Project #1

Hardware Acceleration of RTL Constraints Solver

Dr. M. Watheq El-Kharashi and Dr. Khaled Salah
Number of students: 4

Motivation and Target

The RTL constraints solver's performance is one of the most critical characteristics that determine the overall verification efficiency. In the proposed methodology, a set of constraints describing valid input stimuli for the design under test (DUT) is accelerated using hardware. The methodology will be applied to a real-world hardware design.

Plan

1. Study SystemVerilog
2. Study constraints solving
3. Propose the methodology
4. Implement the methodology
5. Verify the methodology
6. Compare with related work

Project #2

Smart Wheelchair for Disabled Patients

Dr. M. Watheq El-Kharashi, Dr. Magdy El-Moursy, and Dr. Ali El-Moursy
Number of students: 4

Motivation and Target

This project is proposed to help disabled people who have Quadriplegia. This disease is a paralysis caused by illness or injury that results in the partial or total loss of use of all four limbs and torso. The project also serves other patients that have similar conditions, where they cannot move their legs and arms.

The proposed smart wheelchair will help a patient express his/her needs to the nurse without having her around all the time. It will have many features and capabilities to allow the patient to control the movement of the chair even with his/her disability. The wheelchair will be supported by voice recognition and head movement detection capabilities. Moreover, the chair will be equipped with a remote controlling to allow a distant nurse to assist the patent using the latest IoT technology.

Project #3

Smart Door Bell System

Dr. M. Watheq El-Kharashi, Dr. Magdy El-Moursy, and Dr. Ali El-Moursy
Number of students: 4

Motivation and Target

This project is about a smart bell system used by everyone including the disabled persons and elders. The smart door bell system will enable a person to open his/her home door only for the authorized and trusted people. The system will allow video and voice conversation to be conducted remotely between a visitor and the householder before granting home access.

The smart bell system aids in home security and allows the user to let the people he/she wants in without the need of being at home. In addition, it is useful for everyone even the elders and disabled people that always rely on someone to do the job for them. Now they can do it with a push of a button.

This project is divided into two parts: hardware and software. The hardware part involves building a small embedded system to transfer the conversation and control the door access. The software part is a phone application to allow a video stream of the knocker and a remote control of the door access.

Project #4

Memory Compression for Emulation

Dr. M. Watheq El-Kharashi and Dr. Dr. Khaled Salah
Number of students: 5

Motivation and Target

In this project, memory compression is proposed as storing data is the much consuming part during emulation process. Compression and decompression should be implemented on emulator. This will decrease the memory area overhead which is very important for complex memory protocols.

Plan

1. Study Verilog
2. Study compression techniques
3. Propose the methodology
4. Implement the methodology
5. Verify the methodology
6. Compare with related work

Project #5

Crowdsourcing App

Prof. Ahmed Hassan

Technologies: Mobile and Web Development, Machine Learning
Number of Students: 4 Students

Project description in points:

1- In crowdsourcing, the user can reach other users who can help him/her in his/her daily tasks, and these users are just normal people ..it will be freelancing for the ordinary tasks.
2- The user starts a new service request and writes its content, whether it's that he wants help in establishing his new startup, find someone to buy cheese from the supermarket, needs to recharge the mobile credit, he/she is lost on the road and needs some guidance or to know what mean of transportation to take, needs some information about governmental papers or issues from someone who has a previous experience, etc..
3- Services could be free or paid, and the user is the one who determines when the request will be initiated.
4- Free services makers will take points as an incentive for every free service they make and in the future maybe they can exchange it for discounts in certain stores or restaurants.
5- One service request may need more than one person to do it, the user chooses the number of people to satisfy his/her request and also chooses the amount of money he/she is willing to pay.
6- The user specifies the criteria needed for the service maker such as location, age, job, hobbies, or any keyword chosen by the user.
7- The user chooses the type of the service whether it's transportation, purchasing, information, etc ..or he can choose none of them if his service type is not listed.
8- The request may vanish after a certain period time determined by the service initiator, if no one responds to it.
9- The app search for service makers that have the criteria requested based on what they wrote on their profile when they registered on the app.
10- The user can choose also whether the service will be published on the homepage for all other users or not.
11- The user can ask for a service anonymously if the service was about exchanging information only.
12- The app sends a notification to the service maker.
13- If another service maker accepts the notification/request first, its state will be changed to 'resolved'.
14- The service maker can accept or reject the request, if it's paid he can also suggest certain amount of money, higher than the amount pre-determined by the service initiator.
15- If service maker wants more information or wants to negotiate, he can write a comment to the asker in the request, and the asker responds to him/her, without direct chat.

16- After service maker accepts the request, the one who asks for the requests has to confirm.
17- After accepting, the service maker and the user can contact each other through chat phone or text messages, and if there is more than one service maker in the request, the user can make a group chat between all accepted members.
18- Every user must provide his/her identity card, verified phone number, also a profile photo identical to that of identity card, before asking for paid services, in order to ensure safety for all users.
19- To handle problems that may happen in paid services, we thought of some procedures to be taken:
a- To make a paid request, user have to charge his balance on the app first by visa, or another payment tool (to be determined), in order to fine him if he cancelled a request after someone accepted it.
b- The user who asks for a service, may ask for any guarantee -while he is initiating the request-in order for him to make sure that the service will be done correctly.
These guarantees could be a receipt, a photo, a screenshot, or anything the user determines.
c- The user has to accept or reject the guarantee provided by the service maker, if he/she doesn’t for 2 days; the service maker can take his/her money.
d- If the user rejected the guarantee, they can discuss the problem through chat, and if there is still no resolution, any one of them can request for app resolution, and the app checks the guarantee provided.
20- The asker and the service maker will rate each other after the service is finished.
21- Every service maker below certain rating will be blocked in order to ensure services quality.
22- In the homepage, service makers can subscribe for certain type of services to see new request in their homepage.
23- The app will support user references.

Project #6

Project Title: Adaptive E-learning
Supervisor: Prof. Hoda Korashy Mohamed
Number of Students: 8
Required Skills:
- Object Oriented Programming
- Suitable web programming language
- Software Engineering
- Intelligent systems

Problem Statement:
E-learning system is an integrated set of interactive online services that provides the teachers, learners, parents with information, tools and resources to support and enhance educational delivery and management. It aims to access educational curriculum outside of a traditional classroom.

Objectives:
- Design Adaptive E-learning framework
- Design Intelligent Student model

Expected Deliverables:
- Web Application
- Android Mobile Application

Project #7

Project Title: Android App based ADAS System
Supervisors: Dr.Ashraf Salem, Dr.Hossam Abdulemenium and Dr.Bassem A. Abdullah

Description:
In this project, we will build an Advanced Driver Assistant (ADAS) system based on an android application. The application is developed to assist drivers, independently of the kind of car they are using, the type of road and the skill of the driver. The application main function is to analyze the road in front of the driver to detect any possible threats and notify him.

Technologies involved:
- Android Application Development
- Embedded Systems
- Machine Learning
- Computer Vision
- GPU [Optional]
- Voice Recognition [Optional]

* For optional technologies, one or more shall be used according to the features of the project.

A commercial product similar to the target deliverable of the project:
https://youtu.be/35DrKCurFhs

Project will go through the following phases and steps:
(1) Project Setup phase: October 2018
- Survey of the similar Android App based ADAS Systems in the markets
- Survey of the similar Android App based ADAS System made by amateurs and professional groups of students, young engineers
- Survey of the packaging options for the final product and determining the most suitable for the time, budget and local constraints
- Coming up with set of target features of the product that will be implemented in this project including competitive features.
- Put the high level design of the product and dividing it into modules with high level specifications.
- Put features for a pilot project (proof of concept or prototype) to be ready in two months
- Dividing the team into groups according to the design
- Coming up with technologies and skills to be studied by each group
- Coming up with procurement document
- Coming up with risks and challenges document
- Coming up with a list of non-technical activities to be done
- Forming committees to execute the non-technical activities
- Put a timeline for the next phases

(2) Project Pilot phase: November-December 2018
- Groups are working in learning list
- Non Technical activities should be either completed or full setup completed
- Pilot project (prototype of the final project) should be completed and ready for demo before fall semester 2018 examination starts
- Timeline and plan of execution is ready

Break 1: Mid of Dec 2018 to Mid of Jan 2019 (Fall Semester Examination)
No Technical work - non technical activities follow-up

(3) Project Execution phase: January-May 2019
- Mature implementation of all modules by all groups with full testing
- Android App based ADAS System should be completed and ready for demo before spring semester 2019 examination starts
- Timeline and plan of the product packaging and commercialization is ready

Break 2: Mid of May 2019 to Mid of June 2019 (Spring Semester Examination)
No Technical work - non technical activities follow-up

(4) Project Packaging phase: June-July 2019
- Packaging the product and Final demo preparation
- Preparing the thesis, presentation and marketing material of the product
- Project Defense

Project #8

Project Title: Smart Assistant Box
Supervisors: Dr.Ashraf Salem and Dr.Bassem A. Abdullah

Description:
In this project, we will make a smart assistant box. The assistant box is powered by Artificial Intelligence (AI). The project involves making of the packaging of the assistant.

Technologies involved:
- Embedded Systems
- Machine Learning
- IoT
- Image Processing [Optional]
- Voice Recognition [Optional]
- Natural Language Processing [Optional]

* For optional technologies, one or more shall be used according to the features of the project.

A commercial product similar to the target deliverable of the project:
https://youtu.be/1R6lZDOtmFg

Project will go through the following phases and steps:
(1) Project Setup phase: October 2018
- Survey of the similar smart assistant in the markets either software or hardware form
- Survey of the similar projects made by amateurs and professional groups of students, young engineers
- Survey of the packaging options for the final smart assistant box and determining the most suitable for the time, budget and local constraints
- Coming up with set of target features of the smart assistant box that will be implemented in this project including competitive features.
- Put the high level design of the product and dividing it into modules with high level specifications.
- Put features for a prototype of the assistant box to be ready in two months
- Dividing the team into groups according to the design
- Coming up with technologies and skills to be studied by each group
- Coming up with procurement document
- Coming up with risks and challenges document
- Coming up with a list of non-technical activities to be done
- Forming committees to execute the non-technical activities
- Preparing data-sets of training the models of the selected detectors in the assistant
- Put a timeline for the next phases

(2) Project Pilot phase: November-December 2018
- Groups are working in learning list

- Non Technical activities should be either completed or full setup completed
- Pilot project (prototype of the final project) should be completed and ready for demo before fall semester 2018 examination starts
- Timeline and plan of execution is ready

Break 1: Mid of Dec 2018 to Mid of Jan 2019 (Fall Semester Examination)
No Technical work - non technical activities follow-up

(3) Project Execution phase: January-May 2019
- Mature implementation of all modules by all groups with full testing
- Smart assistant box should be completed and ready for demo before spring semester 2019 examination starts
- Timeline and plan of the box packaging and commercialization is ready

Break 2: Mid of May 2019 to Mid of June 2019 (Spring Semester Examination)
No Technical work - non technical activities follow-up

(4) Project Packaging phase: June-July 2019
- Packaging the smart assistant box and Final demo preparation
- Preparing the thesis, presentation and marketing material of the smart assistant box
- Project Defense

Project #9

Project Title: RTOS for Automotive Applications
Supervisors: Dr.Ashraf Salem and Dr.Bassem A. Abdullah

Description:
In this project, we will build a Real time Operating System (RTOS) on ARM processor. The Real-Time Operating System is built from scratch or by modifying FreeRTOS. The project involves building the kernel including the periodic scheduler. To verify the product, an automotive application will be created and tested on a target board.

Technologies involved:
- Embedded Systems
- Operating System
- Advanced C/C++ Programming

A product/prototype similar to the target deliverable of the project:
https://youtu.be/zPBBHo3NiYs

Project will go through the following phases and steps:
(1) Project Setup phase: October 2018
- Survey of the small RTOS in the online courses and universities
- Survey of the similar projects made by amateurs and professional groups of students, young engineers
- Coming up with set of target capabilities of the RTOS that will be implemented in this project including competitive features.
- Put the high level design of the product and dividing it into modules with high level specifications.
- Put features for a base of the project (proof of concept or prototype) to be ready in two months
- Dividing the team into groups according to the design
- Coming up with technologies and skills to be studied by each group
- Coming up with procurement document
- Coming up with risks and challenges document
- Coming up with a list of non-technical activities to be done
- Forming committees to execute the non-technical activities
- Put a timeline for the next phases

(2) Project Pilot phase: November-December 2018
- Groups are working in learning list
- Non Technical activities should be either completed or full setup completed
- Pilot project (prototype of the final project) should be completed and ready for demo before fall semester 2018 examination starts
- Timeline and plan of execution is ready

Break 1: Mid of Dec 2018 to Mid of Jan 2019 (Fall Semester Examination)
No Technical work - non technical activities follow-up

(3) Project Execution phase: January-May 2019
- Mature implementation of all modules by all groups with full testing
- Product should be completed and ready for demo before spring semester 2019 examination starts
- Timeline and plan of the product packaging and commercialization is ready

Break 2: Mid of May 2019 to Mid of June 2019 (Spring Semester Examination)
No Technical work - non technical activities follow-up

(4) Project Packaging phase: June-July 2019
- Packaging the product and Final demo preparation
- Preparing the thesis, presentation and marketing material of the product
- Project Defense

Project #10

A hardware Accelerator for Deep Learning

Prof. Ashraf Salem and Dr. Mohamed Taher

Overview: Deep Learning is an emerging field in machine learning. Deep Learning is leading the paradigm shift in utilizing neural networks in complex machine learning and artificial intelligence practical applications. This project targets accelerating core computations in deep learning algorithms using FPGA. It is desired to build a scalable architecture for deep learning networks. In this project, the hardware parallelism is to be explored to efficiently implement the core multiplication, accumulation and activation operations. Those operations significantly affect the overall execution of popular deep learning algorithms such as tensor algorithm

Project #11

The Engineering Educational Game of Abdo Pasha Palace

Supervisor : Dr Islam Ahmed El-Maddah

The engineering education is not considered an easy one. It usually needs a high level of self-motivation from the student. The elements of gaming and score beating, and achievement usually have the advantage of preventing the engineering students from falling bored and losing the motivation to complete learning difficult modules.
This project improves the engineering education through adding interactivity and gaming. In this project some educational goals will be examined through adding the gaming and interactivity elements. The target project focuses on delivering a unique educational experience mixed with the joy of gaming and living the life of a student's adventure.

Project Requirements:
Students must be familiar with graphical user interface, gaming techniques and advanced object oriented Programming C++ and C#, #D game unity Engine.

Project Objectives:
Students are expected to finish this project having developed skills and competencies level in developing game complete programs, building educational means using games

Project #12

XPLORE EGYPT

Your Tourism Personal Assistant

Supervisor : Dr Islam Ahmed El-Maddah

More than 80% of prospective tourism customers start their research on the internet. A well designed and maintained website or mobile application is a very important tool for a successful tourism business. This usually attracts potential young customers and generate high quality leads. In this project students will develop an assistant program that guides the user to choose and plan between the possible options of tourism tours and accommodation. The project will be an online service for touring Incredible Egypt. It is aimed at providing information about important places of interest, hotels, restaurants, cafes, monumental places and museums tailored according to the user needs and personality. Not only can visitors read and know more about these places, they can also book in hotels and restaurants.

Project Requirements:
Students must be familiar with graphical user interface, web pages and their techniques and advanced object oriented Programming C++ and C#

Project Objectives:
Students are expected to finish this project having developed skills and competencies level in developing complete tourism programs, and building personal assistant application

Project #13

Project Title: An intelligent College Enquiry Chat Bot

Supervisor: Dr. Sahar Haggag

Number of students: 8

Introduction

A chatbot is a computer program which conducts a conversation via auditory or textual methods. Such programs are often designed to simulate how a human would behave as a conversational partner.

Chatbots are typically used in dialog systems for various practical purposes including customer service or information acquisition.

Chatbots are often integrated into the dialog systems of, for example, automated online assistants, giving them the ability of, small talking or engaging in casual conversations unrelated to the scopes of their primary expert systems.

A conversational agent (chatbot) is a piece of software that is able to communicate with humans using natural language. While chatbots can be used for various tasks, in general they have to understand users' utterances and provide responses that are relevant to the problem at hand.

In the past, methods for constructing chatbot architectures have relied on hand-written rules and templates or simple statistical methods. With the rise of deep learning these models were quickly replaced by end-to-end trainable neural networks.

Chatbot models usually take as input natural language sentences uttered by a user and output a response. There are two main approaches for generating responses. The traditional approach is to use hard-coded templates and rules to create chatbots. The

more novel approach, Neural network models are trained on large amounts of data to learn the process of generating relevant and grammatically correct responses to input utterances. Models have also been developed to accommodate for spoken or visual inputs.

Objectives

An intelligent College Enquiry ChatBot project will be built using artificial intelligence algorithms that will analyze user's queries and understand user's messages. This system will be a web application which will provide answers to the queries of the students. Students will just have to select the category for the department queries and then ask the query to the bot that will be used for chatting.

Artificial intelligence will be used to answer the students' queries. The students will get the appropriate answers to their queries. Students won't have to go to the college to make the enquiry. The system replies using an effective Graphical user interface which implies that as if a real person is talking to the user.

Project #14

B-IDE: A Brain-controlled Integrated Development Environment for Programmers with Hand Disabilities

Dr. Seif Eldawlatly

Maximum number of students: 5

Computer programming is one of the professions that mainly rely on the motor skills of the programmers in which it is necessary to use their hands. People with hand disabilities are thus deprived from joining such profession. In addition, hand and arm injuries might end the career of a successful programmer.

Brain-computer interface (BCI) systems allow controlling computers and other electronic devices using brainwaves, which is relevant to be applied for users especially with reduced motor abilities. The project will provide a desktop application that helps the hand-disabled person to code. The project aims to provide a new intelligent way for writing on computer's keyboard using Steady State Visual Evoked Potentials (SSVEPs) signals. In this project, wireless EEG recording headsets will be used to record brain activity. Feature extraction and machine learning algorithms will be developed to enable the control of the interface using brain activity.

Project Modules:

1- IDE Interface Development: An interface will be developed that allows Java programming using inputs computed based on brain EEG activity.

2- Signal Pre-processing: Recorded EEG signals will be filtered to eliminate possible noise. Channel selection will be applied to identify the relevant EEG channels.

3- Machine Learning Algorithms: These algorithms will decode the recorded brain EEG signals in order to identify which command or component the user wants to interact with.

Project #15

Mobile cross platform development tool

Dr. Ahmed Hassan

Building native mobile applications requires rewriting the application several times because each platform has its own development tools. In addition, converting some legacy application services to mobile apps have the same problem. In this project, it is required to build tools that solve these problems. Students will learn about the structure of mobile apps, legacy applications and then design and implement the tool.

Project #16

Arabic Speech Recognition App for Quran

Number of Students: 6

Dr Hazem Said

Although Arabic is currently the sixth most widely spoken language in the world with an estimated number of 250 million speakers, General Arabic speech recognition engine with high accuracy is still a challenging problem. Higher recognition accuracy can be obtained in special domain applications.

This project aims to build Arabic speech recognition engine for Quran verses. The engine will be executed by a mobile app. The theme of this year project is to make the App friendly for “visually impaired” people.

Project #17

Teaching Car to See

Number of Students: 8

Dr Hazem

When we drive, we constantly pay attention to our environment, as our safety and that of many other people are at stake. We particularly look out for position of potential obstacles, whether they be other cars, pedestrians, or objects on the road.

In this project, machine learning is used to detect environment around car including objects, lanes, traffic signs,…etc. This application can help driver by setting light or sound alarms on his/her way. Tests will be applied on real videos recorded by the team members.

Project #18

GP Title: Automotive Embedded Autonomous Applications

Prof. Sherif Hammad - Dr. Hossam Hassan

GP Abstract

During the last years, graduation projects have positively and successfully contributed in building some autonomous embedded functionalities. As examples, drive-, brake- and steer- by wire in addition to lane keeping, and object detections. This project aims at starting from last year's base line and improve/develop autonomous applications on Golf car and/or RC car. This development should use automotive development standards. For 2019 team will work to improve the existing stack by and tools by working on 2 work packages:

1- Golf Car WP: - Implement applications on ASU ENG manufactured car platform.
2- 2- RC Car WP: - Implement RC car platform with all available and possible sensors - Implement applications on RC car platform.

GP Expected Deliverables

1. Autonomous functions implemented on standard embedded platforms to run on ASU ENG car platforms

2. RC car platform valid for development and research

3. Autonomous functions implemented on standard embedded platforms to run on RC car platforms

Requirements in students to join

- All Teams should have experience in C, microcontroller, Mechanical design, system modeling.

- CSE, MCT or/and CHEP relevant programs students are to be interviewed for qualifications assessment.

Project #19

GP Title: Autosar Stack.

Prof. Sherif Hammad - Dr. Hossam Hassan

GP Abstract During the last years, graduation projects have positively and successfully contributed in building AutoSar embedded software, configuration and development tools. iGP aims at continuing this effort to put ASU ENG at first class developer of educational embedded automotive industrial tools. So, it is required to develop/improve AutoSar selected BSW (Basic Software), RTE tool (Real Time Environment), and Configuration tools. For 2019 team will work to improve the existing stack by and tools by working on 4 work packages:

1- Tools WP:
   - Convert the Autosar Studio from web based tool to standalone. - Upgrade the configuration tool to be based on eclipse and use Arcore SDK.
   - Update the arxml files to use the Autosar schema.
   - Add Autosar system definition to the configuration tool.
   - Create the new module configuration GUI.

2- RTE WP:
   - Update Autosar Studio and RTE generator to support the different Autosar features “the existed tools are supporting the S/R ports only and periodic runnable triggering”.

3- COM stack WP:
   - Update CAN driver to support the pooling.
   - Develop the rest modules of CAN stack BSW “CanIf, PDUR and COM”.

4- Ethernet stack WP:
   - Develop the basic BSW components of Ethernet stack.

GP Expected Deliverables

1. Autosar Studio standalone tool with supporting Client/Server ports and runnable triggers as described in Autosar specs.
2. Professional Autosar Configuration tool based on ARtop SDK.
3. RTE full functionality as described in Autosar specs.
4. Build the missing BSW from the CAN stack (CanIf, PDUR and COM).
5. Build the Ethernet Autosar stack.

Requirements in students to join

- All Teams should have experience in C, microcontroller, Python and XML.
- For tooling team should have experience in Java and Eclipse plugin experience is a plus.
- CSE, MCT or/and CHEP relevant programs students are to be interviewed for qualifications assessment.

Project # 20 ***Academic year:*** **2018- 2019**

Project Title: Smartglass

Supervisor (s): Dr. Ayman Wahba

Number of Students: 8

Required Skills:

Hadoop development, Machine learning algorithms, Predictive analytics techniques, Foreign exchange market knowledge.

Problem Statement

Smartglasses are wearable computer glasses that add information alongside or to what the wearer sees.

Superimposing information onto a field of view is achieved through an embedded wireless glasses with transparent heads-up display (HUD) or augmented reality (AR) overlay that has the capability of reflecting projected digital images as well as allowing the user to see through it, or see better with it.

Smart glasses can be used in may applications, such as guidance for blind people, guidance in touristic places … etc. Modern smart glasses are effectively wearable computers which can run self-contained mobile apps.

Objectives:

(1) Design and implement a smar glass

(2) Apply it for gudance in museum and touristic places

Technical Approaches

HW Design Phase: The hardware components are specified, and the design is made, implemented and tested.

SW Development: Collect data about the museum items, select the image processing algorithms to be used, specify the requirements of the system, design the software, implement the software, testing and verification, integration.

Choosing and developing most fit predictive model to forecast future trend of exchange rate

Software Requirements: Image processing algorithms

Hardware Requiremnts: Aduino, Bluetooth Communication

Expected Deliverables

A smart glass implemented and working + project documentation

Project #21

Exam Cloud

Introduced by: Dr. Mohamed Sobh

Expected Number of Students: 6 Students

Overview:

Design and implementation of cloud based examination service. Imagine millions of questions in one place, teachers can generate completely new exams in seconds, students can examine their knowledge by solving hundreds of unique questions, online training center can generate online exams and evaluate their online users, teacher can make crash quiz in certain topic and collect the result. Questions cloud is an unlimited supply of unique questions in any subject and in any languages. The system offers different types of question, the ordinary one and the MCQ. The system allows either automatic correction or manual or both. The system can produce exams, quizzes and sheets. Based on the continuous authoring, examination and revision the question repository grows rapidly.

Project #22

Marketing Data Analysis

Introduced by: Dr. Mohamed Sobh.

Expected Number of Students: 4 Students

Overview:

Digital marketing became one of the biggest breakthroughs in the recent few years, so Building a tool to help the decision makers to create and execute the digital marketing plans became a must.

The tool provides two solutions: First, a detailed insights provided about the Facebook page, using the csv files provided by Facebook, to build a social media report. Second, Recommendation system for boosting the Facebook pages and posts, based upon the users interests and personal preferences using an unsupervised Machine learning model.

Project #23

People Count Estimate using DNN

Supervisors: Prof. Hazem Abbas and Dr. Mahmoud Khalil

Number of Students: 5

The objective of this project is to develop an application for counting people in different densities (low, medium). The application can also identify motion flow patterns. Students are required to develop a DNN model for people detection and use it for counting. Students will be developing computer vision algorithms using libraries such as OpenCV, tensorFlow, or Caffee.

Required experience.

1. Familiarity with OpenCV, TensorFlow, or Caffee
2. Experience in C++
3. Experience in Deep Learn. Hazem Abbas and Dr. Mahmoud Khalil ing
4. Experience in UI development tools such as QT or similar.

Project #24

Applying Deep Reinforcement Learning Techniques on Simple Computer Games

Supervisors: Dr. Hazem Abbas and Dr. Mahmoud Khalil

Number of Students: 7

Required Skills:

(1) Machine Learning, Neural Networks, & Deep Learning.

(2) Reinforcement Learning & Deep Reinforcement Learning.

(3) Software (Game) Development.

Problem Statement:

Reinforcement Learning (RL) is one of the most general fields of machine learning. Instead of doing very specific tasks like classification using supervised learning, RL agents try to learn from their own experience and mistakes without supervision. That is why it is believed that if we, humans, want to create real AI, Reinforcement Learning would be the way to go.

In this project we aim to apply RL techniques in the constrained environment of computer games. We will make the computer learn how to win simple games on its own, without giving it any prior knowledge about the game rules. We will also develop those games on our own and will make sure different games have different learning objectives or different goals for winning. In addition, we will test our algorithms in a configuration where our RL agent can only treat the game as a black box [i.e has access only to the frames of the game as input], and also in another configuration where we give it additional information about the game's inner state [since we have access to the code we created on our own]. We will report our findings in both situations.

Objectives:

(1) Studying Machine Learning.

(2) Studying Neural Network and Deep Learning.

(3) Studying RL (Reinforcement Learning).

(4) Surveying established techniques for RL.

(5) Developing various simple games with different learning requirements.

(6) Developing AI capable of playing these games on its own.

Deliverables:

(1) Our created games.

(2) An AI capable of playing those games without prior knowledge about their rules.

Project #25

Video Summary Graduation Project

Supervisors: Dr. Hazem Abbas and Dr. Mahmoud Khalil

Number of Students: 4

The problem's interest

As university students in the millennial era, we are required to watch hundreds of videos as part of our education and information enrichment in our specializations. However, not all these videos are as equally important to watch. So, if somehow there were a tool to summarize a video's content into a textual form or a hyper-lapse video that clearly identifies the contents of it, it would save us a lot of valuable search time, thus increasing our productivity. On the other hand, this idea could also be applied to general types of videos, categorizing them and giving a summary to what they may contain. Moreover, the idea is going to have many consecutive phases, each one representing a certain functionality that the project is supposed to cover. There's a paper published on this subject that could prove very useful in the project: arxiv.org/pdf/1708.04160.pdf

Dataset: YouTube's 8M dataset: research.google.com/youtube8m/index.html

Algorithms needed

Computer Vision using ConvNets, NLP (probably a *Natural Language Understanding* module for the audio accompanying the video and a *Natural Language Generation* module for generating the text file summarizing the video's content) using RNNs, a tool for generating hyper-lapse videos.

Project #26

Car Sales Agent Bot

Supervisors: Dr. Hazem Abbas and Dr. Mahmoud Khalil

Number of Students: 4

A custom-branded car dealership bot takes advantage of the latest untapped marketing channel, allowing potential clients to browse through your car selection, answering questions based on their preferences in order to receive the most relevant vehicle recommendations.

Rasa Frame can be used to:

1. Build the Entity Extraction Model
2. Build the Intent Detection Model
3. Build the Intent to Action Model
4. Build the Action Backend and dealing with data to form response
5. Build the backend of the chat platform that we will use

Project #27

upper limb autonomous humanoid Robot

Supervisors: Prof. Sherif Hammad

Project #28

Intelligent Threat Hunter, an Intelligent networks security platform

Prof. Ayman Bahaa

Project #29

xPython, a trusted platform for embedded systems and Internet of Things

Prof. Ayman Bahaa

Project #30

Verification of DDR SDRAM Controller Core

Prof. Hany Fekry, Dr. Mohamed Taher

Sponsored By: Si-Vision

Outline With the rapid development in the processor's family, speed and capacity of a memory device is a major concern. The DDR is an enhancement to the traditional synchronous DRAM. The DDR is able to transfer the data on both the edges of each clock cycle. Thus doubling the data transfer rate of the memory device. The DDR is available in a very low cost that's why it is widely used in personal computers where they are basically used to provide the functions of storage and buffers. The DDR SDRAM supports the data widths of 16, 32 and 64 bits. It automatic refresh during the normal and power down modes. The DDR is a complete synchronous implementation of controller. It increases the throughput using command pipelining and bank management. Goal Build SystemVerilog and UVM verification environments for one of the (DDR SDRAM controller core) open source codes at opencores website.

Prerequisites • VHDL or Verilog. • C++ and OOP basics. • Digital design and computer architectures basics.

Project #31

self driving car and car accident avoider

Prof. Wagdy Anis , Dr. Bassem Amin

Project #32

Trade Surveillance and Anti Money Laundry, a blockchain approach

Prof. Ayman Bahaa

Project #33

Data Analytic Model for Analyzing Car Accidents

Supervisor: Gamal A. Ebrahim, Ph.D.

Analyzing car accidents data that might be collected in certain country can lead to many findings such as finding the relationship between accidents and car types, the relationship between accidents and town, city, or governorate, or even the reasons of having too many accidents for certain category of drivers.

This information can be utilized in planning traffic and reducing car accidents. Hence, in this project a data analytic model will be established and will be applied to a set of test data so that it can be a prototype that can be utilized for real environment.

Project #34

Classifying Software Projects into their Design Patterns

Supervisor: Gamal A. Ebrahim, Ph.D.

Design patterns is a general repeatable solution to a commonly occurring problem in software design. A design pattern is not a finished design that can be transformed directly into code. It is a description or template for how to solve a problem that can be used in many different situations. In this project, the students will investigate software design patterns and compare them focusing on when to use each of them. Then, they will build a software tool that can analyze software projects into the best design pattern that can be utilized in building the software. Typical applications of this tool will be conducted based on real software projects.