Delhi. If this important area comes under any sort of epidemic, a large section will be affected.

Outcomes

Project went through extensive research about the Azadpur Mandi which resulted in a deep understanding of the working mechanism of governing bodies responsible for the conditions of Azadpur. A comparative study with different Markets in and out of India and their different styles of operating. A report was submitted with recommendations for better regulations at Azadpur mandi.

#Innovation in Education Sector

Scripting Mathematical Stories and its Pedagogical Feasibility

Student's Name/s

Uzma Masood

Mentor's Name/s and Affiliation

Dr. Jyoti Sharma (Cluster Innovation Centre)

Abstract

This study aims to investigate the impact of using stories in primary school Mathematics teaching. An intervention was designed to see the effectiveness of using storytelling strategy in teaching Mathematics and its pedagogical feasibility in classrooms. Integral to the intervention was a series of three stories especially written by the researcher based around the fictional characters and with a problem-solving storyline. The stories include a range of mathematical facts, skills and concepts applicable to young learners. Additional resource materials to accompany the stories were also designed.

Outcomes

In this study, investigation were introduced through stories and explored through an inquiry problem solving approach balancing between development of conceptual and procedural knowledge. Beside this, activities within each stories promoted reasoning, making connections and designing and analysing representations. The study reflects a child-centered pedagogical approach. It allows students to make sense of the Mathematics they are learning, and at the same time it offers support for the teacher to observe and reflect on this learning so instruction can be adjusted to student's needs.

Future Prospects

The implications from the study highlight the importance of using stories can play in ensuring high quality Mathematics teaching and learning. Based on these findings, this study recommends the use of storytelling by teachers; and by education policy makers, especially those involved in curriculum development and teacher training programs to take this issue into account. It is recommended that further research on employing storytelling in secondary level.

Exploring Mathematics through Rangoli

Student's Name/s

Amrita, Anchal, Shefali Gupta

Mentor's Name/s and Affiliation

Dr. Jyoti Sharma (Cluster Innovation Centre)

Abstract

The purpose of this project is to integrate Rangoli with Mathematics and to show how effectively one can teach as well as learn Mathematics with Rangoli and also, to develop some effective and useful teaching learning material for classroom to make children feel more comfortable and active with Mathematics. The mathematical Rangoli designs include some important mathematical concepts which children find difficult in learning and some activities based on those designs which will be helpful for teacher as well as children. These activities were implemented in classroom setting with 6th grade children and found positive result where children participated actively and enjoyed these activities.

Outcomes

We tried our project with 60 students of 6th class and the result was very much as per the objective since the students enjoyed this colorful and fascinating method of learning Mathematics. They also wanted Mathematics to be a lively and active discipline which the project proposed successfully. This can surely enable students to explore and question about what they are doing.

Future Prospects

This project can be used as a pedagogical tool. It can also be used as a classroom application for assessment of students. Further, it can also be used as recreational tool and hands on activity.

#Innovation in Education Sector

Mathematics hidden in Newspapers

Student's Name/s

Uzma Masood, Adiba Samreen

Mentor's Name/s and Affiliation

Dr. Jyoti Sharma (Cluster Innovation Centre)

Abstract

This project examines the mathematical angle of stories in the news and particularizes it with Mathematics education. Timely newspaper articles are highly motivational for students for all ages by offering them the opportunity to learn from reality. It facilitates the transition from rote learning to student-centered assessment, provides teachers to incorporate the newspaper in the classroom and put reflective thinking into practice.

Outcomes

It is extremely important, then, that students find the Mathematics experience in school both demanding and supportive. For this reason and others, teachers are challenged daily to find new ways of engaging students in learning by using meaningful activities and relevant material. It is clear that students learn best when they are motivated and studying material that is relevant to their lives. The newspaper is of tremendous value in bringing the real world of authentic data into the classroom.

Future Prospects

Mathematics is not primarily a matter of plugging numbers into formulas and performing rote computations. It is a way of thinking and questioning that may be unfamiliar to many of us. It is important that the classroom teacher take every opportunity to use current, relevant resource materials to assist students in learning independently. Our hope as educators is to facilitate learning for a world that requires, learning should continue far beyond the hours and days spent in the classroom.

Self-Paced Mathematics Learning and Assessment Interactive Module

Student's Name/s

Nutan Kumar Singh, Sakshi Bajaj, Syed Shahzar

Mentor's Name/s and Affiliation

Dr. Jyoti Sharma (Cluster Innovation Centre)

Abstract

The development of ICT and its rapid growth is changing the way people use, develop, process and share knowledge. It is transforming learning by addressing the new needs of the learners. It is a well-known fact that learners learn and retain better when they are actively involved in the learning process. The project aimed at developing a self-paced interactive Mathematics learning and assessment module on mensuration, for primary class students. The learning activities in the module are organized sequentially making the learners responsible for their own learning. The self-paced learning module provides better comprehension and retention. It promotes mathematical skills like problem solving, critical and higher order thinking. It helps to track progress and provides required feedback.

Outcomes

A self-paced interactive Mathematics learning and assessment module was developed. The topic of mensuration was divided into smaller concepts. Learning activities were organized sequentially because each component has certain objectives that must be met before moving to the next component. The self-paced module enabled the learners to take control of the learning process. They could learn at their own pace and level which was highly motivating for them.

Future Prospects

If incorporated in the school curriculum it holds the promise of substantially transforming the way learning takes place. This module has high potential as it caters to both the changing need of the education and the technological advancement.

Word2Affect: Sentic Pattern Matching from Text

Student's Name/s

Tarun Khajuria

Mentor's Name/s and Affiliation

Ir. Abhijeet Parmar (Cluster Innovation Centre)

Abstract

Opinion mining is a major operation that various businesses use to analyze the online reviews for their feedback. Major opinion mining work is still performed by classifying the opinions text based on the presence of positive or negative words and using aggregate polarity of the review for determining the perception for various businesses. With the method presented in this work more subtle insights are obtained by inferring the emotional state of the user through the review text. For this purpose we use common sense knowledge to cluster the concepts expressed in the text based on their affect. One of 24 emotional states is mapped to the clustered concepts using a Gaussian model. This way more than the polarity other sentic indices that are a better indicator for business and product analysis can be inferred from the combinations of these emotional states.

Outcomes

This project proposes a new methodology for analyzing text reviews. The use of sentic computing to analyze text reviews gives more important insights into the product or business health, by maintaining a higher dimensional output i.e. emotional state of customer, which can further be aggregated to extract business insights from various aspects.

Future Prospects

Further work includes improving the efficiency of submodules by customizing then for words for a specific business type they are being used to review. More work can be done on various other insightful parameters that can be derived from the current output in terms of emotional state.

Web Application for Sign Language Recognition

Student's Name/s

Santoshi, Vikas

Mentor's Name/s and Affiliation

Mr. Amit Kr. Gautam (Delhi Technological University)

Abstract

The project was to develop a web application that recognizes fingerspelling American Sign Language (ASL) gestures from the gesture input provided in the form of image. When a person signs any alphabet with his hand facing the device camera, then the hand is detected and the sign shown gets printed on the screen.

The external characteristic of hand, i.e. shape based algorithm is used for recognition. Since almost all of the alphabets have a unique shape, each alphabet is characterized on the basis landmark points marked on the boundary of the hand shown by the signer. A training set is built by training several images of each alphabet and the landmark points of each alphabet which produces a 72 and 180 point descriptor are stored in database. The database is used for recognizing the alphabets.

Outcomes

The recognition rate achieved so far is 89%. Also since the recognition is alphabet wise, a spell checking feature is incorporated for better accuracy.

Future Prospects

The project has some further scope of extension. Since, only the external characteristic of the hand (shape) is being considered till now, therefore internal characteristics such as color or texture. Also, two of the excluded alphabets J and Z that require dynamic processing should also be added.

Sexual Harassment and Domestic Violence among Deaf Women: Police Redressal of their Grievances

Student's Name/s

Akhila, Aditi, Harsimran, Jitendra

Mentor's Name/s and Affiliation

Ms. Priya Bhatnagar (Cluster Innovation Centre)
Dr.Surinder Randhawa (IGNoU)

Abstract

The project aimed to address the psychological trauma suffered by the deaf community at the domestic front. The issue of safety and security of deaf women was the primary concern. The project aimed at encouraging the learning of sign language among the community and the police personnel for sensitive handling for the critical community. Learning of the sign language by police men was initiated. Further, with the aid of psychological counseling modules, the attempts were made to assess their psychological issues and improve their quality of life. Also, the focus was on enhancing public literacy thereby, extending the boundaries of their inclusion in our lives with a notion of unconditional acceptance.

Outcomes

Nearly 2000 police personnel at various levels were given an orientation at two sessions at Police Training School at Wazirabad and Police Training College at JharodaKalan. Subsequently, with the students' intervention sign language was made a compulsory component of the training syllabus for the police at different levels. A written module for the subject has also been devised, specially designed.

Future Prospects

The project targeted the security sector of the society to help the hearing-impaired class of the society. In the next leg it can focus on the other sector where the deaf girls face challenges in their day today life.

Towards creating the Atlas of South Asian Languages

Student's Name/s

Himanshu Patel, Vivek Shekhar, Vikalp Kumar

Mentor's Name/s and Affiliation

Dr. Hina Nandrajog (Cluster Innovation Centre)

Ms. Versha Rana (Cluster Innovation Centre)

Ms. Avitoli Zhimo

Abstract

The first comprehensive language maps of the region were produced in the earlier part of the twentieth century as a part of a linguistic survey of India. But as a consequence of numerous changes in political boundaries and new research on previously unknown languages, the Linguistic Survey of India map series has become almost obsolete. The project was an effort to create a thematic language atlas of South Asian Languages. The atlas created by students was instrumental in capturing the mega diversity of South Asian languages. The interactive language map that was created gave general information about the language area, region, society and culture.

Outcomes

Standard 1500 classified vocabulary and 500 sentences in various domains of daily use were created. A concise grammatical sketch and typological information was given.

The work was done in two phases- the first phase covered the Laddaki and Galo languages and the second phase included Tibeto-Burman languages and languages of the Punjabi belt.

Future Prospects

The Project is closely linked with the language app a dynamic version of the created maps can be integrated in the computer application.

Tribal Story Book Illustration

Student's Name/s

Ranveer, Pallavi, Ricky, Yawar, Khyati, Kirti

Mentor's Name/s and Affiliation

Dr. Prem Kumari Srivastava (Cluster Innovation Centre)

Dr. Rizio Yohannan Raj

Abstract

Tribal literature forms an integral part of our literary traditions. Tribal folk tales are not only rich in local knowledge but also in universal wisdom. But, most of this knowledge is in oral form hence is often neglected because of its oral quality. The project spells the tribal stories in a book form. The project attempted to explore the rich tribal art and culture which has deep imbedded in Indian society and is vanishing with time and space.

Outcomes

The students achieved a deep understanding of the way of life, thoughts, attitude and culture of the Adivaasi community in India. They also mastered the art of turning life stories into fictional accounts. Finally they came out with sensitive stories in the form of a booklet.

Future Prospects

An attempt can be made to build an archive of the 'unheard' and 'soon to disappear' real stories that deal with the vivid experiences of adivasis. This will lend dignity to the adivasi people and their cultures.

Language structure of Mathematics

Student's Name/s

Atul Anand, Era Kaila, Sakshi Bajaj

Mentor's Name/s and Affiliation

Ms. Shabnam Agarwal (Cluster Innovation Centre)

Abstract

The project was done to understand the role of Language in building clarity of Mathematical concepts. Position paper on Mathematics of NCF -2005 states one of its visions as: "Children see Mathematics as something to talk about, to communicate, to discuss among them, to work together on." The project was conducted with around 150 students (Age group: 10-15 years) from two English-medium schools in Delhi to see the extent to which this 'vision' is achieved so far.

To understand the role of Language in building clarity of Mathematical concepts, we identified the components of Mathematical language as: Symbols, Terms and Definitions. Each component of Mathematical Language was worked upon to assess the challenges faced by students and for each related worksheets were designed. Students were observed and interviewed to identify possible misconceptions. The data collected was analyzed and after much discussion, and deliberation, analysis of the problem, the conclusions and some recommendations were given.

Outcomes

Language (of instruction) has a crucial role to play in building clarity of mathematical concepts and slack in the formation of concepts acts as a barrier in itself leading to improper communication on the part of students. Only 4% (6 out of 150) were able to communicate effectively i.e., they used Mathematics in the correct context with grammatically correct answers

Future Prospects

Study can be extended to higher Mathematics too. The possible recommendations can be considered and worked towards by recognized institutes of education and teacher training. The recommendations if thought seriously about can be incorporated in education documents of our Country too.

English Learnt versus English Asked

Student's Name/s

Anurag Saini

Mentor's Name/s and Affiliation

Ms. Shabnam Agarwal (Cluster Innovation Centre)

Abstract

Many a times it is seen that students complain what they studied at different stages of their learning is not same as being asked in competitive examinations.

So under this project, I carried out a research to analyze the situation that whether there are gaps in our English curriculum and the syllabus of different competitive examinations or it is the same. Research sample were those who have completed their studies and appearing/appeared for the different competitive examinations, mainly -graduates, doctors, engineers, and even those who are aspiring for it.

Outcomes

1. More than half of population (56.7%) says that English we studied in classrooms is not sufficient for the linguistic proficiency and to acquire writing skills.
2. When they devote 61.1% extra time for the preparation of English, they feel 70% confident while attempting the English section of the competitive exam.
3. They says that there is large gap in English we studied at our school/ college level and English being asked in the competitive examinations and rated 6 (on average) and demand for reforms in the curriculum of teaching English & competitive English syllabus.

Future Prospects

1. School English curriculum should be designed in a way that it meets the expectations of competitive examination.
2. Way of assessment in schools should be changed and there should be more emphasis on grammar and practical portion rather than learning question-answers.
3. Curriculum should be Indianised.
4. We can achieve the goals by slight changing in the teaching style of English, accordingly.

Communicational Strategies in a Mathematics Classroom

Student's Name/s

Syed Shahzar, Naim Akram and Mohammad Rashid

Mentor's Name/s and Affiliation

Ms. Shabnam Agarwal (Cluster Innovation Centre)

Abstract

Mathematics doesn't come naturally because Mathematics is so often conveyed in symbols; oral and written, communication about mathematical ideas is not always recognized as an important part of Mathematics education. Students do not necessarily talk about Mathematics naturally; teachers need to help them learn how to do so." Learning of Mathematics is often viewed as an isolated, individualistic or competitive matter – one sits alone and struggles to understand the material. Perhaps it is not surprising that many students are afraid of Mathematics and develop "avoidance" towards the subject.

The project was directed to facilitate effective communication in the Mathematics classroom through peer learning and electronic aids. In order to achieve this goal, sessions were held which consisted of group discussions aimed at converge scattered individuals' ideas into like-minded groups and eventually develop mathematical vocabulary and communication skills.

Outcomes

A strategy was developed to promote and facilitate communication in a Mathematics classroom with effective discussions and brainstorming among students to develop and construct a particular concept with emphasis on the basic to the complex terminology used during the course.

Future Prospects

The work if extended further which makes a module across all grades can be used as a tool for teachers to strengthen mathematical vocabulary of students and make them learn to communicate and share universal mathematical concepts and operations with their peers and others.

Effectiveness of 7 C's of Communication in the Teaching of Mathematics at Elementary School Level

Student's Name/s

Sneha Tyagi, Nidhi Rathi

Mentor's Name/s and Affiliation

Dr. Prem Kumari Srivastava (Cluster Innovation Centre)

Abstract

Communication is a process in which meaningful information of thoughts is exchanged between two or more persons. Being a mode of communication and transferring information, English plays an important role in classroom teaching. Some teachers teach fluently in English but fail to connect with the students. This is because of lack of proper use of the 7 C's of communication in teaching. Within the time frame of 30-40 minutes, a teacher/facilitator needs to transfer the most appropriate and useful knowledge to the students. In fulfilling this aim, the 7 C's of communication can play a vital role. This paper is a study of the 7 C's of communication in Elementary Mathematics classes. The 7 C's of Communication are Clarity, Conciseness, Concreteness, Correctness, Consideration, Completeness, and Courteous. Seven random videos of elementary classes of Mathematics were collected and analyzed on the parameters of the 7 C's of communication. The tools were: Checklist and Observation.

Outcomes

Results displayed that though the teachers were using the 7 C's of communication, the teacher learning process was not very effective. Though their communication was complete and correct, there was a lack of either concreteness or clarity in their communication. In addition, during teaching learning process, "Consideration" was very low due to which there was a disconnect and disassociation between the teacher and the learner which led to lack of understanding of students' level culminating in a development of phobia for Mathematics in students.

Future Prospects

To conclude with, one can say that if a teacher is taught about the 7 C's of communication during his/her training period it will help them in becoming more effective and reflective teacher which in turn would help in removing the phobia for Mathematics from students.



#Social Engineering

Using ICT for Promoting Ecotourism and Urban Biodiversity Conservation

Student's Name/s

Aayushi Anand, Swapandeeep, Taniya

Mentor's Name/s and Affiliation

Dr. Govind Singh (I.P. College for Women, University of Delhi)

Abstract

The project aimed at using the Information and Communication Technology for the purpose of conservation. The study area has been confined to the Delhi Ridge where its ecological and economic value and threats have been extensively studied. The Keoladeo Ghana National Park has been used as a frame of reference for comparison with the Asola Sanctuary. The two places have been reviewed at great detail to establish the potential of the Asola Sanctuary and reap this potential through replicating the Bharatpur National Park's management practices.

On the other hand, birds have been identified as the urban sustainability indicator. A web based application has been developed for biodiversity conservation centered at the conservation of declining bird population of Delhi. Main idea behind the creation of web-app is to encourage bird-watching among the citizens of the world's second bird rich capital city Delhi.

Outcomes

This web-app serves as aid for bird identification for the newbie bird watchers. The web based application is designed in such a way that it can be easily accessed by everyone using smart phones. Its use would help create interest and sensitivity towards birds and their conservation among the citizens of Delhi.

Future Prospects

Apart from providing facts about each bird, the web-app can be enhanced further by providing the sound clips of birds as well for identification.

Interpreting Air Pollution, Meteorological Data and its Statistical Analysis

Student's Name/s

Kamal Ranjan, Vikas Tomar

Mentor's Name/s and Affiliation

Dr. S.K. Tyagi (Central Pollution Control Board)

Abstract

The project aimed to develop a statistical analyzer and interpreter of the CAAQM (Continuous Ambient Air Quality Manager) data which was able to process "Air Pollution and Meteorological Data" on the basis of various hourly computations (Hourly, Eight Hourly, and Daily basis) and able to plot that processed data. This project will help to identify the cause of pollution which in turn can be controlled and minimized by the respective authorities.

This project tried to predict the direction and the source from which the pollution in a particular area arises based on the results produced by the analyzer and thus working to control it.

Outcomes

We were able to obtain the violations of various Air Pollutants based on the different hourly computations

Future Prospects

The project was made using the data for the month of February only. This project can be extended for an entire year and later can easily be used for each and every year in order to control the level of pollution, so as to prevent people from acute diseases and create a healthy and pollution free environment.

#Social Engineering

Transportation System in Jagatpur Village of Delhi

Student's Name/s

Puneet Kumar, Om Prakash

Mentor's Name/s and Affiliation

Dr. Shobha Bagai (Cluster Innovation Centre, University of Delhi, India)

Abstract

“Jagatpur” is a resettled semi-urban village adjoining “Jharoda” village near Burari by-pass in Delhi. The village is isolated from other important places due to lack of any systematic transportation means which was a major issue in the village.

The aim of this study is to find a solution to the problems and come up with a proposal for an efficient public transportation system in the village which is eco-friendly, economical and convenient to the villagers. Some important roads and vacant space inside and outside of the village were analyzed and measured, so that possible routes that could connect the village to the main roads and the nearest Metro station could be suggested. In this study, the authors also propose a sustained route plan of DTC bus (with timings) and Gramin sewa for the most preferred route by villagers that was obtained by survey.

Outcomes

A sustained route plan of DTC bus (with timings) and Gramin sewa is proposed that would help the Jagatpur Village people to connect with the main roads from where they could find further conveyance easily. This Public Transportation system in the village will be eco-friendly, economical and convenient to the villagers of Jagatpur.

Future Prospects

The proposal presented in this project can be implemented for a certain trial period. If successful then this type of mapping and transportation systems can be planned for other villages that are in very remote places.

Developing a System for Green Rating of Colonies

Student's Name/s

Aayushi Anand, Swapandeeep, Taniya

Mentor's Name/s and Affiliation

Dr. Govind Singh (I.P. College for Women, University of Delhi)

Abstract

This project is centered on rating colonies, both quantitatively and qualitatively, on the basis of their environmental and general performance. As a pilot study, five types of colonies were identified in South Delhi and surveyed on the basis of selected parameters (water supply, parking space, green areas, efficient waste & sewage disposal systems, and connectivity to public transport/market, civic amenities, mixed land use, security and sustainability). An Environmental Performance & Quality Index (EPQI) was developed using those parameters for green rating of colonies of Delhi. We analyzed the results obtained from the primary data and rated the performance of the colonies numerically as well as qualitatively through a star rating system (EPQI) that we had developed. The EPQI was implemented in such a way that it will influence property rates and can be used as a business venture in the real estate sector of India.

Outcomes

The motive was to analyze the relation between the price of the property and the provision of various amenities by the colony in the light of making recommendations for improving quality of life in the various colonies of Delhi. The inferences drawn from the results obtained could serve as the basis for providing recommendations to the concerned authorities.

Future Prospects

This project can be extended to other colonies and areas as well. The Environmental Performance & Quality Index (EPQI) can be made more comprehensive and all-inclusive. The value of the project can be explored further in the real estate industry.

#Social Engineering

Kusumpur Pahari: Gender Sensatization

Student's Name/s

Adarsh, Arun, Praveen, Shamrez, Subhash

Mentor's Name/s and Affiliation

Dr. Amitesh Kumar
Dr. M. Saleem Mir
Mr. Surendar Sharma

Abstract

The main aim of the project was to bring out theatre modules to address the gender insensitivity problem within the Kusumpur Pahari, a slum of South Delhi. The project intended to empower the women and make them realize their rights. The issue of the gender insensitivity was gauged through a detailed questionnaire and survey method. After becoming aware of the main issues some theatrical modules, relevant to address those issues, were brought out; and theatrical performances were organized within the locality to make the people aware of the problem latent within the fabric of their life.

Outcomes

The theatre module and the performances showcased in the area were highly significant in reducing the issue to a large extent and similar modules may be replicated within other parts of the city. It helped in changing the attitude of the people towards the education of the girl child, in particular.

Future Prospects

Theatrical performances in areas like Kusumpur Pahari were a great success that made us realize that there are other sensitizing issues prevailing in the area which can be effectively handled through street theatre.

Ways of Seeing

Student's Name/s

Devaki, Kirti, Praveg, Parul and Leelamber

Mentor's Name/s and Affiliation

Ms. Anandana Kapur

Abstract

In a distinct move away from historical sites, the project looked at the reality of visually impaired students of the University of Delhi. A documentary film on the lives of visually impaired girls living in the Burari blind girls hostel in North Delhi was created. The project aimed to spread awareness on the issues and difficulties faced by blind women in their journey to the hostel and the college. It is noted that a large number of visually-impaired girls stay in a hostel in an underdeveloped area, Burari. For the 38 blind girls in the hostel (nearly all are Delhi University students) run by an NGO, Vinayak Blind Women Welfare Society is Herculean. The script showcased such experiences and sites for intervention for documentary filmmakers.

Outcomes

Through the documentary the students tried to sensitize people to the needs of the visually impaired. It also tried to spread awareness and sensitization on the issues and difficulties faced by visually-impaired women in their journey to the hostel and the colleges by showcasing such experiences and sites for intervention through the creation of a film script.

Future Prospects

There are problems faced by physically challenged people in every walk of life. And there is a constant need in the society to sensitize people about their problems. Also, we as a part of society needs to look at possibilities to handle such problems in an effective way.

#Social Engineering

Children In Conflict With Law: An Intervention

Student's Name/s

Akhila R, Aditi Prashar, Harsimran Kaur, Jitendra

Mentor's Name/s and Affiliation

Ms. Priya Bhatnagar

Mr. Amodh Kanth

Abstract

The recognition of children in conflict with law has been a recent phenomenon. The project aimed to work for children in conflict with law and get a practical knowledge of the workings of the Juvenile Justice System. During the project the students witnessed the proceedings of a Juvenile Justice Board. They also talked to various authorities involved in the system and visited various related institutions. The focus of the study was on the appropriate rehabilitation and allocation of funds for the sensitive class. Also the project tried to develop customized counseling modules addressing the psychological underpinnings of the same. The focus of the project was on the rehabilitation and the reintegration of children in conflict with law. Finally, the global objective of the endeavor is also to improve the quality of life and prevent relapse.

Outcomes

The affiliation with Yuva Connect Program (Prayas) led the students to connect with the children released from the Remand Home. Workshops were held for the rehabilitation of the children required intensive training of the students in counseling. Case studies were prepared and for psychological rehabilitation of nearly 12 children, the students of the project had many sessions with them to build up a rapport.

Future Prospects

To realize the sensitivity of children in conflict with law with development of customized counselling modules targeting at prevention of relapse and a better quality of life.

A Study of Mathematical Aptitude of Third Gender and Their Attitude Towards Mathematics

Student's Name/s

Sneha Tyagi

Mentor's Name/s and Affiliation

Dr. Pratyasha Sahoo (Cluster Innovation Centre)

Abstract

The school or education system is always formulated keeping in mind the two genders. These two genders include the male and the female. (Whether they are students or teachers). Nonetheless, we come across persons who don't come under these two genders in our day to day lives. These people are LGTB. They are detached from the mainstream and form their own groups. They are found in a minority and follow their own rituals, customs and traditions.

The study focused on the education of eunuchs and therefore includes them as the sample for the study. Theories and researches focus on the liking, phobia, attitudes, and aptitudes of the two genders in education specifically towards Mathematics. But there is not a single study which has ever talked about the relation of Mathematics with the third gender.

Investigator was wondering about the usage of Mathematics by third gender in real life and how the knowledge of a single subject/discipline can change the way of living and earning their livelihood? As Mathematics is just not a subject rather it's a way to see and perceive things analytically. This study explores the relationship between everyday practices and mathematical understanding of third genders.

Outcomes

Majority of third genders like Mathematics and want to study it further if given a chance. They feel that Mathematics may be useful for them for their betterment.

Future Prospects

Third genders should get every facility for education and job, so that they do not need to beg. They should get admission in every school in the light of the concept of inclusive education and teachers should treat them as equal on the basis of grounds of genders. Students should get more knowledge and awareness about the third gender community.

#Unraveling History

Mapping 1857: A Journey through Kamla Nehru Ridge

Student's Name/s

Devaki, Kirti, Praveg, Parul and Leelamber

Mentor's Name/s and Affiliation

Ms. Ananadna Kapur

Dr. Amrit Kaur Basra

Abstract

Mutiny Memorial, now rechristened as Jeetgarh, originally built by British in 1863, is a gothic style octagonal tower made up of red sandstone. It was said to be constructed in memory of the officers and soldiers, British and Native of the Delhi Field Force, who were killed in action or died of wounds or disease between 30th May and 20th September 1857 (i.e. during the first war of Indian Independence). Built in early 19th century by a British officer William Fraser, Bara Hindu Rao, now known Hindu Rao Hospital, boasts of a rich legacy. Khuni Jheel (Bloody Lake) is a water body situated in Kamla Nehru Ridge. It is named so because bodies of British killed by the rebels and then the rebels killed by the British were dumped here and then water remained bloody for many days.

The project aimed to reclaim the rich heritage of India.

Outcomes

Historical documentation of the key milestones and history of the first war of independence as witnessed by the monuments and Virtual Tour of the ridge was done through a documentary. During the project, a workshop on script writing and story-boarding was also organized for the students that gave them an insight of the how media industry works. It helped them to improve upon their skills related to the field.

Future Prospects

To explore and present to the people of Delhi, the stories witnessed by these monuments and reclaiming the space for heroic tales of sacrifice and bravery of our freedom fighters in the public consciousness

Red fort before and after 1857

Student's Name/s

Abinav, Manish, Rahul, Javed, Rajnish

Mentor's Name/s and Affiliation

Dr. Sukrita Paul Kumar, Asif Khan Delhvi, Dr. Neel Rekha

Abstract

Red Fort is one of the biggest monuments in India. Which holds an auspicious place in the pages of history. Red fort shows us a glimpse of the royal life of the Mughal Empire which ruled over the nation for more than 300 years. It shows the state of prosperity in which the Mughals lived in. Red Fort has a state of art architecture every monument inside the Red fort has its own beauty and its own purpose, and as a whole it represents as an imperial palace, an ideal place for any emperor to live in. and this is also why all the Mughal rulers who ruled Delhi used to control and manage their empire from this fort only. But Red Fort was not always like this when it was built. Originally it was much different from what we see now, it had many other small monuments and places and gardens. What we see now is just a bunch of monuments which are left from the destruction.

The destruction happened in the revolt of 1857 when the Indian population raise their voice against the British colonial rule. When the British got their position back in red fort after winning the battle against the mutineers they destroyed many monuments inside the red fort just to show their act of supremacy. They tore down, damaged many monuments changed purpose of many buildings inside the red fort created many new building for their own use and purposes. This project is about all the changes that took place in the red fort after the revolt of 1857.

Outcomes

During our project we came to know about the lifestyle of kings and queens, architecture of red fort, rulers of Red Fort.

By the means of this project, we concluded that eighty percent of the red fort had destroyed in 1857 revolt.

Concluded that Red Fort has lost his glory in dark. Students should know about this great revolt and the role of red fort in it. We are now preparing a booklet of Red Fort posturizing the changes that took place at Red Fort.

Future Prospects

Mapping monuments of Lucknow.

#Unraveling History

Nowhere People: Migration Stories Of Delhi

Student's Name/s

Ranveer Raj Bhatnagar, Pallavi Tirkey, Leitanthem Ricky Meitei, Mohammed Yawar, Khyati Panwar, Kirti Joshi

Mentor's Name/s and Affiliation

Dr. Prem Kumari Srivastava
Dr. RizioYohannan Raj

Abstract

Delhi is a city of migrants. Whatever human exodus has occurred in India since Independence, Delhi has been a target for the moving population. The project aimed to see the stories, all of them woven around the same central theme of coming to Delhi and setting up their life all over again. Taking into account the different socio economic classes, the experiences are far ranging, from a simple move to forced uprooting of families. The view of migration of a family from a female perspective and the differences which rise up from the priorities of the genders.

Outcomes

The students collected, narrated and fictionalized life accounts of individuals who've migrated to the city. The students also presented the fictionalized narratives as publishing-ready manuscripts.

Future Prospects

To attempt to build an archive of the 'unheard' and 'soon to disappear' real stories that deal with the vivid experiences of adivasis. This will lend dignity to the adivasi people and their cultures.

Story of Ashokan Pillar at the ridge: An Interactive Application

Student's Name/s

Ashish, Devesh, Manish, Vipul, Shivam

Mentor's Name/s and Affiliation

Dr. Neel Rekha

Dr. Vikas Kumar Verma

Mr. Pratap Nand Jha

Mr. K.K. Muhammad (ASI, Delhi circle) in collaboration with Indira Gandhi National Centre for Arts (IGNCA)

Abstract

The project aimed to narrate very interesting and historically significant story of Ashokan pillar at the northern ridge by a flash application. The story is about its transfer from Meerut to Delhi and how this particular monument is related to Feroz Shah Tughlaq, Hindu Rao, William Fraser and many others. After checking the authenticity of the story, the missing links, photographs from British period, field visits to places linked with Ashokan pillar, etc were filled in. The project was initiated from the idea of showcasing the transfer of the pillar, which has an interesting set of events and involved the technique which was ahead of its time. The project tried to spread the information and the stories which could feed to the interests of the people and could create the necessary awareness about the neglected state of such a great monument, probably one of the first.

Outcomes

The flash application was developed to make it interesting and is loaded with many features and effects that gives it an interactive look. Through this the students tried to show the life events of the monument through a set of video, audio, images files and texts.

Future Prospects

People can be sensitized to the historical relevance of the other monument in Delhi and elsewhere.

#Unraveling History

Northern Ridge And Its Heritage: Illustrated History- Creating A Catalogue

Student's Name/s

Ashish, Devesh, Manish, Vipul and Shivam

Mentor's Name/s and Affiliation

Dr. Neel Rekha

Mr. Pratap Nand Jha

Mr. K.K. Muhammad (retired superintendent ASI, Delhi circle) in collaboration with Indira Gandhi National Centre for Arts (INGCA)

Abstract

This project is about creating a catalogue on the monuments on the northern ridge and the surrounding civil lines area. The sites include: Flagstaff tower, Chauburji Masjid, Qudasia Bagh, Mutiny memorial, Ashokan Pillar, Pir Ghaib, the old baoli, the Vice Regal Lodge and Nicholson cemetery.

Outcomes

A catalogue with sketches of the monuments was created.

Future Prospects

Mapping the history of Delhi can be done with various angles.

Monuments speaks Mathematics: A Case Study of Samrat Yantra

Student's Name/s

Sneha Tyagi, Nidhi Rathi

Mentor's Name/s and Affiliation

Dr. Pankaj Tyagi (Cluster Innovation Centre)

Dr. Jyoti Sharma (Cluster Innovation Centre)

Abstract

Mathematics is a very popular subject from ancient times. Intentionally or unintentionally lots of Mathematics is being used in monuments. Some of the mathematical reach monuments are Jantar Mantar, Pyramids of Egypt, leaning tower of Pisa and more. We appreciated their beauty and architecture but never thought of using these incredible gifts from our ancestors to promote Mathematics. This project looks into the Case Study of Samrat Yantra. The area of study includes: Shape and Geometry, Axis with coordinates, Size with Ratio, Orientation with Direction, Curves and Quadrants, and Shadow and Time.

Outcomes

1. Students can be taught about basic science concept without using high tech devices.
2. Student can be taught various mathematical concepts. Example: Coordinate geometry, Complementary angles, Ratio, Tangent lines, geometry etc.
3. Student can be taught practical geometry. For example: Primary directions and Secondary directions, longitude, latitude.
4. There are numerous topics of Mathematics NCERT textbook from class VI to xii that can be taught through this samrat yantra.

Future Prospects

If we can relate our school Mathematics with these monument then it will help in encouraging the student, they will be able to visualize the application of Mathematics, to appreciate the beauty and relevance of subject and last but not the least student will be able to find Mathematics embedded around them. They'll get the chance to appreciate the work of their ancestors and to feel proud of it and to explore more and more Mathematics out of it and we all know that best way to learn is to explore.

#Delhi University Innovation Projects

Automated Project Proposal Development Tool for Rapid Implementation of 24X7 Water Supply Systems in Small Towns and Villages of India

Student's Name/s

Akshay Kheral, Akshee Jain, Aman Thakur, Chandrani Kumari, Latisha Khattar, Mayank Arora, Mayank Jain, Nikita Garg, Santoshi, Shreya, Vikas

Mentor's Name/s and Affiliation

Dr. B. Biswal (Cluster Innovation Centre)
Dr. Shobha Bagai (Cluster Innovation Centre)
Dr. Sanjeev Singh (IIC UDSC)
Dr. Aparna Mehra (Department Of Mathematics, IIT Delhi)

Abstract

The project aimed at developing a public domain software module that will automatically generate the project proposal for implementation of a 24X7 water supply system in any small town or village. The generated proposal, starting from input parameters related to the population, geographical layout, payment capacity, consumption etc., will contain all details of the water distribution network, cost of the proposed project, tender document and a commercially viable tariff structure. The proposed software module will incorporate spatial position analysis, mathematical model for pipe network and tariff structure, optimal path analysis and analysis of relationship between topology and pipeline network.

Outcomes

Shuffled Complex Evolution (SCE) proved to be the relevant optimization algorithm to determine water distribution network. Cross subsidy can be used to generate optimal tariff slab structure for efficient recovery of cost. The optimized network design module minimizes construction costs and maximizes reliability of final solution subject to the constraints of pressure level at demand node and flow compliances.

Future Prospects

Testing the software under vivid environments, real-time implementation scenario, and interface of the module needs to be more user-friendly. The final aim is to fully automate the procedure thereby reducing the user effort and manual input requirements. When both types of testing would be done, the executable of the software will be made Open Source for every user.

Solutions for road management from modeling and simulation of traffic flow on selected roads of Delhi

Student's Name/s

Vivek Pal, Himani Swarup, Sumit Yadav, Om Prakash Yadav, S. Pavitra, Puneet Kumar, Sandeep Kumar, Rahul Yadav, Manju Kumari Meena, Shrija Saha

Mentor's Name/s and Affiliation

Dr. B. Biswal (Cluster Innovation Centre)

Dr. Shobha Bagai (Cluster Innovation Centre)

Dr. Sanjeev Singh (IIC, UDSC)

Dr. Varsha Banerjee (Department of Physics, IIT Delhi)

Abstract

This project aimed to develop a mathematical model for real time simulation of traffic flow of some selected Delhi Roads. Model parameters and rules of vehicular movement were to be determined from the study of synchronous recording of traffic inflow and outflow on selected roads. Statistically, the simulation aimed to correctly predict the out flux of vehicles observed for each segment. After achieving a confidence level, the model was to be used to simulate new traffic flow scenarios on the same road segment by changing road dividers, flyovers, traffic restrictions etc. Origin of specific jams or clustering was to be studied through computer simulation and solutions obtained by testing new layout of the same region or by redesigning the traffic lights.

Outcomes

1. Simulation of algorithm in MATLAB, Visualization algorithm on PovRay.
2. A Java applet for simulating the traffic along major road segments around the University of Delhi, North Campus.
3. A traffic light system for dynamic synchronization of traffic light with the density of vehicles at a junction.
4. Algorithm for public transport along a road segment passing through Jagatpur village.

Future Prospects

1. Incorporating the physics of vehicular motion into the existing simulation model.
2. Graphics simulation of traffic flow using MATLAB graphics tools
3. A new model for BRT.

#Delhi University Innovation Projects

IT model for parking space management: Optimal and Efficient parking and retrieval of vehicles

Student's Name/s

Sahil N Mathur, Shreya Juneja, Vasundhara, Aditi Chawla, Tarun Khajruia, Parul Madan, Sandeep Narwal, Akshat Bhattacharjee, Madhulika, Deepak Singh

Mentor's Name/s and Affiliation

Dr. B. Biswal (Cluster Innovation Centre)
Dr. Shobha Bagai (Cluster Innovation Centre)
Dr. Pankaj Tyagi (Cluster Innovation Centre)
Prof. Geetha Venkatraman (Ambedkar University, Delhi)

Abstract

The project envisages exploring the possibility of installing efficient and optimal solutions that address the parking problems of the city.

The scope of the project is to analyse various options like multi-level parking, valet parking and parking in saturated residential colonies. Through surveys held across Delhi, it was found that most of the residential colonies lack appropriate infrastructure to accommodate the vehicles. For such saturated colonies, a multi-level car parking model has been suggested. Also, in order to increase the efficiency of valet parking systems, an android application has been designed which can be used by the valet to make optimal use of available parking space. Apart from this, simulation of unorganised car parking lots have been created using MATLAB.

Outcomes

1. Efficiency of different parking layouts in Delhi University parking lot using computer simulation.
2. Design of a multi-level parking balcony that integrates aesthetically to the existing building and operated electronically to increase parking space.
3. An android app for managing valet operated parking lots in public malls, hospitals, auditoriums etc.

Future Prospects

1. Sync a live-image capturing Quadcopter with special surveillance software that would help authorities to ensure the security and organization of their parking lot.
2. Research on using RFID technology for server based management of parking space.
3. The Android application developed for single-level parking lots needs to be developed further for final commercial utilization.

Designing innovative working models to explain concepts of Physics and Mathematics along with IT based module

Student's Name/s

Md. Zurez Tuba, Himanshu Grover, Shubham Goel, Taniya, Divyanshu Srivastava, Kamal Ranjan, Raghavendra Tripathi, Shikhar Sharma, Saumya Saloni, Vikas Tomar

Mentor's Name/s and Affiliation

Dr. Pankaj Tyagi (Cluster Innovation Centre)

Abstract

Students in this project worked to provide innovative methods for understanding concepts of mathematics and physics by designing working physical models supplemented by IT modules. The students based on their own learning experiences design these models. Along with this, reading modules are also being prepared for each model. Models designed to explain following concepts are the highlights of the work so far: Bell Numbers: The number of ways in which a set with n elements can be partitioned into disjoint, non-empty subsets, Inclinator: a device to measure a range of heights and distances with ease using a computer or mobile interface, Geometrical symmetry to symmetry groups: explaining symmetry in an equilateral triangle, an isosceles triangle and a regular octagon, Sum of an infinite series: board model, Trigonometric scale: to directly measure the values of trigonometric functions (sine, cosine, etc.), Android based applications: six mobile apps developed by students for free distribution, Magnetic collision: to explain concept of collision, conservation of momentum, energy conservation etc.

Outcomes

Students based on experience or problems faced by them during their learning time developed the models. It was a hands-on learning for students. Project team is in the process of applying patent for some models. Research articles based on various applications/models developed are under progress. IT modules developed so far will be uploaded on CIC website. Mobile apps developed by students will be freely distributed.

Future Prospects

1. Prepare enough number of IT based modules to explain different concepts of mathematics and physics
2. Converting every IT module into a format, which can be viewed by downloading on android mobile phones.

#Delhi University Innovation Projects

Modelling Metro Feeder Bus Service for North Campus: Feasibility and Financial Viability

Student's Name/s

Aditi Chawla, Madhulika Mukherjee, Anurag Singh, Chandrani Kumari, Aman Thakur, Deeksha Tandon, Mayank Arora, Gourav Kalbalia, Sumit Yadav, Shreya Juneja

Mentor's Name/s and Affiliation

Dr. Jyoti Sharma (Cluster Innovation Centre)
Ms. Twisha Dhingra (Cluster Innovation Centre)
Mr. M. S. Upadhye (Chief Security Commissioner, DMRC)

Abstract

The Delhi University (North Campus) Metro Feeder Service Project aims to create a financially and technically viable Metro feeder bus system for all commuters, within the North Campus area of University of Delhi. The project started by studying existing structure of commuting to metro station and after moving out from metro station. Real-time data was collected to know the actual flow of commuters coming to north campus by metro. Detailed map of North campus was studied to select appropriate nodes which could cover entire north campus. A week-long visit to IIT Madras was done to study the feeder bus model. Various available technologies in modern vehicles and route engineering were also explored. Inputs were taken from DMRC and DTC to know the systematic challenges and business possibilities. Three major components, namely, data analysis, technology support and business possibilities were brought together to develop a robust, technology friendly and sustainable feeder bus service model has been proposed.

Outcomes

1. Important nodes have been identified as per the population density
2. ACO (Ant Colony Optimization) simulation of feeder bus cluster dynamically scheduling themselves to minimize the waiting time for passengers is completed
3. RFID Metro Card has been proposed
4. Robust, sustainable, technology friendly multi route feeder bus service has been proposed

Future Prospects

1. Designing a smart information system (enriched by an android application)
2. Possible collaboration with DMRC and other government agencies can be explored

Template Replication – Village Transformation – Replicating the success stories of Hiware Bazar, Maharashtra

Student's Name/s

Natasha Sharma, Avnish Kumar, Shreya Khurana, Himanshu Saini, Rajat Saini, Niket Sagar, Harsimran Kaur, Manish Narayan, Kaustubh Joshi, Shamrez Ali

Mentor's Name/s and Affiliation

Dr. Vikas Kumar Verma (Cluster Innovation Centre)
Dr. Amitesh Kumar (Cluster Innovation Centre)
Mr. Prakash Chandra Jha (National School of Drama)

Abstract

Our project aims at creating a development model for the selected village (Khanpur Japti) based on the transformation in Hiware Bazar. In this direction, we conducted surveys of these areas including some other Aadarsh Gaon of Maharashtra through interview method, using questionnaire as a tool. In the later stage, the data collected would be analyzed using appropriate statistical techniques. Khanpur Japti faces the scarcity of agricultural land and lack of adequate funds for development activities. Majority of the population are engaged as daily wage workers at the nearby construction sites. The issues such as girl education, computer literacy etc. still needs to be addressed on emergent basis.

Outcomes

The significant outcomes of this study lies in the fact that it introduced the group to the real life problems of the villagers by visiting the villages- Khanpur Japti (Distt. Ghaziabad, Uttar Pradesh), Hiware Bazar (Ahmednagar District, Maharashtra) and some other Aadarsh Gaon of Maharashtra. We observed the kind of social, technical and political interventions adopted in Hiware Bazar.

Future Prospects

1. The approach to the problem through the hands-on measures, other than conventional types, such as blogs, theatre and documentaries, direct interaction with people.
2. Channelizing the Human resources of Khanpur Japti through creating awareness in order to change villagers' approach towards existing problems would help to attract the people who have deserted the village back to the native place.
3. Empowerment of various institutions at the village and people at grass root level for Decision Making.

#Delhi University Innovation Projects

Impact of FDI in Multibrand Retail on Local Kirana Shops

Student's Name/s

Akshay Khunteta, Anoop Sah, Asmita, Ananya Goel, Divyansh Dev, Harsh Tanwar, Mayank Malhotra, Prashant Sinha, Rohan Bhardwaj, Swapandeep

Mentor's Name/s and Affiliation

Dr Shobha Bagai (Cluster Innovation Centre)
Parul Gulati (Cluster Innovation Centre)
Dr Sonam Singh (Cluster Innovation Centre)
Prof Manoj Pant (JNU, Delhi)

Abstract

Kirana stores and small traders are worried over loss of business with the entry of Foreign Direct Investment (FDI) in multi-brand retail. The unorganised sector of these kirana stores are worried that once big retail brands set up shops in the country, profit margins would reduce as producers may directly source their goods to these big retail shops. On the other hand it is being argued that the buying culture of India can sustain both, multi-brand retail and small kirana shops. The aim of this project was to provide a mathematical model for the coexistence of the multi-brand retail and small kirana shops

Outcomes

1. Mathematical Model was formulated
2. Parameters estimated
3. Detailed analysis also carried out to discuss the effects of various parameters on the sustainability of both – Kirana shops and Multibrand retail stores.

Future Prospects

As of now the main factor that the parameters depend on is income. The dependence on other factors can also be studied.

Improving the current system of Junk Management and Recycling

Student's Name/s

Latisha Khattar, Parul Madaan, Aayushi Anand, Tushar Mishra, Navneet Sahu, Sarthak, Akshay Karwal, Afhiraj Singh Rawat, Nikita Garg, Fidel Kachari

Mentor's Name/s and Affiliation

Dr. B.Biswal (Cluster Innovation Centre)

Abstract

The unscientific and irresponsible handling of junk is a common sight practice. The project aimed at developing the better managerial solutions for waste handling through series of planned activities and proper laid down guidelines. The project targeted government institutes and residential colonies (basically the area in and around Delhi University) for getting information on the current practices involved. Our further course of activities is planned in reference to our primary research.

Outcomes

The project points out the flaws in the existing business methods and practices of junk disposal (in the area in and around Delhi University). It has developed an organized mechanism for collecting the waste generated within the institute which, if required, can be replicated on the larger scale. It has laid down the guidelines for scientific segregation of the junk to ensure the maximum retention of the value of the junk. It has succeeded in effective partnership for outsourcing the segregated junk to recycling firms

Future Prospects

With this effective mechanism of waste collection and segregation, this model, can be replicated on a wider scale. Furthermore, this project aptly goes with the mission of Swach Bharat Abhiyan launched by Prime Minister Narendra Modi.

So, it can be used as one of the base model to scale up our collaboration with other institutes which could help us in carrying our motto and mission to a larger area and newer height.

#Delhi University Innovation Projects

Digital Reconstruction of Lost Art and Craft

Student's Name/s

Vikas, Santoshi, Manju Kumari Meena, Sangeeta, Pavitra, Srija, Akshat, Sahil, Nitin, Rahul

Mentor's Name/s and Affiliation

Dr. Bibhu Biswal (Cluster Innovation Centre)
Nalini Thakur (School of Planning and Architecture)

Abstract

Archeological sites and artifacts show a considerable amount of structural complexity and documenting the details in 3D with accuracy and precision is still a technological challenge that needs to be investigated for producing a richer scientific datasets. The present project aims to adopt a coherent approach to repatriation and non-contact restoration of archeological monuments and lost artifacts by combining high resolution digital imaging, laser scans, image-based rendering, reflectance modeling and thereby generating 3D impressions in digital and analog formats. The present investigation will facilitate the digital mediation of lost arts and pre-historic artifacts of India and will provide an opportunity to visualize and experience these historical marvels with greater details without damaging the real artifact and sites where light exposure could be damaging.

Outcomes

Content aware reconstruction methods are more efficient and accurate for reconstructing 2D images and paintings.

Structure from Motion (SfM) algorithm are used for 3D reconstruction from 2D images.

Additive Manufacturing techniques could be used for quick restoration of crafts.

Future Prospects

Generation of high resolution laser scan database of crafts and monuments

Improvement in rapid prototyping mechanism for realistic restoration





musé

verb | \myüz\

: to think about something carefully or thoroughly
: to think or say (something) in a thoughtful way

intransitive verb

: to become absorbed in thought

transitive verb

: to think or say reflectively

noun | \myüz\

(in Greek and Roman mythology) each of nine goddesses, the daughters of Zeus and Mnemosyne, who preside over the arts and sciences.

synonyms: inspiration



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Projects at a glance

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VOLUME 1



Tell me and I'll forget;
Show me and I may remember;
Involve me and I'll understand.

