#	Supervisor	Project Type	Title	Abstract
			Secure Document Exchange System based on Visible Watermarking	In this project we are going to design and implement a web-based system for protecting document exchanges through secure network connection and detect any leakages sources. Multimedia technology usages is increasing day by day and to provide authorized data and protecting the secret information from unauthorized use is highly difficult and involves a complex process. By using the watermarking technique, only authorized user can use the data. Digital watermarking is a widely used technology for the protection of digital data. Digital watermarking deals with the embedding of secret data into actual information. Visible watermarking is a widely-used technique for marking and protecting copyrights of many millions of images on the web, yet it suffers from an inherent security flaw—watermarks are typically added in a consistent manner to many images. This consistency allows to automatically estimate the watermark and recover the original images with high accuracy. An algorithm can take a watermarked image as input and automatically estimates the “foreground” (watermark), its alpha matte, and the “background” (original) images. Such an attack relies on the consistency of watermarks across image collections, we would like to explore and evaluate how it is affected by various types of inconsistencies in the watermark embedding that could potentially be used to make watermarking more secure. We can demonstrate the algorithm on stock imagery available on the web, and provide extensive quantitative analysis on synthetic watermarked data. Finally, visible watermarks should be designed to not only be robust against removal from a single image, but also to identify the document recipient. Domain knowledge: Web Development, Watermarking, Python, OpenCV https://openaccess.thecvf.com/content_cvpr_2017/papers/Dekel_On_the_Effectiveness_CVPR_2017_paper.pdf

1	Dr. Saad AlAhmadi	Research	Location Privacy in the Era of the Internet of Things (IoT) and Big Data Analytics	The interactions of The Internet of Things (IoT) and big data analytics are greatly impacted by location information and in turn greatly impact location privacy. In this project we would like to examine the relationships between these four concepts with an aim toward furthering a framework for future analysis and research. Difference sources will produce big data such as sensors, devices, social networks, the web, mobile phones, etc. V. Location is a critical and often central component of context-aware computing and similar notions of ubiquitous and pervasive computing. In the past location privacy was of relatively little concern because location information was not pervasively and continuously available. Now that technology has radically altered information availability, privacy of location is closely tied to controlling access to this information, and people want to be in control of the information availability. Location privacy preferences are now quite well studied in the context of users carrying mobile devices but not extended through an IoT context where device-to-device communication can carry location information far beyond users' awareness. Privacy concerns are becoming an increasingly critical issue in the IoT. Without assurance of privacy in a world of interconnected sensors and systems, users will be unwilling to adopt these new technologies. The International Telecommunications Union report on the Internet of Things notes that "Concerns about privacy and data protection are widespread, particularly as sensors and smart tags can track a user's movements, habits, and preferences on a perpetual basis." Despite its relevance and importance, privacy is not yet receiving adequate attention in the enthusiasm to exploit the technical capabilities of the IoT. Domain knowledge: Security, Deep Learning, IoT https://arxiv.org/ftp/arxiv/papers/1412/1412.8339.pdf

			IoT Attack Detection with Deep Learning	With the rise of the Internet of Things (IoT), the number and diversity of connected devices is expected to increase exponentially. While this promises significant benefits to users, who will have access to a broad range of new applications, it also opens the doors for a number of new security, privacy and safety threats, including physical safety and personal security threats. Tight limitations on hardware cost, memory use and power consumption of IoT devices have given rise to a number of security vulnerabilities, which can usually be dealt with traditional cyberattack countermeasures. However, protecting collections of smart devices poses new challenges that go far beyond securing each of the individual devices. These new challenges stem partly from the ability of smart devices to control physical aspects of their environment, and partly from their interactions with each other and with the Cloud. As a consequence, there is a wide consensus that security is one of the most challenging requirements for future IoT systems. In this project, we will analyze the cybersecurity threats against an IoT-connected home environment and present the principles and design of a learning-based approach for detecting network attacks. In an IoT-connected home environment, there may be dozens or even hundreds of sensors with various functions (e.g., measuring temperature, light, noise, etc), in addition to actuators for controlling systems such as the heating, ventilation, and air conditioning system. Each of these devices may use different protocols to connect (Wi-Fi, Bluetooth, Ethernet, ZigBee and others) and most of them are not able to connect directly to the Internet. A crucial component is then the IoT gateway, which is a device capable of aggregating and processing sensor data before sending it to Internet servers. The attack detection approach relies on the analysis of the traffic flows exchanged with the IoT gateway. The data packets exchanged with the IoT gateway are captured on all network interfaces. These packet flows are then analyzed in order to extract various packet-level metrics from which network attacks can be detected. A deep learning model, which has been previously trained with” normal” and “malicious” IoT traffic, takes as input these metrics and predicts the probability that the IoT-connected home environment is currently under attack Domain knowledge: Security, Deep Learning, IoT https://hal.laas.fr/hal-02062091/file/article.pdf

2	Dr. Mohamed Maher Ben Ismail	Research	Forecasting Bitcoin Value using Machine Learning Techniques	Today, Bitcoin is considered as a revolutionary cryptocurrency in the market. Even though it was silent all along in the marketing world, it recently attracted the attention globally by defying all forecasting algorithms. Today, as of April 26 2021, it stands at a market value of 200 349,09 Saudi Riyals. Initially, most of the online merchants have recognized it as a form of currency. Since then it has become kind of a stock market where people invest to generate profits. Forecasting the value of bitcoin as forecasting the flow of stock market. Over the years many algorithms have been developed for forecasting stock markets, but very few have focused on bitcoin price prediction. In this research project, we focus on predicting the price of Bitcoin prices based on historical price data by studying trends in the form of both seasonal and general trends. Various forecasting techniques involved with stock market predictions will be investigated using real datasets and standard performance measures. The forecasted prices would help you understand the risk factor involved in investing in the bitcoins and the possibility of having a profit or loss in it.

3	Dr. Mejdl Safran	Research	In-store Customer Tracking and Analytics	Online retailers can track their shoppers' behaviors on their websites or phone applications to understand their shoppers' activities and preferences (e.g., what products they click on, what categories they browse, how much time they spend on a website, which products have not been reviewed, etc.). The aim of this project is to build a system that will eventually enable traditional retailers to have the same level of understanding about their shoppers as online retailers. Therefore, the system will allow traditional retailers to get a little glimpse inside the mind of their shoppers through their behaviors inside the traditional stores (e.g., at what instances do shoppers go to the stores? In what manner do they act? How will these results affect sales? etc.). The goal of this project is twofold. (1) Students will use deep learning techniques to analyze the recorded videos from inside the retail stores to count the number of shoppers, determine shoppers' demographics and shoppers' paths, calculate the dwell time, generate heat maps (i.e., depicting how many shoppers are walking through each aisle, where they are pausing, how long they are spending in front of each product category), and optimize and plan employee locations. (2) Students will build web-based platform that will allow the administrator to manage his stores and get insights such as incoming traffic (enter), outgoing traffic (exit), traffic conversion (shoppers count vs. number of invoices), store optimizer (traffic vs. number of employees present in the store), shoppers' demographics (females vs. males, singles vs. families), average dwell time, heat maps, etc. Students will be supported with real videos generated from retail stores and real data (number of employees, number of invoices, etc.). Students will be guided through the process of building the deep learning models to analyze the videos. Students should have at least the basic skills of building machine learning models and building web-based applications.
4	Dr. Ameur Touir	Research	Drone Navigation and path planning	The objective of the project is to provide 3D-navigation solution and pathfinding for drones. The drone has to be given an optimal collision free path between a start and end points. A* is a well know algorithm that was used for searching the shortest path in navigation context and other similar application. A combination of A* with the quadtree showed better performances in manipulating ground robots. The quadtree, which is a 2D spatial structure was well studied and applied in robotics during the past and several solutions related to pathfinding were provided. The subject of this project aims at tackling the problem and providing pathfinding solution for drones using the extension of the quadtree (2D). The aim of this project is to adapt these techniques using drones.

5	Dr. Sultan Farhood	Software	AI-Based Video Analytics for Retailers	Traditional retailers struggle to keep up with the changing landscape especially in the pandemic; One of their disadvantages over online stores is the lack of systematic ways to collect customer data and analyze it to predict how customers would behave in the future. The goal of this project is to create an artificial intelligence-based video analytics system that helps retailers gain more information about their customers. The proposed system could utilize machine learning approaches to analyze the content of the surveillance cameras and provide useful information and trends, such as the number of visitors over time, the store's peak hours, the number of people who passed by the store, the heat map of the visitors, etc.
6	Dr. Mohamed AlSulami	Research	Zero-Shot Conditional Summarization on Ad-hoc Natural Language Questions for Arabic Text	Conditional summarization provides a specific type of summarization such as supporting question answering, or topic-based discovery. There are many applications that require more specific summaries than the traditional general-purpose summaries. Unlike traditional summarization, in which the goal is to produce an objective summary of the most salient information in a passage, in conditional summarization, the selection of the most salient points as well as how those points are expressed are explicitly conditioned on an ad-hoc context, such as a question or topic of interest. Although considerable research has been devoted to general-purpose summarization of documents, rather less attention has been paid to the conditional summarization. In this project, we will study the problem of conditional summarization in Arabic Text which are explicitly conditioned on an ad-hoc natural language question or topic description. We explore the use of the transfer learning and fine-tuning deep learning models (attention models) on natural language tasks to enable zero-shot conditional summarization on language tasks. We will present new adaptive summarization strategies and improve the zero-shot summarization quality techniques. Our aims are even more specific than topic-driven summarization: we are interested in summarizing documents in response to ad-hoc natural language questions asked by the general public. The summary, therefore, has to be tailored not only to the topic of the question and task but must also be restricted only to the aspects of the topic that directly address the question.

7	Dr. Nasser AlSadhan	Software	Arabic Text Dialect Recognition	Arabic language is one of the hardest languages to analyze due to the many different dialects that exist, both in written and spoken form. Modern Standard Arabic, which follows the Arabic grammar, is rarely used in an online setting. Therefore, it is important to differentiate between different dialects when any kind of an analysis is conducted on the Arabic language. In this project, we intend to review the state of the art in text analysis in Arabic, and any work done on dialect detection. The proposed system aims to output the words associated with each dialect, as well as, predicting the dialect of any given Arabic text. Basic to intermediate knowledge in Python is required as most machine learning packages are implemented in python.
8	Dr. Aqil Azmi	Software	Plagiarism Checker	Plagiarism is to take some work and present it has one's own work. Plagiarism affects the education quality of the students and thereby reduce the economic status of the country. It is done by paraphrased works and the similarities between keywords and verbatim overlaps, change of sentences from one form to other form, which could be identified using WordNet etc. This plagiarism detector measures the similar text that matches and detects plagiarism. Internet has changed the student's life and also has changed their learning style. It allows the students to get deeper in the approach towards learning and making their task easier. There are many methods to detect plagiarism. Usually the detection is done using text mining method. In this plagiarism checker software, a user uploads a file, which will further be divided into content and reference link. This web application will process the content, visit each reference link, and scan the content of that webpage to match the original content.
9	Dr. Abdullah Alshalan	Software	A cybersecurity compliance assessment platform.	he objective of this platform is to allow its users to define a cybersecurity framework, and then enable them to perform a compliance self-assessment for their organizations based on the defined framework. The platform can then visualize the outcome of the assessments to give organizations better visibility on their compliance status. Requirements: Full-stack web development.
10	Dr. Fawaz Alsulaiman	Software	Artificial Intelligence Application	Artificial intelligence has many applications including image recognition. In this project, students have to develop an application that utilize machine learning or image recognition in a domain of choice.

11	Dr. Kerrache Said	Research	Learning-based automatic generation of video description	Video description is the automatic generation of written or spoken natural language sentences that describe the content of a video. It is a problem with important applications in human-computer interaction, assisting blind persons, and automatic generation of video subtitles. The past years have seen a surge of research in this field due to the unprecedented success of deep learning in image captioning and natural language understanding and generation. This project aims to develop a method for the audio description of a live video feed. 1. Select key informative frames from the video to reduce computation time. 2. Use a pre-trained deep neural network to generate captions for the selected frames. 3. Use a text-to-speech engine to generate the audio description from the text captions. Possible application: give the visually impaired audio feedback about his/her environment using video feed from a mobile phone.
12	Dr. Azzam Alsudais	Software	On-demand Tourism Experiences	Idea: In recent years, KSA has opened its doors to international tourists. Given how immature the tourism industry currently is, there should be some solutions that facilitate tourism activities. In this application, we would like to offer on-demand tours to international visitors. Through this platform, local experts may offer their experience in the form of activities (desert camping, hiking, city tours, etc). Tourists may browse through these activities and select the ones that interest them. The application should, then, connect tourists with local experts who are responsible for providing the full experience for those visitors. Solution: This on-demand tours platform mainly consists of two major components. First, the mobile application which is offered in two different versions: one for local experts to offer their experiences, and another for visitors to search and select from these experiences. Second, there should be a backend server offering functionality that connects the two types of users to each other.

13	Dr. Mohammed AlAbdulkareem	Software	Online Auction	In an online auction, buyers and sellers engage in transactional business, where sellers offer the products and buyers purchase items through price bidding. The bids will have a starting price and an ending time. Potential buyers who place the highest bidding price for an item are declared the winners. In this project, you will create a secure online auction system using the fraud detection method with binary authentication. If a user wants to buy an item through an online auction, they must provide their identification details like mobile number, email address, ID number, etc. The system will then screen the users, authenticate, and authorize them. Only authorized users can bid in the auction. Any registered user can bid on any item once the bid was reached by time limit the winner will be announced and an e-mail will be sent with details of completing the deal. Once the deal is done the owner can either remove the item or replace it on auction again. To offer an item you must register in the system as a seller. A seller can bid on items offered by other sellers. A bidder can focus on an item by setting an alert on bid amount. When the bid reach that amount the bidder will be notified.
14	Dr. Adel Soudani	Research	A contribution to the design of a hand gestures recognition system using machine learning algorithms	the project aims to design a system based on sensors and gyroscope to track and to recognize the hand gesture. This system will be based on Arduino platform that is responsible to communicate continuous codes quantifying the hand position and sign to a server that will analyze them using machine learning algorithms for classification and efficient recognition of the hand gestures. Hardware and tools : Paython /C++, Arduino platform, wi-fi communication, laptops
15	Dr. Iehab AlRassan	Software	Car Auction on Handheld Devices (I-Pad, IPhone, Windows mobile and Samsung)	In this project students will learn how to create and manage handheld's databases –smart phone and tablet) – using IOS, windows mobile and Android operating systems. The aim of this project is to bid and buy used or new cars at live online vehicle auction. With access to the database of auction vehicles, customers have the options when searching for a car and bidding on auction vehicle inventory.

16	Dr. Hussein Al-Salman	Research	A Deep Learning Approach for Cyberbullying Detection of Arabic Users on Different Social Media Platforms.	Recently, increasing the number of social media users has changed how people interact and communicate. One of the social media disadvantages is cyberbullying. Cyberbullying can be one of the hardest things that impact people's mental and psychological behaviors, especially youth individuals. Deep learning is the state-of-the-art approach that achieved a high accuracy rate in different natural language processing (NLP) applications. This project aims to develop an automated tool to detect and classify cyberbullying of Arabic writers among various social media platforms. Moreover, in this project, we define and investigate the importance of cyberbullying detection for analysis in many applications. Arabic cyberbullying detection is one of the complicated NLP analysis tools due to the rich morphology and noisy contents of the Arabic language. There is a number of works have been proposed for Arabic cyberbullying detection. However, these works need some improvements in terms of effectiveness and accuracy. Therefore, this project aims to improve cyberbullying detection of Arabic users on different social media platforms using effective deep learning and natural language processing methods. The project's tool will be able to process the Arabic texts through stemming and tokenizing methods and extract text features. After that, the project can use the trained deep learning methods to classify the Arabic texts into positives or negatives classes. Experimental and comparison results of the project on Twitter datasets will be finally documented and reported.
17	Dr. Khalil ElHindi	Software	A Smart Online Shopping-List Management System	Behind the scenes, today's websites are actually rich applications that act like fully developed desktop applications. Python has a great set of tools for building intelligent web applications. In this project, you'll learn how to use Django (http://djangoproject.com/) to build an online system that lets users (multi-users) intelligently manage shopping lists. The system can be used by all family members to manage their shopping list. The intelligent system will use association rules to recommend to the users the items that they might need to purchase. We'll write a specification for this project, and then we'll define models for the data the app will work with. We'll use Django's admin system to enter some initial data and then learn to write views and templates so Django can build the pages of our site. You will also need to use a package for machine learning such as TensorFlow , or write your own ML software. Django is a web framework—a set of tools designed to help you build interactive websites. Django can respond to page requests and make it easier to read and write to a database, manage users, and much more.

18	Dr. Abdelmonim Artoli	Research	Modeling and simulation of fluid flow	You will learn comutational and visualisation techniques related to engineering and scientific applications. This knowledge will be used in investigating fluid flow through a typical design. Standard Mathematics and algorithmic skills are required. You shall have some knowledge on Computer Graphics.
19	Dr. Omar AlSaleh	Software	Quran Reciters recognition system with integrated audio input	In this project you will develop a system to recognize Quran reciters (القارئ) with integrated audio input using machine learning. The input is an audio of some verses and the output is the name of the reciters. You will use Python, Support Vector Machine, RNN algorithm, and Convolutional Neural Network. You will collect audio datasets all over the Internet to train and test you model. The Librosa package could be useful to extract and classify audio samples.
20	Dr. Omar AlSaleh	Software	An Arabic chatbot for information technology services (IT support)	In this project you will develop an Arabic chatbot to communicate with end-user who seek for IT support services. You will develop the chatbot according to ITIL standards and methods. You will develop your chatbot to help IT support department in King Saud University to better serve students, employees, and faculty members. The chatbot will be web-based (mobile-friendly) or an Android app.
21	Dr. Rachid Sammouda	Research	Masked Face Recognition System using RGB color Images	The proposed project seeks to build a system that can recognize the person identification through a masked face image inserted by the camera. This masked face recognition system powers an image recognition algorithm to process images and to identify persons. First, the system converts RGB images into grayscale images which is then further converted into black and white images. During the process, image processing is applied to remove unwanted regions and environmental interference. The system further uses shape character recognition for recognizing the images with 95% accuracy or above. In the system, all related persons' images will be stored in a specific directory with different mask shapes. The size of each image is fixed to allow the easy recognition of the symbols with accuracy. The images will remain in black and white form, and the system will create a dataset of these images. When a user inputs a query image into the system, it will resize the query image, compare the resized image values against the templates image values in the dataset, and finally display the result in a numerical format.