



PROJECT ABSTRACTS

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CIVIL ENGINEERING

GRADUATION PROJECTS

CE01 COMPARISON BETWEEN SPOT SPEED METHOD AND HAND-HELD GPS DEVICE FOR CALCULATING AVERAGE SPEED IN DUHOK CITY

By: Abdullah Hussein Othman, Ibrahim Akram Abbas, Vin Arif Hito, Dilkhaz Manaf Mustafa, Naveen Husni Hassan

Supervisors: Dr. Sarhat M. Adam and Dr. Bayar Mohammed

Traffic volumes are increasing every day; therefore, data collecting becomes more difficult which requires expansive equipment. The safety and time efficiency movement of the people and goods are dependent on Traffic characteristics. The two main parameters that most traffic management bodies depend upon are average speed and time. The purpose of this study is to compare and develop models between spot speed and GPS (Global Positioning System) data. GPS is a cheap and simple hand-held device method for collecting data which are used for navigating and monitoring vehicle's position, time, and safety.

The data has been collected using the two methods (GPS and spot speed). This data covered many of

the important roads in Duhok city. Firstly, the GPS data was compared with spot speed data. Then the data was divided into two sets. One of the sets has been used for developing models using spot speed as depended variable and GPS as independent variable and the other set was used for validation. The models have been developed for each road separately and for whole roads together.

CE02 STRUCTURAL ANALYSIS AND DESIGN OF A COMMERCIAL STEEL WAREHOUSE STRUCTURE

By: Larsa Imad Azeez, Merna Amer Jalil, Maryana Waleed Naisan, Ban Khashman Hasan

Supervisors: Dr. Abduljabbar I. Abdy

The work conducted in this project is related to the structural analysis and design of the main members and their connections of a commercial warehouse steel structure building. The analyzed and designed parts include: roof purlins, rafters, columns and their joint connection of the steel structure. The parts of the building chosen were considered to be the most crucial based on the given loading conditions. The major load acting on the structure included: wind load, and the structure's own weight



but the design focused on the wind load. The main purpose of the analysis was to identify parts of the building which experienced the highest stresses and design it to be able to withstand the high wind pressure. In this project, the dead and live loads were determined according to the method outlined in AS/NZS1170.1 (Australian Standard for Structural Design Actions-Permanent, Imposed and Other Actions), the wind actions were determined according to the method outlined in AS/NZS1170.2 (Australian Standard for Structural Design Actions-Wind Load Actions). The structural steel design were carried out following the AS 4100 (Australian Standard for Steel Structures).

CE03 ARTIFICIAL NEURAL NETWORK APPROACH TO PREDICT COMPRESSIVE STRENGTH OF CONCRETE THROUGH NONDESTRUCTIVE TESTING METHOD

By: Maryam Ayser Mohsin, Noor Nadir Shaker, Muaataz Hasan Mohammed, Ali Haihat Khairullah, Zhino Zahir Kareem
Supervisors: Dr. Abdulhameed Y. Abdullah

Many studies have been done in the previous years to use ultrasonic pulse velocity (UPV) and rebound hammer tests as measure of

concrete compressive strength due to evident advantages of nondestructive testing methods. An artificial neural network (ANN) approach has been suggested for the evaluation of relationship between concrete compressive strength and (UPV) and rebound hammer values by using the data obtained from many samples taken from different reinforced concrete cubes having the exact placement day and various ratios of concrete mixtures. The neural network toolbox of MATLAB has been utilized in order to estimate the compressive strength of concrete specimens without carrying out real tests, using the predetermined test data. The results for predicted compressive strength values are analyzed in a root mean squared error basis. The presented approach allows to practically finding concrete strengths in the existing reinforced concrete cubes, whose records of concrete mixture ratios are not available or present. The method can also be used in conditions such as too many numbers of the structures and tests to be done in a restricted time. Application of these techniques will contribute significantly to the concrete quality assurance.



CE04 IMPROVING THE PHYSICAL PROPERTIES OF ASPHALT CONCRETE USING STEEL FIBER

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Abdulwahid Ali, Malika Khalil Chary,
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Abdulrazaq and Sherzad Waisy*

The rapid growth of population and increased people demand lead to increase in the number and load of heavy vehicles. Road agencies in Kurdistan Region are facing major challenges in addressing a stable and durable asphalt concrete pavement to withstand the heavy load vehicles. Most of the roads deteriorate faster than expected or before ending the design period, sometimes one year after construction. This deterioration is due to many factors, one of these important factors is the type of material used. However, the material properties can be improved by using additives.

The purpose of this study is to improve the physical properties of asphalt concrete mixture of local materials by adding steel fiber. To achieve this, the following have been used and selected. 1) the same materials (aggregate and asphalt) that are using by local road agencies in Duhok governorate. 2) Binder course and the medium of the

gradation ranges (specified in SORB specification). 3) The Marshal Design method for mix design.

Firstly, the optimum asphalt content was determined. Then samples at optimum asphalt content with different percentages of steel fiber were prepared and tested to determine the effect of steel fiber and the percent that gives better physical properties, such as stability and flow.

CE05 ESTIMATING WASTEWATER QUANTITIES IN DUHOK CITY USING GIS TECHNIQUE

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Wastewater refers to the polluted water due to human usage; it is the water that is used in domestic, industrial, and agricultural activities. Estimation of wastewater quantity is significant for locating wastewater treatment projects also for the design of sewers. The aim of this study is to estimate the quantities of wastewater in Duhok city using GIS by dividing the study area into three zones which is in turn subdivided into sectors. The estimation of daily wastewater firstly accomplished based on multiplying the number of population in each sector with the average daily water use per capita and equaled to 350



liter. Secondly the estimated wastewater quantities were divided in grey water and black water. A theoretical total waste water estimation was measured based on per capita production for the comparison purposes. GIS model is proposed for the estimated daily wastewater that help decision makers choose the best locations for the wastewater treatment plants and in the preparing the networks design. Results show that a total of about (105000 m³) where discharged daily, out of which (35570 m³) black water and about (69355 m³) as grey water. There is also no significant difference between the estimated quantities and the theatrical quantities of daily wastewater produced. It can be seen that the number of populations is the most influential factor in the estimation process.

CE06 SEISMIC PERFORMANCE EVALUATION OF R.C. FRAME BY NONLINEAR STATIC PROCEDURE

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Mahmood
Supervisors: Dr. Yassamin Khalid*

The objective of most design codes is to provide a safe performance with controlled damage during major and infrequent earthquake. Recent earthquakes have shown that

structures may suffer from irreparable or too costly damage. Besides, inelastic behavior of structures and structural elements is observed even during smaller ground motion. The performance assessment of structural systems includes two types of procedures such as elastic procedures; the lateral force method and linear dynamic analysis and the inelastic procedures that takes into account the nonlinear behavior of structures such as nonlinear static analysis (pushover) and nonlinear dynamic analysis.

The main objective of this project is to evaluate and assess the seismic performance of a six-story residential building apartment with shear wall constructed in Duhok governorate by using nonlinear static procedure analysis (Pushover); this type of analysis is widely recommended in the literature as an easy to apply procedure that in the same time describes how the structural performance is accurately affected during seismic excitation.

The frame building has the dimensions of 26 m x 19 m which comprises 5 bays in the x-directions and 4 bays in the y- direction, respectively. The analytical 3D model of the frame-wall structure is modelled using ETABS 2016 engineering software and subjected to dead load, live load, wind load,



seismic load and pushover loads. The resulted capacity curve obtained by the analytical modelling is compared with the structural frame performance levels determined by FEMA389-2004. Furthermore, the loading demands imposed on the frame-wall structural system and its components especially the 1st story columns are captured and compared with their detailing design data

CE07 DEVELOPING OF SCC FOR A READY MIXED CONCRETE COMPANY IN DUHOK CITY

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Aystan Abdullah Khalaf, Issa Ismail
Rasull, Dana Burhan Ali
Supervisors: Mr. Youkhanna Z.
Dinkha*

Self-compacting concrete (SCC) possesses enhanced qualities and improves productivity and working conditions due to elimination of compaction. SCC is suitable for placing in structures with congested reinforcement without vibration and it helps in achieving higher quality of surface finishes.

This project consists of development of: (i) suitable mix of SCC using excel sheet that would satisfy the requirements of the fresh properties like workability tests carried out for this purpose (slump flow, L-box, V-funnel, and J-ring) for a ready mixed concrete company, The

methodology adopted followed the restrictions of mix design as per EFNARC and ACI specifications; (ii) casting of concrete samples and testing them for strength aspects like compressive, split tensile, flexural also dry density and total water absorption by using local aggregates, cement, admixture and additives were used by in this work.

Two mixes were designed as per the request of the ready mixed concrete to minimize the problem of segregation that they were facing during casting of C30 (30 MPa) and C40 (40 MPa) mixes in addition to ensure strength level that the mixes have been design for. This was achieved by keeping the cement content constant as 360 kg/m³ and 410 kg/m³ for C30 and C40 respectively.

Mix proportions for C30 and C40 grades of self-compacting concrete were developed that satisfied the fresh properties of SCC as per EFNARC and ACI specifications and in addition the compressive strength results using standard cubes (10*10*10) cm for C30 at 7, 14 and 28 days were 35.9, 49.9 and 61.5 MPa respectively, also the strength results for C40 were 49.5, 61.5 and 76.8 MPa at 7, 14 and 28 days respectively.

The significance of this project lies in its attempt to provide some performance data of SCC so as to



draw attention to the possible use of SCC.

CE08 THE USES OF GROUNDBREAKING TECHNOLOGIES TO ESTIMATE EARTHWORK VOLUMES

*By: Abdullah Mohammed Akrem,
Ninos Esho Dinkha, Sozan Murad
Muhsin, Parikh Khan Tahseen Hussein
Supervisors: Mr. Yousif Zaia*

Earthwork measurement is a process of excavating, hauling and placing materials from one place to another using economical method. This kind of work is passed through two stages which are gathering data using surveying instrument and measurement of figuring volumes using either manual methods or software method.

In this project, field test is carried out to gather data for estimating earthworks and two technologies are used which are, Digital Level (DNA 03) and Total Station (TS02). The purpose of the project is to compare between the two technologies used and to find the accuracy of total station for estimating volumes

CE09 STRUCTURAL DESIGN OF MAT FOUNDATIONS OF LOW RISE BUILDINGS USING SAFE SOFTWARE

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Ahmed, Yousif Amjad Issa, Khalid
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Supervisors: Dr. Rafi' Mahmoud
Sulaiman*

In this study, a full discussion and clarification of SAFE software design of mat foundation of two different selected buildings constructed on soils of low bearing capacities are presented in details. The first mat foundation is a six-stories residential building that supports columns and walls subjected to moments in x or y directions whereas, the second one is a six-stories Hillcrest Manor building under different static and earthquake dynamic loads.

The study shows that SAFE software is an efficient and professional software program which can be used both for analysis and design of mat foundations, in addition to, spread and combined footings. As a result, the calculations presented herein cover the principal steps in design of mat foundations as it would be carried out in a structural engineering consultants' office showing all drawing sheets design details.



Finally, the SAFE design results show that thicker mat is required for check of punching shear due to the combined effects of shear and moment transfer in comparison with that of the rigid method. Also, at locations of higher loads, such as below selective walls or columns, the mat was be thickened to achieve a more uniform distribution of pressure below the mat.

CE10 MULTI-STOREY BUILDING DESIGN

By: Yasir Khudida Elias, Idrees Ahmed Ameen, Dirok Salahaddin Saeed, Dilkhaz Saeed Abdulla Supervisors: Dr. Ahrar Botan

The theme of this bachelor project is design of multistory building design, which consist of designing a multistory building for an insurance institution in Duhok.

The building is designed using reinforced concrete and the design is executed according to ACI 318-08 code. The type of structure is rigid frame with mostly of two-way slabs extending between frame beams. The main reason behind using reinforced concrete as the essential material is that the availability of such material in Duhok city.

CE11 COST AND QUANTITY STUDY OF A MULTI-STORY BUILDING IN DUHOK CITY

By: Waleed Rashow Saidow, Murad Barakat Alias, Rami Ibrahim Khalil, Hammad Hajji Khalaf Supervisors: Dr. Abduljalil Suliman

This project studies the estimation of quantities of the materials required for the construction of a rehabilitation center which is multi-story building in Duhok city in order to estimate the required budget for the completion of this building.

The estimation has been done by the following steps; the first step was calculating the quantities of all the items of the project starting with the preparation of the site, earth excavation for the foundations, concrete works and so forth. The second step was the obtaining of the prices of all materials, wages of all equipment and the working fees for each item and then constructing the rates of all the items. The third step was calculating the total amount of each item by multiplying the rate of the item into its quantity.

The items should be summarized in a table called Bill of Quantities (BoQ).



WATER RESOURCES ENGINEERING

GRADUATION PROJECTS

WRE01 DESIGN OF BOX CULVERT FOR SPECIFIED AREA

By: Aveen Ismail Haji, Mastan Ihsan Ali, Shingar Karim Abdullah, Inas Salim Ali

Supervisor: Mr. Fawaz Khaleel Aswad

This project present “Design the Culvert for specific area”, the selected for this project it Chamanki area. This area located to the east of Duhok by 80 km. after select area of study, next step was collect the data about the area (Topographical and hydrological Data). The data collected and analyzed to get the information about the area and the rain fall, from analyze the topographical data we get the area of catchment area that served by the culver which was (0.823) km². From the hydrological data and by used the information form the third years we find the parameters of the Rational Method ($Q = CIA$) that has been used to find the discharge. The Coefficient of discharge (C) has been found from the information about the nature of surface of catchment area and it found equal to (0.75). And from analyze the hydrological data we get the rain intensity (I) which equal to

(45.99 mm/hr), and by using the equation the discharge equal to (7.886) m³/sec. after complete the analysis of data, the Auto CAD civil 3d has been used to find the suitable dimension of Culvert. The structure design has been completed by using the program ETABS.

WRE02 ASSESSING THE IMPACT OF HOUSEHOLD CHARACTERISTICS ON WATER DEMAND

By: Muhamad Jamal Ahmad, Viyan Taha Ali, Wala Noori Qasim, Nipel Jihad Ahmed

Supervisor: Dr. Wa'el A. Hussien

Water supply management requires accurate evidence-based estimations on per capita consumption and a good understanding of the factors influencing the consumption. The information can then be used to achieve improved water demand forecasts. Although, estimation of household water consumption is required for the water related studies of the city of Duhok, very little is known for the city. This project investigates per capita water consumption resulting from daily activities in different types of households in the city of Duhok.



A detailed survey was prepared to collect information on household characteristics (e.g., number of children, elders, adult males and females, household type, total built-up area, garden area, number of rooms, number of floors and monthly income). The survey aims to collect data on daily water consumption for different activities at a household level. The survey was conducted in winter season.

The collected data of household water consumption were analysed, including estimation of statistical parameters (i.e., mean, standard deviation, minimum, maximum and distribution shape identification through kurtosis and skewness). The relationship between household characteristics and total household water consumption was investigated. Per capita water consumption in Duhok households was estimated for using it in the future studies.

WRE03 DESIGN OF WATER DISTRIBUTION NETWORK FOR HAWSHIK RESIDENTIAL AREA

*By: Nechirvan Idrees Hasan,
Osama Rasull Ahmad, Burhan
Muhamad Salih, Adeeb Rafhat
Mansoor*

*Supervisor: Mr. Anas W.
Abdulrahman*

The water distribution network design is a complex process to find all the required diameters for network pipes to deliver water from source to end user in efficient way. For this project a water distribution network is designed to a land at west of Duhok governorate, Sumel. This area was selected with coordination of the Directorate of Water of Duhok, DoW. The land's overall area is about (1.2) square kilometer and it has been divided to four main sub zones, and is ready to habitat about (9733) people. The design process is done with the aid of the WaterCad program, using the Hazin-Williams calculations method. And use pumping system of method of distribution because the land is flat and we used dead end (tree system) of layout of distribution system. The final design diameters and lengths of pipes are verified by the program and the network is ready to be build and deliver the drinking water to the end users efficiently.



WRE04 DEVELOPMENT OF IRRIGATION PROJECT IN KHABAT DISTRICT

*By: Bjeen Bahzad Salih, Hiwa Faris Jano, Huner Sabah Mohamad, Jagar Khoeen Mahmood Abdullah
Supervisor: Dr. Shaker A. Jalil*

Khabat irrigation project is constructed at the middle of the seventy of the last century. This project is Invested for 45 years, during this period of operation, there may be some emerge notes have been arisen. The project site has been visited and after asking about the management and operational difficulties, together with local farmers observations, two major difficulties arise, shortage of water supplied to a part of the project where the land has a higher level than channel water level, the second difficulty is change in land use and lack of maintenance. Using Google maps and GIS measures and employing Civil-3D software for calculation leads to mention that the project area is reduced by 7% due to growing villages and increase of local roads. Depth of irrigation water has been calculated according to climatic data and employee the FAO CROPWAT-8.0 software. The needed irrigation water depth is based on the plantation intensities and crop types of Agriculture official plan at this project. Two typical

private farms have been selected for designing modern irrigation systems to increase the efficiency of water use, the first farm irrigated by sprinkler system and the second by drip irrigation system. These systems increase the irrigation efficiency and so reflected on the yield production.

WRE05 HYDRAULIC CHARACTERISTICS OF FLOW OVER CIRCULAR CRESTED NORMAL WEIR

*By: Vahin Ramadhan Abdullah, Eman Lazgin Yunis, Rojeen Abdulrahman Ali, Sahar Alyas Khider
Supervisor: Dr. Bahzad M. Noori*

In this project, the hydraulic characteristics of flow over circular crested normal weirs under free over flow conditions are studied experimentally. For this purpose, nine weir models were manufactured and tested in which weir height and crest diameter were changed three times. the experimental results showed that water surface profiles along the center line were smooth and continuous having a descending trend with steep drop near the downstream face of the weir. Also, the experimental results showed that the discharge increases with the increase of upstream water depth



above crest and weirs of small crest diameters and low heights pass higher discharges. Simple power equations were obtained for the variation of discharge coefficient (C_d) with relative upstream water depth above crest (h/P) showing that (C_d) increases with the increase of (h/P) values and weirs of low heights and small crest diameter gave high values of (C_d). An empirical equation was obtained for the estimation of (C_d) in terms of (h/P) and (h/D) with high correlation coefficient.

The discharge magnification (Q_{NC} / Q_{NS}) was found increasing with the increase of (h/P) values giving high values of magnification (better performance) for weir of low heights and small crest diameters and the best ratio of crest diameter to weir height (D/P) was found to be $(1/3)$ which can be recommended for the design of this type of weirs. A simple design method was presented through which the final dimensions of the designed weir were obtained and the head – discharge curve of the weir was predicted for the whole range of weir operation.

WRE06 DESIGN AND ANALYSIS OF LONG-THROATED FLUMES

*By: Nawzad Kamiran Rasheed,
Huvan Hassan Salih, Israa Jalal
Amen,
Nada Ali Fatah, Wala Muhammed
Salih
Supervisor: Ms. Jihan M. Qasim*

In open channels, the rate of flow can be measured by a wide variety of structures that can be broadly classified into three groups: orifices, weirs, and flumes. Goodwater measurement enables water to be supplied at optimum rates to the areas of use. To serve this need, structures described as long-throated flumes play a key role. They are made either by narrowing the channel (forming a throat), or by both raising the channel bottom and narrowing the width. Long-throated flumes are recommended and preferred over Parshall flumes, especially in natural streams, due to their minimal head loss, low construction cost, and adaptability to many channel types and flow ranges. These flumes can be designed or calibrated using computer programs that eliminate the need for laboratory calibration. In this project, WINFLUME software is used to design different types of long-throated flumes having movable and stationary crests with abrupt expansion, gradual expansion, and



truncated ramp. As design examples, some rectangular and trapezoidal channels in Duhok region, such as, Bakhtme, Chrani, Kamaka, and Koshina are considered. The flow conditions through the flumes are analyzed. In addition, a detailed quantity survey of the structures is carried out in order to provide a guide on their construction cost. It is suggested that these water-measuring devices be included in all new water projects to improve water management, e.g., at flow divisions within canal distribution systems, headworks, offtakes, outlets, and drainage collection points.

WRE07 DESIGN OF LEACHATE DRAINAGE SYSTEM OF QADISH LANDFILL

By: Haval Farsat Jahwar, Hogir Kajal Kishto, Alaa Badea Ismaeel, Saad Moslih Ali
Supervisor: Ms. Sayran A. Ibraheem

The leachate from sanitary landfills is ranked as the strong sewage with considerable content, diversity and concentration of pollution. Particular attention must be paid to protection against groundwater pollution by leachate. This is connected with the design of drainage systems. The leachate from drainage can be discharged to a treatment plant.

In this project the design is dealt with the drainage system of Qadish landfill with area about 16000m². The drainage system designed is fishbone layout, one main pipe and four laterals in every side. The pipes diameters are 250 mm for laterals and 400mm for main drain with slope about 3%. The discharge measurement depends on the rain and snow recorded data and the water content of the wastes. The best type of drainage pipes selected is perforated corrugated PVC pipes.

WRE08 DESIGN OF STORM WATER SYSTEM FOR MALTA DISTRICT/DUHOK

By: Chinar Mohammed Saeed Ahmed, Rangin Hassan Abdulkarim, Eman Hamdi Farhan, Maveen Lazim Mohamed, Huda Ahmad Mustafa
Supervisor: Mr. Ali A. Yousif

Recurrent flood because of insufficient drainage system is a major problem faced by a number of cities around the world. This affects a large number of people living in urban areas resulting in loss of life and property. Most of our cities will be fractured, if a heavy storm with high run off is hit, due to improper drainage facilities and the most of our existing storm water drains are in dilapidated stages and not working



properly, losing self-cleansing, no proper maintenance, and incorrect design without any scientific base.

In this project, a comprehensive study carried out to design a storm system for Malta district in Duhok city. The design accomplished with the aid of AutoCAD Civil3D software. The results showed that the maximum diameter at the main outlet is 3 m in diameter and minimum diameters around 0.5 m in the system.

WRE09 DESIGN OF SANITARY SEWER NETWORK FOR ETUT DISTRICT IN DUHOK CITY USING SEWERCAD

By: Bashar Aziz Hasan, Mateen Sulaiman Abdulmanaf, Ezzadin Abdulbadi' Zubair, Vanya Bashar Jalal, Hindav Nasrat Younis
Supervisor: Mr. Khairi A. Omar

The aim of this project is to design a sanitary sewer network for Etut District in Duhok City using SewerCAD. The design project will demonstrate the success at designing of sanitary sewer systems. The report will first provide brief introduction regarding the need of wastewater disposal. This involves the project city profile including location, condition of existing water supply and sanitation and current infrastructure. The paper will also

highlight the main objectives of the project. In the second stage the procedures of sanitary sewer network designs will be presented. The major portion of the project is the detailed design of sanitary sewage and network. This involves detailed design of dry discharge flow, size of sewer pipe, sewer material, sewer appurtenances and design considerations are undertaken. On the basis of the results of this project, it can be concluded that putting this project into practice for Etut District in special, and the whole Duhok city in general will provide an improved infrastructure for liquid waste management.



ARCHITECTURAL ENGINEERING

GRADUATION PROJECTS

AR01 URBAN DESIGN PROJECT/NEW DUHOK (ADMINISTRATION ZONE)

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Inas Hishyar, Muslima Abdulla,
Hereen Ramadan, Blind
Muhammad*

*Supervisors: Mrs. Rana Fathi
Farhan*

The management zone project, inspired its concept from the idea of self-organization, how to build relationship between building. By Using a Maze organization, the team aimed to achieve a patterned relationship between administration zone and the other surrounding zones. In addition, the concept was inspired by Kurdish heritage to relate the project to Kurdistan culture

The concept was built based on

1. The meaning of administrative buildings which means organization and management, that been built on a high level of organization presented by a Maze system.

2. Postmodern Architectural style. One trend of postmodern is taking historical elements using then in a

new way. That's why we've taken Kurdish ornament.

3. Achieving car free project by located all parking lots on site boundary

4. Allocating administration zone of the outline of the site, to be more accessible from both inside and outside the site.

The Architecture style used is postmodern which concentrates in using the reuse of historical elements in a new way and applying it to as follow:

1. Using Kurdish ornament as a historical source in design details such as shelters, openings, landmarks and skin.

2. Using Warm colors as a principle used by postmodernist.

The team get a final design thus is showing

- clear pattern on site similar to maze organization

- Combination the new building and Kurdish culture.

- Combination between administration building and their buildings Educational, Health, Recreational, Religious & Industrial complexes. So, each group's



mission is to organize all complexes in a town, as a redesigning for New Duhok area. The other scale, is complex scale

AR02 URBAN DESIGN PROJECT/NEW DUHOK (COMMERCIAL ZONE)

*By: Omed Hakeem Adulrahman,
Haitham Jabbar Mustafa, Waad
Abdulla Mohamed, Asma Mawlood
Hasan, Anwar Sabri Mohamed
Supervisors: Mrs. Rana Fathi
Farhan*

The urban complex of New Duhok consists of five zones (residential, entertainment, commercial, media and administrative) of 1500 km² in.

Designing such urban project in Duhok city, required an inspiration that shows the identity of Duhok and Kurds. Therefore, the designers of the commercial zone were inspired by project site contour that been abstracted to generate the projects lines, where the masses rise as small mountains resembling the nature of our ground.

The abstraction of contour lines and using the zig zag roads, been representing the roads used in mountains (The symbolism of mountains). Where, Kurds have always been known as Mountain people, who have special relationships with throughout good

and bad times with it, (where horizontal linear organization were used).

Sustainable urban space, were used to reach the optimum link of five zones of the project. Likewise, to systematize the movement of public, semipublic, semiprivate and private of green spaces breaking the central park theme, and achieving a skyline that looks like a series of mountains between which (valleys) the outdoor relies.

The final design is divided by fragmented shaped roads, each zone having a courtyard and outdoor green zone, with central green zone that have central entertainment zone.

The Design is car free inside while parking lots are combined with the surrounding road.

The project skyline, has the shapes of mountain series (due to manipulating of contour lines). Thus, each zone is identified itself by a monument. Finally, Inspired by Modern organic architecture style this project is harmonized with the site borrowing its characteristics (material, topography, colors, levels, etc.), the pure broken shapes of the masses carved by local materials



AR03 URBAN DESIGN PROJECT/NEW DUHOK (ENTERTAINMENT ZONE)

By: Rawan Hassan Ibrahim, Mheera Yalda Yaqoob, Hamid Shamsaddin Hafdullah, Imran Ferhad Hussein
Supervisors: Mr. Aram Omar Bamerany

From the dawn of mankind human tries to be creative, as architects team we had the challenge to design an urban complex containing five zones (Entertainment, Media, Commercial, Residential and Administration Zones) in the new Duhok area in Duhok-Kurdistan-Iraq. The adopted style is digital style that shows irregularity, newness and not coping from the past because of the use of computers and digital modeling.

As the Entertainment Zone Designer team, our inspiration was based on the old layout of the Duhok city and how it's developed over time, a digital architecture style which developed at the same line with technology development.

, our concern was to create a design that represent the time and how to link our history and the future with a touch of locality and Identity by a portion of Design.

The inspiration of the design came from the old city layout (shape), the layout of the city movement by

achieving the objective to create a new mental vision of the city, and sustainable urban design that can manage the rapid human growth in the future changes.

The final design, is out of ordinary since, it has a unique stamp that give the emotion of innovation, newness, modernity and digital.

AR04 URBAN DESIGN PROJECT/NEW DUHOK (RESIDENTIAL ZONE)

By: Hafta Ahmed, Hayman Abid, Hivi Salim, Dileen Lazim
Supervisors: Mr. Aram Omar Bamerany

The project is urban design, located south of Duhok city to a new location (New Duhok). Which consists of five sectors (Residential – Entertainment– Media – Commercial and Administration), over total area of almost 1500000 m², each zone consists of 4 to 5 projects.

In Kurdistan in general and Duhok city in specific, cities are built with no considerations to the cultural and historic identity, with almost no strategies of designing urban spaces.

The main objective of this project, were to create a city with facilities to meet the nowadays needs, while representing the history and tradition of this country. Designing a project



through function, form and durability; requires study through elements of urban design, and Kevin Lynch Elements of mental image.

Were the team inspired the concept based on two layers, the first, the layout of ancient Babylonian palace and Hanging Gardens, while the second is Duhok valley's layout because of their significance importance.

This project has an economic feasibility and possibility of construction in terms of materials, it is affordable residential project overall.

The adopted architecture style is Local Style (as main architectural style), all traditional elements are taken and used in the design, e.g.: the details of arch and entrance, while playing with the elements sizes and scales and the court with different approaches throughout whole project in order to connect the spaces. Because of the nature of site, it's divided into three levels that representing the hanging gardens of Babylonians.

AR05 URBAN DESIGN PROJECT/NEW DUHOK (MEDIA ZONE)

*By: Avivan Muhammad salih
Abdulkareem , Sazan Gharbi*

*Rasheed ,
Daban Sadiq Salih , Bahra Khiyo
Aziz*

*Supervisors: Mr. Hussein Ahom
Yousif*

The urban complex of New Duhok consists of five zones (residential, entertainment, commercial, media and administrative) of 1500 km² in.

The main challenges of Media modern city, were deconstructing its traditional shapes, through the application of famous paintworks or (Kandinsky) that resembles deconstruction style to carry this challenge through.

Main objectives

- To break the norm of Duhok city skyline and create a new skyline.
- To create sustainable and environment urban design.
- Creating an easier movement through links to connect all site.
- Creating public gathering open spaces, and emphasize its importance for people.

The final design is consider special, because of its environmental benefit



that been considered to satisfy the occupant.

The adopted architectural style, is Deconstruction style. Where the team worked with breaking lines and deformation of shapes and steep edges. So, it was designed according to the principles and characteristic of deconstruction style, the steep edges in this design highlighting and breaking the form into sub sector, with the use of even ratio of glass and solid through the urban design.

FOURTH YEAR PROJECTS

AR06 OPHTHALMOLOGY HOSPITAL BUILDING

*By: Ayman Abduljabar, Azhar
Ahmed*

*Supervisors: Dr. Najih M.
Mohammed, Mrs. Jowan B.
Khorshed, Mrs. Wafaa A.
Sulaiman.*

The main objective of the project is to achieve the flexibility of the architectural forms, facades and the function in the hospital buildings.

The Team concept is related to the function of the building itself, which is Ophthalmology, the idea's inspiration was by the layers of the eye and how the motion of the eye. The challenge was how can embodied to the building. The representing layers can

be seen in the downward motion of the building and gives the outmost reach of an eye movement to spectrum. At the same time, it is applied in the building's façade as the main grip of the project which utilizes the function of louvers to show there is a possibility in the architectural facades of using the various geometric shapes. where, creating a pleasant space within the building as well as the surrounding of the projects.

The plan layout was solved according to the circulation of the patient and staff with optimum importance of reducing the congestion of pathways in the building and having the shortest possible routs of the spaces that required in the site Plan which formed according to the route of the users movements and to make sure there is no intersections with emergency exits.

For the Building function itself the deviation of the plan which is seen as a half circle, the half circle is suspended in air to show the dominance of the administrative part of the building, and it is located in such a way to have a certain correlation between spaces.



AR07 REDESIGN AZADI COMPLEX

By: Haveen Younis, Larsin Elias, Helan Muhsen, Saif Mahir
Supervisors: Dr. Najih M. Mohammed, Mrs. Jowan B. Khorsheed, Mrs. Wafaa A. Sulaiman.

Site Area: 376,000 m²

Style: Modernism Architecture Style

The health complex consists of many types of Hospitals and facilities: (A general hospital, pediatric hospital, kidney hospital, eye hospital, cardiac hospital, prosthetic limbs center, blood bank, rehabilitation center, health school, dormitories). The concept has been started from thinking of the entrance and exit of emergency street, and how to create a separate path of ambulance and to be underground of the building and make sure to not be intersected by other site vehicles movements. One of benefit of this idea is getting higher speed to the building specially in some cases of emergency situations for the patients.

On other hand, the design focused on the pedestrian path, in which people can have better access of moving through the site.

Moreover, for environmental issues, focusing on green spaces to be as central points for all hospitals. Where, the site designed just for

pedestrian and the vehicles is not allowed.

AR08 FACULTY OF ENGINEERING BUILDING

By: Heja Abdulqeuhar
Supervisors: Dr. Najih M. Mohammed, Mrs. Jowan B. Khorsheed, Mrs. Wafaa A. Sulaiman.

The idea of the project is representing the infinity expression and infinity as symbol and due to the project nature, which is educational building, the designer tried to link the idea of there is no end or limit of person education in the world by applying it in the function, form of the building itself.

Metabolism architecture style is the style that used in the project, , and to achieve the idea with thus style, the designer tried to abstract the infinity units, And to accommodate the function of different zones of the project including (studios, workshops, laboratories, exhibition and lecture halls), entertainment facilities (restaurant, gathering spaces) along with administration zone , with large library and other service amenities all together to create a vivid building that support to increase the productivity of individuals.



AR09 FACULTY OF ENGINEERING BUILDING

By: Nadim Sahmi

Supervisors: Dr. Najih M.

Mohammed, Mrs. Jowan B.

Khorsheed, Mrs. Wafaa A.

Sulaiman.

Style: Deconstruction architecture style, Department of Electric Building.

This project was inspired by many of aspects first, the style of deconstruction and how it integrates with the project itself and how to the represent the second aspect of the project which is the more philosophical aspect. This consist of the value of a collage in society, as seen from the perspective of a resident. The collage represents the foundation of the community that everything rests on the shoulders of the people that nurtures the future and it is the start of the betterment of the community which leads to the third part of the concept. The corruption of our current society is an ever concern in every community not only in Kurdistan, I have represented these on the building itself by creating the a chaos in one part of the building which represent the corruption, while the other part is seen as frames that rise from the ground and establish a direction which gives the hope that this is where everything starts and goes on

to a better future while resting of the layers of Kurdish accomplishment.

The site of the building utilizes the levels of the site to accommodate the underground and making it a part of the building as a public area which can be directly accessed from its own entrance rather than having to enter the building itself. The transition of the building layout also helps to create a strong connection with the outside area.

AR10 FACULTY OF ENGINEERING BUILDING

By: Payman Bahjat

Supervisors: Dr. Najih M.

Mohammed, Mrs. Jowan B.

Khorsheed, Mrs. Wafaa A.

Sulaiman.

Style: Metabolism style of architecture, Department of Electric Building.

The main aim of the project is to redesign the existing building to solve existing problems and improve it to better according to circulation paths (vehicles, parking and pedestrian), and take in the consideration the orientation and climate, topography, the height and the skyline of surrounding buildings.

This project is designed according to the metabolism style of architecture, the style depend on units ,here it used units each one has its specific



independence function and by the main horizontal and vertical circulation connected together, this simulates the function of electrical poles and how it transforms electrical wires from one place to another and also, electrical boards have many square units .

The project incorporates these supporting facilities (studios, laboratories, exhibition, lecture halls), entertainment facilities (restaurant, gathering spaces) also with administration zone, library and other services amenities.

AR11 HOSPITAL BUILDING/ REHABILITATION CENTER

*By: Ayman Akhteyar, Sahand Tahir
Supervisors: Dr. Najih M.
Mohammed, Mrs. Jowan B.
Khorsheed, Mrs. Wafaa A.
Sulaiman.*

Designing a rehabilitation hospital for Duhok city in a time the city needs such a center for this type of patients, the team have been inspired by the four stages of rehabilitation and wanted to apply those stages into the building and supply the most comfort zone for the it by adding green areas to inside and outside of the building, having wide and large open areas for the patients and for relaxing purpose in the building.

Using new technology is one of the main objectives of the design, parametric design is the main style that used in designing the elevations and the site plan, the reason that been used the parametric is for getting an opportunity to supply the building by the maximum of comfort space such as, having pools, sitting areas, rounded circulation inside and outside of the building.

While, the plan layout and for the better circulation, all the rooms have access to the green areas in the ground floor and first floor, that what the designers focused on it, to make the building more look like luxury than it is just as hospital for treatment purpose but also to be a place for the people engage and interacting together.

AR12 OPHTHALMOLOGY HOSPITAL BUILDING

*By: Saif Mahir, Larsin Elias
Supervisors: Dr. Najih M.
Mohammed, Mrs. Jowan B.
Khorsheed, Mrs. Wafaa A.
Sulaiman.*

Location: Azadi complex of Duhok / Iraq

Site area: 12.000 m²

Foot print area: 2700 m²

Total floors area: 9700 m²



Style: Deconstruction Architecture style

Concept: The idea of the form is dismantling the solid mass of the building by the reflections and refractions of the fallen light on the dome of the building, which in turn represents the lens of the eye. The building achieves the benefit of the irregularity of the reflections and the formation

of the building's main blocks

Function: this building is organized for health purposes and serves humanity.

It is designed for 50 beds and for all age categories including emergency, outpatient, inpatient, surgical, laboratories, services and administration.

AR13 HOSPITAL BUILDING/ REHABILITATION CENTER

By: Sasan Safar, Nadim Sahmi

Supervisors: Dr. Najih M.

Mohammed, Mrs. Jowan B.

Khorsheed, Mrs. Wafaa A.

Sulaiman.

The objective of this project is to create an environment that helps the most with recovering patients to get back to their normal lives after their medical treatment in other hospital, as a result of evaluating successful similar projects, the designers came

to a conclusion that a building that offers the most interaction with exterior, which includes natural lighting and ventilation can greatly boost the recovering process of patients. So, the first concept layer of this building is the openness of the plans which offers the most interaction with outside area, a side from the exterior being mostly openable glass and windows.

The concept of hierarchy is realized in the plans as well as in the elevation and form itself while proposing the need of importance of private section as well as the elevated spaces being a reasonable distance away from the main public area. By further emphasizing the privacy of the selected patient areas, it is added louvers, which also adds to the importance of these particular rooms.

The site was made with circulation of vehicles being as direct and smooth as possible while also retaining the possible counters of the site and giving it a pleasant outdoor area, which is detached from the main traffic. The circulation of cars was minimized as we wanted to integrate the building more with the site to create a greener environment.



AR14 REDESIGN AZADI COMPLEX

By: Ahmed Ameer, Payman Bahjat, Heja Abdulqghar, Warveen Adnan
Supervisors: Dr. Najih M. Mohammed, Mrs. Jowan B. Khorsheed, Mrs. Wafaa A. Sulaiman.

Redesigning Azadi campus site, as an urban infill project, with minimum negative impact to the existing building and with minimum cost. Due to the azadi campus site day upon day is getting more problems with traffic and its circulations, less green areas, and the lack of connection between buildings, and the availability of each building's service and parking. First, the team designers tried to solve the circulation problems, then made some area for greener and accommodation for people, by removing some old or unnecessary buildings and using their sites for public spaces for people.

Second, the designers tried looking for a good connection between buildings by closing those buildings that have strong relation to each other, or by making easy access between them.

The outlines of the additional building were restricted by the existing buildings, all have rigid forms with simple cubic or rectangular shapes with right angles, so the design

connected the outdoor spaces with different lines styles from buildings, also, used a free curved line around buildings in order to distinguish between buildings and outdoor spaces.

AR15 FACULTY OF ENGINEERING BUILDING

By: Warveen Adnan
Supervisors: Dr. Najih M. Mohammed, Mrs. Jowan B. Khorsheed, Mrs. Wafaa A. Sulaiman.

The concept started with the urban project of the faculty of engineering in duhok university, after deep examine for the engineering departments are all standing alone without the relation or a good accessibility between them, the designer tried to solve this problem and make them all link to each other's

Then the designer tried to design one of the faculty building, for this project is Mechanical engineering department, the inspiration of the concept was from the level of knowledge, and the ability to develop human skills by reading, studying, and then how to developing the skills. And to consider this idea, it has been using the shape of (book) and as a source of knowledge.

For the source of the form was inspired by the architectural style



(deconstruction), as the style requires not a rigid geometrical shape, but the fragmentation of this shape to a none right angle or irregular shape

The building incorporating all facilities (studios, workshops, laboratories, exhibition, lecture hall), entertainment facilities (restaurants, gathering space) with administration zone, a large library with other services, all gathering to make a building with the availability of all student's requirements.

AR16 FACULTY OF ENGINEERING BUILDING

*By: Zainab Mohammed
Supervisors: Dr. Najih M. Mohammed, Mrs. Jowan B. Khorsheed, Mrs. Wafaa A. Sulaiman.*

The main objective of the project is to redesign the existing Electrical Engineering Department in university of Duhok, with solving the existing problems and improve the correct use of building by improve the design. The style used in this project is Folding Style which one of the most important characteristics is Continuity.

The concept of the project can be divided into three main phases; First, the designer used site characteristics, rectangular shape

(which represent organization, regulation and inequality which is required in the faculty), then compose 0 them by using the idea of electricity work , and finally form them according to folding style and according to deep study for site restrictions, orientation, design principles, wind direction and Topography.

The project is incorporating all supporting facilities (Studios, Workshops, Laboratories, Exhibition, Lecture halls), Entertainment facilities (restaurant, gathering spaces) along with administration zone, a large library and other service amenities, all together creating a healthy vivid campus that support collaborative work for graduating productive individuals.

AR17 INTERIOR DESIGN PROJECT

*By: Haveen Younis
Supervisors: Mr. Naram Murquis Issa, Mrs. Marwah Muhammed Saeed*

Project Name: Bao Bao Bag Shop

Site Area: 974 m²

Style: Modernism Architecture Style

Concept: It's derived from 2 basic figures. The first figure is the pattern existed on the bags of Bao Bao brand of bags, which is their famous



pattern. And the second figure derived from the Kurdish cultural tool which is called “Tashi”, exactly from its circular round movement of its thread From first figure, I copied the pattern on floor and ceiling, with some minor edits, and I pulled up some furniture from the outlines And from the second figure, I put a helix on the floor which is like thread’s movement, and I made some circular furniture from the round moving. Also, I designed some ceiling lights like the shape of Tashi.

Function: It’s a handbag shop, designed for shopping bags of Bao Bao brand. Inside, the showrooms are mixed and they’re two (Main & Special/Private), which is existed in the center of the shop. Also, two front glass show areas for outside shop’s front. And there are administrations (Admin’s office & Cashier), with a small storage at back of the store.

AR18 LANDSCAPE DESIGN

By: Shereen Bapeer

Supervisors: Mr. Naram Murquis Issa, Mrs. Marwah Muhammed Ssaeed

Site area: 1865 sqm

Style: Indian & Persian Style

The idea of concept comes from two layer

The first Layer has been taken from site which already have violin here I took (Violin strings) and use it as an element to divide site.

Then the second Layer, took from style which is (Jali Indian pattern) .

* Jali or Jaali (meaning “net”) is a form of Architecture decoration is Common in Hindu temple architecture.

AR19 INTERIOR DESIGN

By: Solin Ibrahim

Supervisors: Mr. Naram Murquis Issa, Mrs. Marwah Muhammed saeed

Project name: Roman Beauty Center

Type of design: interior – beauty center

Site area: 974 sqm

Style: Mediterranean

The concept is derived from 2 basic figures. The first figure is taken from part of the plan of roman bath as part of beauty center. And the second figure derived from (alfosaifsa) which Mediterranean use it in their design.... From the first figure I copied the part of plan on the floor, and using arches on walls and ceiling, and used roman style to furniture and other details, from second figure i copied pattern on the floor and some part of walls and used



color of Mediterranean style which is (blue) to feel more about the style

Function: it is beauty center, designed for beauty purpose and women care, inside there is body care zone and manicure zone at the back of the center. Also, office and storage. And the reception at the center of the beauty center.

THIRD YEAR PROJECTS

AR20 OFFICE TOWER (10000 SQ. M) IN QAZI MOHAMMED ROAD /KRO,

*By: Anna Khoshnaf Moheammed ,
Naz Mohammed Faeq
Supervisors: Hawar Abdullah Yousif,
Serbest Khaleel Ismael*

The designers of this project were inspired the project concept, from the mechanism of “Sandglass”, connecting “time limitation” offices work and the sandglass. The arches of the tower’s elevation are inspired by the body shape of the sand glass, two arches, each one on a side where used, with a creative designer touch for softer, attractive, and elegant shape. At the other hand, that touch added more internal area to the tower. In addition, straight lines with rectangular shapes were used in the tower base and at the outlines to, aiming to link the tower with its rectangular shaped site.

The structure of the building is based on the use of glass, steel structure in the arches “Shells”, reinforced concrete for column, slabs and shear walls. The tower consists of twenty-five floors on the ground and three more underground basement floors. This project is a commercial project, where 35% is offices that distributed in the tower mass, 11% supportive spaces for employees (e.g. Markets, restaurants, rest rooms, gym, smoking room, etc.) distributed in the tower base and 19% car parking in the basement floors.

AR21 OFFICE TOWER (1000 SQ. M) IN ZERI LAND, MODERN STYLE

*By: Solin M.Nadhif M.Salim, Jeen
Mousa Sleman, Dejin Mohammed
Hamdi
Supervisors: Mr.Hawar Abdullah,
Mr.Sarbasr Khalil*

The aim of this project is to have a tower that have serve different types of use in one building. Although, the main function of the building is offices, it has restaurant, shops, mini market, health centre, etc.). The concept was inspired by the wind phenomena and movement, that been simulated in the web grid around the building that been inspired by tornado mechanism while turning around the objects.



The functional structure of the building consists of four underground floors (e.g. service floor and parking lots), a base of three floors while the tower has twenty-two floors except the base. The ground floor consists of (reception and lobby, restaurant, resource, supporting spaces for employs and administration zone), First floor has shops, Gym, restaurant and services whereas the Second floor is conference halls and its services. The other floors are consisting of offices which been categorize into four types (large office, medium office, small office and personal office).

The height of all floors is 86.8m, while the total height of the tower only is 100m. The structure of the building is columns and beams with shear-walls. The other floors are consisting of offices which we have four types (large office, medium office, small office and personal office).

AR22 SHOPPING MALL CENTER IN ETIT, DOHUK

*By: Hozan Sherif mohammed
Supervisor: Hawar Abdullah Yousif,
Serbest Khaleel Ismael*

This project is located in Etit_Dohuk, the area of the site (70000 sq.), with a ground floor area of (10000sqm). Circulation of Shopping malls is essential issue for an easy access and navigation of customer. Thus,

the designer depended on the circulation, where two perpendicular axes been created, forming two (L) shapes so that the movement will be smooth and fluent. The façade elements (window and colours) is designed using postmodern style.

AR23 SHOPPING MALL CENTER IN ETIT, DOHUK, POSTMODERN STYLE.

*By: Dejin Mohammad Hamdi
Supervisor: Hawar Abdullah Yousif,
Serbest Khaleel Ismael, Mrs. Hanan
Mihi Hussein*

The designer in this project combined postmodern and modern architectural style, through adopted the Assyrian palace (postmodern part) using the gate and detail of Assyrian palace in the entrance and façade as attraction element, which be combined with modern features such as glass and steel. The project is consisting of three floors, the ground is 4.80 m height and basement that have parking, utilities and engineering services. Structure is consisting of column and beams reinforced concrete and steel structure and shear wall in the basement. Main function of the mall is both entertainment (e.g. restaurant, café, cinema and playing hall) and shopping (e.g. shops and hyper market). In addition, a plaza is created outdoor and indoor for the



purpose of relaxing, gathering and sitting places.

AR24 SHOPPING MALL CENTRE (12000 SQM) IN ETIT- DUHOK

*By: Esra Tariq Mohammed
Supervisor: Hawar Abdullah Yousif,
Serbest Khaleel Ismael, Mrs. Hanan
Mihi Hussein*

The designer of this project inspired the concept from Basilica of Trajan found in Roman architecture, the elements used are (the circles and semi circles) in plan. While the façade used postmodern architecture style, by using arch windows and flat roofs in one side of the building (similar to historical buildings) and Straight, Random lines, and non-flat surfaces in other side of the building. The circulation was designed to focus on providing easy access for visitors, in term of movement and visual access. The ground floor plan is about (12000 sq. m).

AR25 SHOPPING MALL CENTER, POSTMODERN STYLE

*By: Hariwan Jalal Smo
Supervisor: Hawar Abdullah Yousif,
Serbest Khaleel Ismael, Mrs. Hanan
Mihi Hussein*

The concept of the project inspired by historical buildings elements, the adopted element is “the Arch”,

because arch carry the construction load, which been imagined as similar to the flow of visitors and staff in the shopping mall. As well using the metaphysic movement while using contrast shear wall.

The design in general focused on the flaunty of movement and open spaces, by providing the visitors with a direct visual access to all shops at the entrance. This project consists of shops at ground level, entertainment areas at second floor. The first floor is designed to encourage people to walk around in the mall (marketing strategies, maximum window shopping), on the other hand it designed for structural reason to solve the problem of space with double floors height such as the cinema. Using different elevation levels, the service entrance is allocated at the back of the building while at higher level the main entrance is taking place.

AR26 SHOPPING MALL CENTER IN MALTA/DUHOK POSTMODERN STYLE

*By: Hajar Salman Sadiq
Supervisor: Hawar Abdullah Yousif,
Serbest Khaleel Ismael, Mrs. Hanan
Mihi Hussein*

For this project, the designer adopted “zigzag pattern” found on Erbil citadel wall. The designer adopted Erbil citadel because of its importance to



the Kurdish architectural heritage, as one of the oldest and finest building. Besides, the shopping, the mall also is used for entertainment and relaxing (e.g. restaurant and café), thus, A plaza is added for movement and gathering of visitors. The project consists of three floors, that been designed using modern materials such as glass, steel, reinforced concrete and steel structure.

SECOND YEAR PROJECTS

AR27 MOUNTAIN VILLA (980 SQM),

By: Chra Miro Mohammed
Supervisor: Mr. Naram Mark, Ms. Marwa Mohammed Saeed, Ms. Armange Ismael

The idea of the project comes from three sources starting from the site by borrowing some lines from the mountains and also from the project itself which is a villa for an air planes the site which is mountain area and also from project which is a villa for an airplane designer and the 3rd source is from the style which is the art nouveau style which is the jewelry.

AR28 DESERT VILLA (980 SQM)

By: Jisar Naef Ahmed
Supervisor: Mr. Naram Mark, Ms. Marwa Mohammed Saeed, Ms. Armange Ismael

The concept has been applied on three levels, the first one is from the cracks in the ground which is from the site of the project in the desert location, the other source is from the function of the project which is a villa for a hand craft designer and the third source is from the style which is the expressionism movement.

AR29 FOREST VILLA

By: Noora Sherzad Ali
Supervisor: Mr. Naram Mark, Ms. Marwa Mohammed Saeed, Ms. Armange Ismael

The concept has been applied from two sources starting from the site which is a forest site and the concept that applied is the cell shapes of the tree leaves which have hexagonal shapes and has been applied on the site plan level with the other floor plans to form the main composition of the project. The other source which been applied has been taken from the function of the project which is a villa for a fashion designer and a fabric pattern has been applied on the site plan level interlocking with the composition.



AR30 MILITARY AIR PLANES DESIGNER VILLA (980SQM)

*By: Saif el-deen Sardar Mohammed
Supervisor: Mr. Naram Mark, Ms.
Marwa Mohammed Saeed, Ms.
Armange Ismael*

The concept of the project has been applied depending on two sources, the first source is from the site of the project which is mountain site representing by the lines and shapes comes from the mountains like the triangle which has been used as a framing element to cover a part of the project like the mountain itself and the other parts beneath representing the other source which is from the function of the project as a villa for an airplane designer and the main idea from this source was the helicopter shot gun by its circular shape to form the main part of the project.

AR31 LAKE VILLA (980 SQM)

*By: Sipan Ahmed Nitham
Supervisor: Mr. Naram Mark, Ms.
Marwa Mohammed Saeed, Ms.
Armange Ismael*

The main concept of the project has been applied by using to levels of concepts starting from the project itself which is a villa for a military plane and the idea that applied is from the main lines and shapes of the F22 Ghost military plane which applied on the plan and site plan

level connecting the project with the other parts of the site plan to the lake which is included within the site. While the other source has been applied by a painting from the style of the modern architecture representing by the expressionism movement mixing its lines with the other details of the project.

AR32 HAND CRAFT DESIGNER VILLA (980 SQM)

*By: Sumaya Abdul-Aziz
Supervisor: Mr. Naram Mark, Ms.
Marwa Mohammed Saeed, Ms.
Armange Ismael*

The concept of the project has been applied on three levels starting from the site level which is a desert site in which the idea comes from the cactus plant which is a style of the desert so the main composition has been arranged like the arrangement of the cactus plant as a spiral toward the centre of the project representing the entrance to the other project facilities. While the second idea comes from the style of Art Nouveau within the modern architecture in which many solutions for the openings has been applied.



FIRST YEAR PROJECTS

AR33 ARCHITECTURAL COMPOSITION

Supervisors: Dr. Kadhim Fathel Khalil, Ms. Cebar Jamel Sadiq

Architectural design, is the first stage of obtaining a professional qualification in architecture.

So, the objectives of these projects are to provide basis on which students can progress to professional master of architecture by integrate design principles with architectural design. Besides

developing the sense of presentation and tidiness needed in architectural work. This project we present in design day this year focuses on an introduction to principles of design and provided students with: Develop the drawing skills necessary for architectural design, Initial thinking of composition and try to apply principles of design on tangible work, and shifting the perception from two dimensions to three dimensions.



ELECTRICAL AND COMPUTER

GRADUATION PROJECTS

ECE01 SPIKE DETECTION OF NEURAL ACTION OPTIONAL

By: Awas Jaafer Abo-Zaid, Dilan Idress Hasan, Sundis Jafar Kalash, Dalal Mohammed Ali, Narmin Rasheed Hussien
Supervisor: Dr. Ahmed Khorsheed

This project presented an algorithm that extracts three specific features from a neural signal. These are: (1) peak (timing) detection, (2) peak amplitude extraction. These two features are crucial to facilitate subsequent processing such as spike alignment for spike sorting or envelope tracking for automatic gain control. The method selected for spike detection is based on a single threshold comparison. The input neural signal is compared to a preset threshold value (derived from the signal itself- typically a multiple of its standard deviation). The simulation result determine the true peak (TP) that is the correctly detected point of a peak candidate. A true non-peak (TN) is any correctly detected non-peak point of a peak candidate. A false peak (FP) is an incorrectly designated non-peak point of a peak candidate, a false non-peak (FN) is

any incorrectly detected true peak point of peak candidate.

ECE02 THE SMART ALARM

By: Eman Abdulbadih Zubair, Hivedar Ismail Muhammed, Naleen Mahmoud Mohammad, Rayyan Ramazan Abas, Rejin Jalal Fariq
Supervisor: Dr. Omar MS Ghazal, Mrs. Delan S Al-Sofi

Time management and committing to a specific day-starting timing is always a challenging part of ones' life. Although sound alarm may be enough for many individuals, yet, it might not be enough for others and more helpful means might be required.

In this project an alarm system was designed to have three periods of alarming starting by the sound alarm, to physical alarm when slight shaking of the bed starts after 1 minute, and ending with sprinkling water drops at the feet to awaken the user.

The project was powered by Arduino to initiate the three alarms sequence. The project was divided into two tasks. The first one is to physically design a shaking bed and water sprinkling system and connect the whole system together, while on the other hand, the software part was



done to program the microprocessor and connect the physical system to the user mobile phone where the whole control panel is designed to be an app on the phone.

ECE03 IOT BASED SMART HOME AUTOMATION

By: Dahren Mustafa Kanabi, Dilbeen Farsat Yousif, Hastyar Hiwa Saeed, Nora Naaman Shahbaz, Vajeen Ageed Saleh

Supervisor: Dr. Yassir A. Fathel

Recently different appliances have been presented in a house with the development of social economy and rapid increase in the needs of the people. There is a problem in the management and control of these appliances so as to meet the comfort, health and security at home. To overcome this problem a smart control-based system can meet these requirements. When we talk about Internet of things (IoT), there are large numbers of distinct devices which are connected throughout different systems. These systems provide open platform to all digital devices accessing data from such systems. So, it becomes quite difficult to design such a system for IoT which can handle large classification of devices and also technologies. To connect such a sophisticated network on IoT one need to have central server (server

could be created over Wi-Fi network) which can facilitate all smart phones, tablets and other digital devices.

This system enables on demand controlling or switching between on and off states for some of the household appliances and their period of working. Mostly, among these appliances are; those of air conditioning, water heaters, water pump motors, lights, etc. The parts list is consisting mainly of the NodeMCU Micro Controller, some connecting wires, etc. After practical implementation of the prototype system, the challenges against application on larger industrial or governmental buildings will be investigated.

ECE04 OPTICAL GAS DETECTOR

By: Pauhshan Saifdeen, Kareem Abdulmajeed Shareef, Roweyda Mahmood Mahmood, Vina Farhad Salman, Layla Ali Ahmed

Supervisor: Dr. Omar MS. Ghazal, Mrs. Delan S. Al-Sofi

Many industrial applications of laser and other optical devices aimed for the user safety, one of these applications is the optical detection of the industrial fluids especially when considering that many of these fluids are poisonous and hazardous to the workers lives.



The main property of light that are implemented in many detectors is the absorption of the light when passing through a medium. Since light signal decreases when it passes through the absorbing fluid chamber due to this absorption a photo sensor (a photodiode) can sense a decrease in the received optical signal if enough amount of fluid exists.

In this project, a prototype of a universal gas optical detector targeting alcohol vapor which is absorptive in the red region of the visible light (~650 nm). The reason of selecting such type of fluid is being close to the fluids used in the hospitals for further development of the device and the fact that many of such gases can be safe to work with at this step. The project is powered by Arduino microcontroller in addition to the optical part to give three levels of gas contamination and divide the three levels to safe, caution, and danger

ECE05 SMALL WIND TURBINES ALONG HIGHWAYS IN DUHOK CITY

By: Ahmed Akram Abbas, Allin Odisho Zaya, Fatima Al-Zahraa Jihad Medhat, Nareen Nasrullah Hasan

Supervisor: Mr. Khery A. Saado

Vehicle-induced turbulent airflow by the traffic in the highways is one of

the sources of wind energy which can be harvested to supply the power to the highway lighting and telecommunication signaling. This work focuses on the assessment of potentiality of implementing small scale wind turbines along the highways in Duhok. This study conducts wind speed measurements adjacent to the highway, a major highway in Zakho road, Duhok. Three positional parameters are investigated for suitable placement of the wind turbines. They are: the lateral distances from the road shoulder, the heights from the ground, and the orientation of the wind turbines relatives to the road. Using all of the collected data, existing streetlights on the medians can be fitted with these wind turbines. Additionally, since the wind source will fluctuate, a storage system for the power generated is used to distribute and maintain a constant source of power. Ideally, the turbine can be used globally as an unlimited power source for streetlights and other public amenities.



ECE06 SMART SHOPPING CART FOR KURDISTAN MALLS

By: Nishra Ashmail Lazar, Alan Khalat Hussein, Maryam Ameer Ohara, Maryana Franso Esho, Nohara Poles
Supervisor: Mr. Faris A. Ketî

Recently, Kurdistan region shows a rapid development in many areas such as: business, infrastructure, and technology. As a result, the number of malls and big stores (markets) has been increased. Traditionally, the customers were enforced to push the shopping cart which was difficult for disable customers. They also enforced to ask for the prices of products if their prices labels did not exist. The aim of this project is to control the shopping cart via mobile rather than hand. It also provides the customers (end users) with the facility of reading the prices of products via barcode.

ECE07 DESIGN AND IMPLEMENTATION OF PICK AND PLACE ROBOTIC ARM

By: Diler Agid Othman, Hindav Ibrahim Mahmood, Khayri Sadiq Salih, Sayran Abdulrahman Saleem
Supervisor: Dr. Mohammed Ahmed Shaker and Ms. Jeeman AM. Khorsheed

Peoples are always looking for some things to facilitate their hard works or

daily routine works. At all centuries peoples tried to design that things in different forms and develop them up to now.

In This project a microcontroller based, pick and place robotic arm is designed and implemented.

The proposed system consists of the following: Arduino microcontroller, HC-05 Bluetooth module a set of servo motors and an ultrasonic sensor. An android mobile application is created to send commands to the robotic arm. The ultrasonic sensor will provide feedback to the system thus the designed robotic arm becomes a smart robotic arm. We designed, built and tested this system to successful operation.

ECE08 EFFICIENT CHARGE CONTROLLER FOR SOLAR PANEL

By: Khame Huseen Ahmed, Rozhan Abdulla Ali, Shaima Muheadin Muhammad, Mohammed Hussein Abdulkarim, Imaad Othman Salih
Supervisor: Dr. Ismail A. Ali

A charge controller is a voltage regulator that prevents overcharging batteries. Low cost charge controllers only charge batteries when sufficient light is available and cannot make use of the power generated at low lighting conditions



at dawn and dusk or when it is cloudy.

This project will involve designing an efficient controller that adjusts the charging current to achieve maximum power transfer using maximum power point tracking (MPPT). The charge controller tracks the power generated by the solar panel and regulates the voltage generated by DC-DC converter to achieve optimal battery charging at different lighting conditions.

The controller will also prevent overcharging batteries and disconnect the load when the batteries become overly discharged.

ECE09 DESIGN OF A SOLAR POWER SYSTEM PROTOTYPE BY CONCENTRATING SOLAR THERMAL

*By: Albert Khoshaba Odeesho, Ismael Issa Ismael, Nihad Salih Ahmed, Onil Muneer Shamoon
Supervisor: Dr. Lokman A. Hadi*

A prototype of a concentrating solar power tower system is designed and constructed to produce electricity from solar energy. Mirrors are used to direct the solar energy to a solar receiver which contains water. The water will be heated until it evaporates and becomes steam. The steam energy is used to rotate a small turbine that is coupled to a

generator to produce electricity. The condenser condenses the steam back into a water and returns it to a solar receiver. A single heliostat is implemented to direct the sunlight to a solar receiver during daylight by using two small servo motors and a single microcontroller.

ECE10 HUMAN TRACKING FAN SYSTEM

*By: Yaseen Nawzad Khalid, Rebwar Hasan Ali, Aeda Adil Ali, Kajen Hikmat Nizar, Shler Basher Haji
Supervisor: Mr. Namiq S. Abdullah*

This project deals with the design and implementation of a human tracking fan. Our lives are, day after day, getting more involved with technology than ever. And there is more demand for automated devices and appliances as some people in certain areas tend to focus on one task to get the best results. The model introduced here is mainly based on tracking people using signals from PIR sensors. The PIRs address a motor to rotate towards where a human is standing and they keep track of the movement so that the air from the fan is always direct to the user.



ECE11 3D PRINTER IMPLEMENTATION

*By: Sipan Hazim Mhe, Hisham
Wadullah Siddiq, Zakia Ali Hussien,
Yasser Ibrahim Mohammed,
Hassan Mustafa Ahmed
Supervisor: Dr. Serwan A. Bamerni*

3D printing is a type of additive manufacturing technology where a three-dimensional object is made by laying down successive layers of material which forms the final object. 3D printers offer product designers the ability to print parts and components that are made from different materials which have various mechanical and physical properties in a single build process. The more advanced 3D printing technologies currently yield model/s that closely emulate the appearance and functionality of the final product. 3D printing is achieved using an additive process, where successive layers of material are laid down in different shapes.

In this project, RAMPS 1.4 & Arduino mega 2560 have been utilized as the main components to implement the 3D printer, with the aid of some other electronic & mechanical parts, moreover the Marlin Firmware is used as the device software



MECHANICAL ENGINEERING

GRADUATION PROJECTS

MECH01 DYNAMIC RESPONSE OF CANTILEVER BEAM, SIMULATION STUDY THAT LEAD TO EXPERIMENTAL LABORATORY

*By: Ilyas Saeed Abo, Ivan Abdullah Younis, Renos Shawkat Taha, Redeer Sabah Smou,
Supervisor: Dr. Haval K. Asker*

One of the most efficient ways to understand vibrations is to visualize them. Therefore, this project intends to introduce a laboratory session to the third-year students of the Mechanical Engineering Department / University of Duhok. In the proposed lab session, the students will be able to predict the natural frequencies and to produce mode shapes numerically. Then, the students can perform dynamic vibration experiment on a prepared cantilever beam to compare the predicted natural frequencies with the experimentally seen natural frequencies.

Dynamic response information is useful in structural health monitoring to identify the location and magnitude of damage. Estimation of natural frequency of structure is very

important for vibration-based damage detection and is not usually calculated simply and can sometimes be complicated. In the present approach a cantilever beam is introduced with a MATLAB developed code to obtain eigenvalues and eigenvectors. Through the use of electrodynamic shaker at the base of the cantilever beam, the response of the vibration will be measured at three positions (base, middle, and tip) using Laser Optical Displacement Sensor (LODS). The predicted values of the natural frequencies shall be used to excite the cantilever beam experimentally.

MECH02 DETERMINATION OF THERMAL CONDUCTIVITY USING WATER VAPOUR.

*By: Znar Mahmood Ibrahim ,
Zeravan Miskeen Naser , Marwan Kagel Kasem , Enas Adil Salih ,
Hilbeen Tayeb Omar
Supervisor: Dr. Kasem H. Mousa*

Heat can be transferred in three different modes on of these modes is conduction heat transfer which depends on the thermal conductivity of the material or the ability of the material to transfer heat. In this project a new and accurate



experimental technique and method is used to measure the thermal conductivity of different kinds of materials by using the water vapor and ice for the existence of temperature difference for the high temperature medium to the lower temperature one, which is needed for the heat flow by conductivity in order to estimate the thermal conductivity of the materials.

MECH03 AN EXPERIMENTAL ANALYSIS OF DIFFERENT SURFACES HEAT EXCHANGER USING MINI WIND TUNNEL

*By: Kavi Salah Mohammed, Ikhlās Miqdad Ali, Dejeen Salim Mohammed, Sipan Waheed Jarjees, Dilber Omer Ismail
Supervisor: Dr. Arkan F. Saeed & Dr. Oday A. Abo*

Applications that utilize heat sinks for cooling electrical devices have been increased significantly during the last decades. In present work, the heat transfer properties of a heat sink, heat exchanger have been specified. An experimental rig was previously built to investigate the thermal properties using a mini wind tunnel.

The design calculation depended on change in heat flux across the flat plate and obtained results are compared with theoretical results. The heat transfer coefficient (h),

Reynolds number (Re), Prandtl number (Pr), Nusselt number (Nu), heat transfer rate...etc. have been calculated all with the properties of the air as a working fluid. A new correlation has been predicted which make easy method for predicting the thermal properties of such devices.

MECH04 EXPERIMENTAL INVESTIGATION FOR THE THERMAL CHARACTERISTICS OF OPEN WET COOLING TOWER

*By: Mustafa Khalil Ibrahim, Valantina Yonan Toma, Noori Raad Noori, Onel Kamal Yokhanis
Supervisor: Dr. Arkan F. Saeed*

Researchers and designers keenly seek to improve the performance of cooling towers due to the extensive impact on the work and efficiency of the systems concerned to these systems. For this reason, an open wet cooling tower (OWCT) modified with added packing, designed by P.A. Hilton H891 bench top cooling tower have been studied precisely. H891 OWCT was typically mounted with a forced draft fan at the bottom of the cooling tower, which allows atmospheric air to be drawn in to the column mounted on the system, and a pump also at the base of the unit is installed for pumping the hot water from the loading tank to water sprayers in column cab.



Due to the fact that there is no Catalog for this device which it should come with it, we intend to re-operate that Cooling Tower, and put on the keynote for the performance of that tower in order to be one of a basic device for the Refrigeration and A/C systems Laboratory for the Mechanical Engineering Department, in Duhok University.

MECH05 FINITE ELEMENT ANALYSIS OF 1-D HEAT TRANSFER PROBLEMS

*By: Ahmed Abdullah Muhsin,
Mohammed Salam Jasim, Sipan
Majeed Abdullah, Sagvan Shawket
Shni*

*Supervisor: Dr. Rafi' Mahmoud
Sulaiman*

Time-dependent or unsteady state problems are very common in heat transfer. In some of these time-dependent problems, the transient period occurs between the starting of the physical process and the reaching of the steady-state condition. Whereas, for some problems, the steady-state condition is never obtained, and in these cases the transient period includes the entire life of the process.

This project presents a numerical solution of one-dimensional steady

state and transient heat transfer problems without or with convection. This is done by the Finite Element Method (FEM) using weighted residual Galerkin's approach with one or two modes of heat transfer to discretize the mathematical model, i.e. the heat equation. The analytic solution was obtained by using the separation of variables method and Fourier series.

Three selected examples of heat transfer conduction problems without and with convection effects were analyzed and compared with analytical solutions. It was noticed that the finite element results are essentially the same or close to those obtained by the analytical ones. This evident show that the FE method is an efficient tool to model and solve different heat transfer problems for both transient and steady –state regimes under any initial and boundary conditions.

MECH06 APPLICATION OF WET SYSTEM IN HEAT EXCHANGER (INCREASE EFFICIENCY OF A/C) BY USING WATER

*By: Stevan Nasir Hurmiz, Danty
Hkmat Audisho, Rand Mohammed
feaq, Karwan Tahir Mohammed
Supervisor: Dr. Oday A. Abo*

Split system, evaporative cooling and electrical heater have the



greatest use in Middle East countries while these have an excellent sustainable effect on cooling and warming a house, Geothermal heating and cooling systems are just as efficient and more economical.

The major advantage of geothermal systems is their economical cost compared to all the other systems. But because of the very high temperature of summer in the Middle Eastern countries which makes the Geothermal cooling systems not to be effective that is why it is not dependable.

Our goal is to improve geothermal systems and solve this problem so that it would be dependable throughout the seasons.

The way we can make this possible is to combine geothermal system with another device that can cool down the circulating water in the system to the desirable level that will in turn get a good cooling effect. The selected device for this task is Adiabatic cooling with some extra improvements.

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