

## Abstract Booklet BES Bachelor of Software Engineering

# Department of Omputin

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## Greeting & Message from Principal NUST-SEECS Dr. Muhammad Ajmal Khan, SI(M) PhD (Michigan State University, USA)



It is a pleasure to introduce to you the graduating classes of 2022 in the disciplines of Electrical Engineering, Software Engineering, and Computer Science.

NUST-School of Electrical Engineering and Computer Science (SEECS) is committed to providing first-rate higher education in Pakistan. We emphasize making SEECS a center of excellence for imparting high-quality education in the areas of Electrical Engineering and Computer Science that would lead to the promotion of research and scholarly achievements at National & International levels. We foster a passion for creativity and productivity in our students through an enabling environment of stateof-the-art labs, arranging industry visits, seminars, and international conferences, etc. Besides imparting thorough professional knowledge, we also believe in instilling sound entrepreneurial, social and humanitarian values. The programs offered at SEECS include Electronics, Digital Systems, RF and Microwave, Telecommunication and Networks, Artificial Intelligence, Machine Learning, Big Data, Cyber Security, and Cloud Computing. Hands-on training in these domains augments the basic knowledge of our students, giving insights into its practical application, an essential prerequisite for potential technical leaders of the 21stcentury.

The projects showcased in the Open House demonstrate the skill set of our graduating students, and the highly interactive sessions with the industrial professionals provide them a platform for networking. Another aim of holding this event is to address the dire need for industry-academia partnerships in Pakistan. Through Open House, the industry can witness the outstanding research of various disciplines that are being offered at NUST-SEECS. At the same time, the industry feedback helps us update our curriculum according to the contemporary market trends. Henceforth, I take immense delight in presenting the batch of 2022 as the proud product of SEECS and wish them success as they go forward in their respective fields, with all the best for their journey ahead.

## **Faculty Heads**

Dr. Abdul Wahid Tenured Associate Professor PhD. Computer Science and Engineering Kyungpook National University, Daegu, Rep of Korea Head of Computer Science



Dr. Safdar Abbas Khan **Assistant Professor** PhD. Wireless Sensor Networks University of Paris, France Head of Innovative Technologies in Learning & Information Technology





Engr. Dr. Rafia Mumtaz Tenured Associate Professor



Dr. Muhammad Moazam Fraz **Tenured Associate Professor** PhD Kingston University London, UK Head of Artificial Intelligence & Data Science

> Engr. Dr. Hasan Tahir **Assistant Professor** PhD. Computer Security University of Essex, UK Head of Information Security

Message from Associate Dean - Department of Computing

Dr. Faisal Shafait Professor PhD (Computer Engineering)

Dear Graduating Students,

I am very pleased to see you achieving a momentous millstone of your life. At Department of Computing, we aim to produce graduates who not only have excellent professional and technical competence, but are also inculcated with the norms and etiquettes, which are essentially required to successfully excel in the professional career. Our responsibility is to well equip our students so that they contribute positively and resolve the issues in our society through their technical skills. We also polish the intellectual and entrepreneurial skills of our students and hence we believe that you will be able to make a difference in the market, as you embark upon the new journey.

You are the flag-bearers now and we are very confident that you have the right knowledge-base and technical skill set required to flourish in the computing industry. My advice would be to always welcome challenges in your professional life with dignity, honesty and never forget that there is no replacement for hard work. So step ahead and make your parents, teachers and your alma mater proud! Wish you all the best for your future endeavors.

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# Overview of OPEN HOUSE

NUST SEECS organizes its annual open house to show case the skills of its graduating students. The idea is to provide a platform where our students and industry representatives can mingle and have informal or formal discussions. The students showcase their final year projects which represent their skill set and enable potential employers to identify any matching requirements. The projects are presented by students from two main departments:

#### Computer Science (CS) Software Engineering (SE)

This year Department of Computing has divided the projects into different knowledge areas, including Algorithms and Complexity, Architecture and Organization, Computational Science, Graphics and Visualization, Human-Computer Interaction, Information Management, Intelligent Systems, Platformbased Development, Programming Languages, Social Issues and Professional Practice, Software Development Fundamentals, and Software Engineering. There are around 80 different projects in these categories. You will find a large diversity of projects including mobile applications, computer vision based intelligent driving assistant, cloud based security resource sharing, an Alzheimer's prediction application and many more. You will not only find potential employees but excellent ideas as well that can be turned into products.

At NUST SEECS, we take pride in molding our bright entrants into well trained and appropriately groomed professionals in Computer Science, Software Engineering & Electrical Engineering disciplines. Our graduates are actively sought by the industry and our Alumni are occupying promising positions in some of the most prestigious industrial and business houses, both in public and private sectors. We hope that you will enjoy the hard work of our students and find the right candidate or the next big idea for your company.

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#### Knowledge Area: Computational Science

#### **Extensible CMS for Financial Modeling**

#### **Group Members:** Muhammad Saad Jamil Muhammad Talha Javed

#### Advisor: Dr. Hasan Ali Khattak

Ever wondered how businesses make key decisions for growth and sustainability? Unless you have a finance background, this is impossible. But it shouldn't be that hard. This project is about enabling non-finance teams in a company to model assumptions about the business' growth and participate in critical decisions. A financial model is not very different from a program. The process of writing and debugging a financial model has a lot of similarities to writing and debugging programs in any high level language. This project will involve building an IDE for financial modeling with similar capabilities that we have come to expect from programming IDEs. The exact design will determine the extent to which lexical analysis, parsing and ML based predictive insights are needed. This project will gain interoperability (between Financial Platform components), ensure an easy integration and will provide the environment for knowledge exchange.

#### issues with the traditional doors and thus improves the reliability, security, efficiency and safety. Smart doors are one of the instances that human instinct wishes for, to acquire solace and facilitate its daily life. They do so by the automated sliding entryway, which has temperature sensors and a well-established security system tested thoroughly against reachability, fairness, liveness and safety in the plan interaction. As an individual steps on carpet, a signal is sent to the doors which notify the source to start as a result of which, the doors expand and lights are lit. The doors automatically close when the person has passed. If an individual is standing between the doors, a safety sensor installed keeps the doors opened. The lights are turned off when the person has passed. In addition to this, sensors check the temperature of every person passing through the door for preventive measures from COVID. In case of a high body temperature suggesting a fever, an alert is displayed. Security system for theft protection is installed to assure that an alarm rings if anyone tries to break in. Monitored alarm system followed by a smart capture camera ensures safety in cases if any unusual event is sensed by the other devices. In this project, we aim to model, implement and verify smart doors.

#### Knowledge Area: Graphics and Visualization

#### Knowledge Area: Architecture and Organization

Group Members:	
Sarmad	

#### Tagging multimedia events for Content Advertisement

Advisor: Dr. Muhammad Shahzad Younis

Idea of the project is to tag the keywords with audio/video streaming/stored content and user be sent the alerts when the given keywords are mentioned in the program/content. This App could be used for targeted advertisement of products/places/packages etc.

#### Knowledge Area: Computational Science

**Group Members:** Laiba Wadiya Gillani

## Modeling, Implementation and Verification of Smart Doors

Advisor: Dr. Sidra Sultana

Due to the advancements in the innovative local area and modernization, it is fundamental for a human instinct to desire for more comfort and solace to his/her life. Smart doors are the digital upgradation of the traditional doors having an ability to overcome the

**Group Members:** Amna Faisal Muhammad Deedahwar Mazhar Qureshi

## Analysis of reforestation potential in Pakistan using Machine Learning and Satellite images

Advisor: Dr. Muhammad Ali Tahir

The main idea behind this project is to identify under forested areas (due to various natural or human causes) in Pakistan and measure their reforestation potential. While forests play an important role in mitigating the effects of climate change, the process of reforestation is expensive, difficult to plan and even harder to execute and maintain. Therefore, it is important to understand the efficiency of reforestation efforts and develop solid estimates of areas where such efforts will actually yield results. Using satellite imagery, terrain, and weather data as an input to a machine learning algorithm, this system aims to determine the potential vs actual vegetation cover. The proposed algorithm is supposed to automatically identify geographical regions with high potential for future reforestation or afforestation efforts.

**Group Members:** Natiq Ali Syed Ramish Amir Zaid Wajid

**Group Members:** Hassan Javaid Hassan Khalid Butt Hissaan Ali Shah

#### Horror Game

Advisor: Dr. Muhammad Ali Tahir

It is a horror game with FPS shooting type controls. This game is specifically for pc. The game can be made in Unity Engine. The player will have to get out of the hotel by solving riddles and surviving from the hotel creatures by killing them or by hiding himself. There will be different quests for progressing the game. The main mission for this game is to enhance the player analyzing abilities for different scenarios. Mostly horror games are just about solving the riddles or just surviving in the gameplay, but we will combine these two parts to make it more interactive. Maximum games have simple 2d game menu, but we will use 3D game menu as it will give user more interaction and the interest of the player will increase. The players will be able to change the graphics according to their requirements. In game, the player can find the tools for surviving like health kits or guns.

#### Virtual Shirt Try-On

Advisor: Dr. Zuhair Zafar

Augmented reality is on the rise today making its way into all of life from health care and education to entertainment. The provision of more data and recent advancements in Computer Vision and Deep Learning algorithms has made it even more easier to develop cutting edge technologies. With Loreal Paris and Nike already releasing their technology for facial makeup and shoes try-on respectively, we intend to develop a try-on system for men's clothing. Given an image of a target person and a target clothing, our try-on technology would seamlessly transfer the desired piece of garment style onto the target person. This technology would also include geometric transformations to adapt to the body figure of the target person and generate more realistic results.

#### Knowledge Area: Human-Computer Interaction

#### **Group Members:** Muhammad Shahzil Syeda Amna Jah Bukhar

#### Hotel Booking Website for Tourism

Advisor: Engr. Taufique ur Rahman

There is a lack of availability of hotels on hotel booking websites in Pakistan, which does not fully advertise the numerous, economical hotels and inns to tourists and travellers. Our website will help travellers to browse through multiple hotels and inns in various cities across Pakistan, and find an economical place to stay. The website will provide a user-friendly interface to both users and hotel managers.

#### Imecha

**Group Members:** Adeen Jawad Qazi Ali Tariq Ayna Shairi

Group Members:

Safi Ur Rehman

**Group Members:** 

Advisor: Dr. Seemab Latif

Our e-commerce system is built for a running business of hand painted khussas with the brand name 'imecha' where the customers can design their own khussa and place orders online. It is being built for the convenience of customers as an option of choosing the design themselves will be available. The main goal of this system is to expand the customer audience and help them find better quality products.

## **On-Device Fruit Disease Classification**

Advisor: Dr. Hasan Ali Khattak

Automated system to getting information from the video stream to classify fruit diseases using image processing

#### **Real-Time Facial Recognition and Motion Detection**

Advisor: Dr. Mehvish Rashid

Facial recognition is one of the fastest growing AI technologies with vast applications in the field of security, marketing, and even medicine. This project focuses on the security-related aspects of facial recognition to create a robust solution for monitoring and surveillance aimed at organizations. It relies on computer vision and deep learning to detect and identify suspicious personnel using a centralized database. A web-based dashboard and mobile application will be developed for real-time monitoring, generating live alerts, and interfacing with the algorithm.

#### Knowledge Area: Information Management

#### Knowledge Area: Information Management

**Group Members:** Umair Imran Abbasi

Group Members:

**Group Members:** 

**Group Members:** Abdullah Sheikh Bilawal Ahmed Danish Khan

#### Analytics based Mess Resource Management Advisor: Dr. Muhammad Ali Tahir

A dining hall management may charge hostel students regardless of whether the mess is actually being used or not. This causes hostelites to over expend their already limited budget and also wastage of extra amount of food being prepared. For this purpose, the proposed Mess Management System would greatly help the students in terms of managing their budget effectively and efficiently. On top of that, the service would yield benefits for the management team as well as it would provide feedback from the hostelites and help improve the service even more based on the collected data. Also, the students will be able to manage their meals from their cell phones which will minimize the effort of visiting the warden to get the mess off.

#### **COVID-19 Contact Tracing App**

Advisor: Dr. Farzana Jabeen

The recent outbreak of COVID19 has taken the world by storm, forcing lockdowns and placing a strain on public healthcare systems. With significant amount of asymptomatic carriers the disease has been hard to detect. Testing of population at large scale have proved to be challenging due to limited testing kits and other issues. To tackle this problem government and healthcare workers use contact tracing of infected individuals to identify those who may have come in contact with them known as primary contacts. These contacts are then quarantined or tested depending upon their symptoms. Traditional methods of contact tracing are erroneous and difficult. A large fraction of the population owns smart phones. The idea is to develop an app that uses Bluetooth technology to record close interactions between the users. Thus, the contacts of covid victims can be traced using this app. This can reduce the time required for contact tracing dramatically and mitigate the spread of virus.

#### Location based Lost and Found System

Advisor: Mr. Jaudat Mamoon

The project is a mobile application where the users can list any found object by providing details, images and location. We can also view all the listed objects nearby or search for any item and see if their details match anything we might have lost and contact the person directly. Often times we find something valuable but are unable to decide how to locate the owner. Similarly we might lose something. Almost any one can encounter such problem and it can be very troublesome. Based on our current location, the system effectively lists all the finds nearby. With the Lost and Found system we can list any object and make sure it's rightful owner can receive it. The project will be a Java application for mobile devices. The user could sign-in or continue

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without it. They user can choose if they found an object or are looking for a lost object. If they found an object, they can provide the necessary details along with images. They can also share their location. They must provide their contact information as well. The integrated Firebase database will store and handle all the data and Google Maps will handle the location functionality. Similarly, if someone lost a valuable object, they can also easily contact the person to retrieve their property. Finally, after verifying the owner and retrieving the object, the entry inside the database can be marked as delivered and will be removed.

#### **Online Auction Service for Properties**

Advisor: Dr. Syed Taha Ali

An online portal to run auctions for properties

## Online marketplace for Vehicles with Data Analytics

Advisor: Dr. Mehvish Rashid

Cars marketplace + data analytics is an online marketplace for selling and purchasing cars that shall use advanced data analytics tools and techniques to make the user experience better. Our project shall also use advanced Machine Learning techniques to predict the price of automobiles based on certain features. Our project will consist of two parts. A marketplace where sellers will be allowed to place ads of used vehicles and buyers will be able to contact the sellers. Such marketplaces already exist but we will introduce the predictive analytics part as well to our project. We will use machine learning and predictive analytics techniques to guess the price of vehicles based on various key factors. This will prevent sellers who set unrealistic prices.

#### Rapid à la Mode Craze Scrutinizer (Trends Analyzer)

Advisor: Dr. Farzana Jabeen

In today's world, those who get a hold of trends and latest developments are the quickest are the winners. Facebook, YouTube, and other social media websites are hotspots for finding out what everyone's talking about. The idea is to create a tool which will mine these websites and get a hold of key developments taking place. Finding the right information quickly is crucial for understanding the latest developments. Through web scraping and data mining techniques the latest trends can be compiled into an easy to read format for a beautiful analysis. Natural Language processing techniques will be used to identify and extract relevant information, including insights which may have remained unknown.

### **Group Members:** Fatima Khan

**Group Members:** Ahmed Hassan Ismail Hamza Amjad Zain Javed

#### Knowledge Area: Information Management

#### **Group Members:** Abdul Rafey Hammad Ahmed

Documents

Structured Information Extraction from Text

Advisor: Dr. Mehvish Rashid

The project is based on information extraction. Information extraction is the process of extracting the structured information from the unstructured textual data. In information extraction system we can build a system that extract data in tabular form, from unstructured text. For example, given a receipt, information extraction task would be to identify a Date, Name, Amount, Company Name etc. And store it in a structure, like table, file, database etc. This task can be done by applying deep learning algorithms to text data and choosing the optimal algorithm.

#### Knowledge Area: Intelligent Systems

#### **Group Members:** Bushra Muqaddas Maryam Zafar

**Group Members:** Hassan Raza Bukhari Salman Inayat

#### **Chatbot Based Emergency Hotline**

Advisor: Dr. Muhammad Ali Tahir

Chatbot applications are the latest inventions of digital design. These applications are well known for automatic conversational agents that run on computer programming or a kind of artificial intelligence (AI) interaction between the users and machines with the intervention of Natural Language Processing (NLP). In this project we aim to develop a Voice Based Telephonic Chatbot that responds to emergency calls and generates corresponding alerts and actions using Machine Learning and Natural Language Processing techniques.

## Crop Disease Scouting using AIIOT Technology

Advisor: Dr. Rafia Mumtaz

Rust is considered the most harmful fungal disease for wheat which can cause tremendous damage to the crop. With a continuous rise in population, it is essential to increase the crop yield to combat imminent food security. Towards such an end, we propose an IoT and AI-based solution for rust disease detection and prediction in its early stages. The system will consist of a camera connected with a Single Board Computer (SBC) that will capture the high-resolution images of wheat and send them to cloud. To detect the rust disease and predict its severity levels, deep learning models such as Region-based Convolutional Neural Network (R-CNN) will be trained on the wheat images to perform image segmentation, background extraction, and detection of rust disease. The model will further be trained to classify the detected rust disease into different classes including (i) healthy, (ii) rust-resistant,

**Group Members:** 

Maaz Bin Tahir Saeed

#### (iii) rust susceptible. The trained models will be uploaded on the cloud and will also be installed on the edge device (Agri-DMaP). For this purpose, two Amazon Web Services (AWS) will be used including (i) AWS IoT Core which will act as a bridge between the cloud and the edge devices, (ii) AWS IoT Greengrass which allow the deep learning models to retrain on the cloud after a specific time and run these trained models on the end devices. Additionally, a mobile application along with a web portal will be developed to facilitate the agricultural user to see the area under rust attack, its severity levels, and recommendations to apply treatments (Pesticide) accordingly to the disease level. To increase the outreach of the solution a mobile application will be developed to assist agricultural community to timely detect, diagnose the severity level of the disease. The affected area of the wheat crop will be annotated by the severity levels (such as level 1, level 2, and so on). This information will be available both in audio/visual format supporting Urdu and English languages. This solution will offer many advantages such as containing the spread of rust disease by detecting it in early stages, which leads to increased wheat yield, and spending money on the right pesticide will help the farmer to protect his crop yield.

#### CryptoCash (C2): Enabling instant transfers with digital payments and making investments accessible through cryptocurrency Advisor: Dr. Seemab Latif

CryptoCash (C2) is the first truly digital wallet which enables instant transfers with digital payments and makes investments accessible through cryptocurrency. C2 allows its users to go cashless by scanning QR codes available at partner merchants and for the first time ever, make payments through cryptocurrencies. Fiat payments are supported through interoperability between fiat currency PKR and stable coin vPKR (virtual PKR). Since the application is built on blockchain and smart contracts, it ensures unbreakable security and greater transparency than traditional financing platforms. In phase 1, C2 wallet users will be able to send money to anyone, anywhere in Pakistan and make digital payments at supported merchants. In phase 2, C2 wallet will make investments accessible, allowing anyone to invest with it while keeping a low barrier for entry and removing any middleman like banks, brokerage houses etc. The investments will be pooled from its users and use a number of mechanisms such as staking, stacking, trading algorithms etc. to earn a competing annualised return on investments. C2 is built as a human centered finance service. At the end of the final year project duration, C2 will aim to have completed a case study with one of the partnered merchants where C2 will be deployed in production and users will be able to make QR through payments cryptocurrencies. With its success, C2 will act as a cornerstone in laying down the foundations for digital payments in Pakistan and solve the problem of lack of a good payments service for online businesses in Pakistan.

#### Knowledge Area: Intelligent Systems

**Group Members:** Ali Asad Awais Qamar Faiz-Ul-Hassan

**Group Members:** Faizan Ahmed Talia Hamid

**Group Members:** Afia Abdul Rehman Mariam Batool

## Deep Learning for Self-Driving Cars for Collision Avoidance and Lane Finding

Advisor: Dr. Muneer Ahmad

Self-driving cars are one of the hottest areas of research and business for tech giants. The idea of autonomous cars originates by witnessing accidents due to careless driving of people which could become extremely harmful. They also impose serious challenges, not only on technological but social and ethical grounds as the global average of road car fatalities increases to 18.2 deaths per 100,000 people. This project will focus on two things i.e., driverless cars and safety of self-driving car users. This will be achieved by using deep learning and computer vision techniques to design an algorithm for detecting lanes on the road that allow vehicles to drive and change lanes automatically while avoiding collision with other vehicles and obstacles on the road in order to prevent road accidents and improve passenger safety.

#### Mobile App for emergency services

Advisor: Dr. Muhammad Ali Tahir

An android app for a centralized helpline like 911. The user shall be able to write his/her emergency or enter it through voice. The audiobot will get the necessary information and will inform the concerned department. The user will be shown emergency tips to apply until the help arrives. The app will be user friendly.

#### Recipebot

Advisor: Dr. Rabia Irfan

Technologies like Internet of Things (IoT) and Artificial Intelligence (AI) has completely changed the ways of looking at things at home and with these technological advancement the concept of smart homes and automation is now a realization. Cooking is an activity that has been a part and parcel of living in every home. Kitchen appliances and gadgets are getting smarter day by day and provide support to modernize cooking in different ways. One thing which is less being thought is of recipe management. Recipes books, collections, recipe apps are nowadays freely available. With which the user can try new and different recipes. These recipes can be watched, printed and can be displayed on the devices' screen while cooking again and again, which could even be dangerous. In this project we thought to take the concept of AI based chatbot to a newer level and with voice/speech recognition support can provide the user a recipebot that can communicate and provide relevant content through speech/text/video support to act like a assistance during cooking.

Knowledge Area: Intelligent Systems

#### **Group Members:** Amna Abid Zainab-Binte-Iftikhar

Automated Voice Dubbing System

Advisor: Dr. Rafia Mumtaz

Video Dubbing has become an essential part of our culture now. However, it requires a lot of time, effort, and skill to dub a video in your native language. Automated Voice Dubbing System is a platform to translate videos in the English language to our native language i.e., Urdu. And this process will be carried out through a web application. The subtitles of an English video are extracted, translated into Urdu, and then synthesized to speech automatically.

#### Real time anomaly detection for security

Advisor: Dr. Muhammad Ali Tahir

**Group Members:** Abdul-Basit Chishti Atisam Ul Haq Ijaz Muhammad Ahrar Ahmed

**Group Members:** 

Nowadays, there has been a rise in the amount of disruptive and offensive activities that have been happening. Due to this, security has been given principal significance. Public places like shopping centres, avenues, banks, etc are increasingly being equipped with CCTVs to guarantee the security of individuals. Since constant observation of these surveillance cameras by humans is a near-impossible task. It requires workforces and their constant attention to judge if the captured activities are anomalous or suspicious. Hence, this drawback is creating a need to automate this process with high accuracy. Moreover, there is a need to display which frame and which parts of the recording contain the uncommon activity which helps the quicker judgment of that unordinary action being unusual or suspicious. Therefore, to reduce the wastage of time and labour, we are building anomaly detection system. Its goal is to automatically identify signs of criminal acts in real-time. From there, we can raise a detection alert for the situation of a threat, indicating the suspicious activities at an instance of time.

## Sahulat App - A Pakistan-focused Integrated System Connecting Citizens and Governing Bodies

Advisor: Dr. Yasir Faheem

Reporting domestic and municipal issues has never been easy for the citizens of Pakistan. They have to undergo a long procedure to report problems such as waste disposal, sewage leaks, short water supply, etc. Even though some bodies accept complaints via call, there is no guarantee that reported issues are taken seriously. Most of the complaints go unanswered and unresolved because of lack of governance and progress-checks in the local governing bodies. To facilitate this complaining procedure, the aim of this project is to develop an integrated system that lets citizens lodge complaints against daily-life disturbances. A mobile application

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#### Knowledge Area: Intelligent Systems

is proposed which provides an easier way for citizens to report problems, with the option of remaining anonymous. The problematic zones can be geo-tagged from smartphones and the cameras within them can provide visual proof of the problem. The complaint is stored in the central server, and is sent to the concerned authority depending upon the nature of the problem. A web-based application is also proposed for the governing bodies. This webapplication intends for higher authorities to keep progress checks over lower authorities. Infrastructural problems in specific regions are better highlighted to authorities in that same region via the web portal. The system overall ensures that a lodged complaint is assuredly considered by the authorities, all while the progress on said issue is presented to the citizens.

#### SOP Violation Detection in Fenceless areas through Live Videos

Advisor: Dr. Muhammad Ali Tahir

In the current wake of a global pandemic and community spread of the virus, government officials and administrators have found restricting population movement and social interaction, a mammoth task. The high-priced schemes and lockdown containment measures are still questioning the authorities regarding the relentless and ill-informed actions of the public such as the omission of social distancing, overcrowded public places, non-masked faces and unnecessary gatherings. With such contagious disease and regular SOP violations, the government and local authorities desire a non-pharmaceutical alternative since herd immunity can only be achieved if about three-quarters of the population contract the virus vaccination. To curb the effect of amid breach of SOPs, we propose an intelligent system that will ensure the detection of SOP violations through various imagery sources such as CCTV footages. The technology behind the proposed system is connected to machine learning and computer vision for the human-level understanding of digital graphics. The captured and recorded CCTV images will be at first categorized in discrete classes of the same features. But before the classification, we must have a granular understanding of the image objects such as suspects, the in-contact device, masks and much more. Thus, at this point image segmentation will be performed for pixel-masking of image objects using TensorFlow and OpenCV. TensorFlow will detect the prominent humanoid violators through their extracted features such as faces, physical distance, number of appearances per frame and other constraints. Whereas, for live motion detection OpenCV will be used for tracking down the compliance measures. The project will be advantageous in the sense that it will ensure the identification of illiterate and violating community, digital assistance to the authorities and even medical departments, business workplaces and public places. We expect that the project will be focused more on developing a mitigating and extensible system that will assist the government officials and businesses shortly for COVID-19 precautions.

#### Knowledge Area: Intelligent Systems

**Group Members:** Abdul Rafay Ahmad Muhammad Hamza Ami

## U-Assistant - Urdu speech based virtual assistant for mobile phones

Advisor: Engr. Taufique ur Rahman

We plan to make a Google Assistant/Siri-like voice-based assistant application that understands Urdu. The target audience will be Pakistani common users who may not be well-versed with technology and the English language. Our application will provide video/ image tutorials to help the users to understand the usage of our application. Our assistant will assist the users to perform common tasks on the phone as well as get information easily through Urdu voice-based question answering. The general idea is that users can perform tasks by issuing a voice command in Urdu and the AI assistant will respond in Urdu as well. For example, a user can set the alarm, ask the weather, set the caller ringtone, set the wallpaper, ask to save a contact on the smartphone, make a call, send a message, and much more. These are the features we thought of but we will do more requirement gathering by asking the common people since they are the focus of this project. We will also train the currently available deep learning model and our focus will be on developing a user-friendly application.

#### **UniD-Marketing**

Advisor: Engr. Taufique ur Rahman

**Group Members:** Abdul Rafay Ahmad Muhammad Hamza Amir

With the recent boom in digital marketing, it is increasingly difficult for business owners to keep track of the heuristics of advertising on the different social media platforms available. To facilitate managing different accounts catering to contrasting audiences, our platform will be a one-stop solution for business owners who need to manage their online marketing campaigns. With the APIs exposed by social media giants such as Facebook and Google, we aim to streamline the process of marketing a business owner's product efficiently.

Group Members: Ayesha Siddiqua Mariam Ali

#### Knowledge Area: Platform-based Development

#### Bridge

**Group Members:** Fatima Khalid

Bilal Waheed Malik Muhammad Idrees Advisor: Engr. Taufique ur Rahman

This project is aimed to develop a cost-effective web application that would assist a novice user to easily share and schedule posts for multiple social media platforms like Instagram, Facebook, Twitter etc. It is primarily aimed to assist business enterprises of any size/ magnitude and content creators to handle their content(s) effectively and conveniently on multiple social media platforms from a single platform, named as "Bridge.

#### **Goal Quest**

Advisor: Dr. Arsalan Ahmad

People often struggle when it comes to finding a path or a roadmap that can help them in achieving their goals. Most of the time they don't precisely know what they can do to achieve their objectives. Primarily, this is because there is no proper counseling system to help them. It would be helpful if there was a system or a person that could provide students and young people with a path to reach their goals. Our system aims at providing said path. Data would be gathered from different resources and that share job posts and their required skills. From that, our system will generate a roadmap that could be used to acquire those skills. In addition, the idea incorporates a system to gather content from the web, that can be provided to users to gain skills, as a part of the roadmap. The content would be filtered and shaped according to the knowledge level of users. Consequently, a wide range of people can benefit from the system. The system would provide a rough timeline in which any skills can be gained. Timelines could be made specific to users based on their status and routines. All in all, the system would aim to provide a road that leads to the users to success.

#### **Personalized Education Platform**

Advisor: Dr. Arsalan Ahmad

Group Members: Alina Shoaib Qureshi

The literacy rate of Pakistan is around 60% with around 64% of youth being under the age of 30. It means we are missing out on a potential part of our population and with the pandemic, we have seen how it has impacted education and opportunities among the youth. Almost all developed nations promote one on one mentorship for youth so that they can be accelerated in the right direction. According to statistics, Mentees are promoted 5 times more often than those without mentors and the mentors themselves are 6 times more likely to be promoted. Furthermore, 87% of mentors and mentees feel empowered by their mentoring relationships and have developed greater confidence. If we talk about businesses, then 67% of the businesses reported an increase in productivity

due to mentoring and more than 4 in 10 workers who don't have a mentor say they've considered quitting their job in the past three months. Moreover, people with autism and dyslexia can never be treated without one on one mentoring sessions. Seeing this great importance of one on one mentoring yet one cannot find mentors easily is something that we are lacking. We aim to create a platform that simplifies the process of connecting with a domain expert. In short, the client can easily search his/her domain and can find the related domain experts that he can connect with and get one-on-one training/advice. In this case, the expert will be paid for his services and the client will have to pay for availing that service.

#### **Knowledge Area:** Programming Languages

## Group Members: Syed Muhammad Ubadah

**Group Members:** 

#### Integrated Development Environment (IDE) for **Financial Modelling**

Advisor: Dr. Seemab Latif

A financial model is not very different from a program. The process of writing and debugging a financial model has a lot of similarities to writing and debugging programs in any highlevel language. This project will involve building an IDE for financial modelling with similar capabilities that we have come to expect from programming IDEs. The exact design will determine the extent to which lexical analysis, parsing and ML-based predictive insights are needed.

Knowledge Area: Social Issues and Professional Practice

#### Nigehbaan - Child Lost and Found

Advisor: Dr. Mehvish Rashid

The main objective of "Nigehbaan" is to provide a valuable software application for the society. A great cause has been attached with "Nigehbaan" which is to find the lost children in Pakistan. Each year thousands of children are lost in Pakistan and no trace is found because these kids are either unable to give their home details or they are kidnapped. "Nigehbaan" is an idea to recover such children. "Nigehbaan" will connect lost children with their parents. Parents will be able to upload details of lost children and the system will try to find them out of those who were missing and found by someone in the country. The system will try to found the lost faces across the country and public points using AI technology.

#### Knowledge Area: Software Development Fundamentals

#### Crime Alert: A Realtime Incident Reporting Web App Advisor: Dr. Mehdi Hussain

**Group Members:** Hamid Ayub Muhammad Umer Farooq

A web application that ensures the safety of general public. A crime alert based web application works similar to a social networking app such as WhatsApp, Facebook or Instagram but only crime alerts. People who see crime in their area can post about the incident in real time at this platform, and everyone registered in the app in that area will be notified of the crime. This app is capable to add features such as live sharing space, photos, and videos to the web application platform.

#### Knowledge Area: Software Engineering

#### **Group Members:** Haashir Bin Shakeel Muhammad Ahmad Ejaz Muhammad Mobeen

## **Alfabolt Analytics Platform**

Advisor: Dr. Seema Jehan

The goal is to build a SaaS platform to enable developers to track all users in their mobile / web apps. Along with users, we want developers to be able to track all events within their application. Each event could be linked to another user and we want to be able to track links as well. We also want to be able to allow users to trigger secondary events automatically based on an event e.g. if a user triggers a "message sent" event, they might also want to auto trigger a "message received" trigger incase they are looking for users that got the maximum number of events over a given time period. Using this data, we want to offer our users: Funnels:Tracking a series of steps and examine percentage of people dropping off at each step. Flows:Tangential analysis. A-HA moment finder; Find the action or actions that drives customer value.

#### Perho Pakistan

Advisor: Dr. Khawar Khurshid

Solving one of the most critical challenges faced by Pakistan: 25 Million out-of-school children. A social platform to provide education opportunities to all the children through

personalized citizen sponsorship. Each sponsor can keep track of the progress of his sponsored student.



National University of Sciences & Technology (NUST) School of electrical Engineering & Computer Science (SEECS)



**Group Members:** Abdul Mughees Awar Babar Hussain Hammad Ali