

BOOK OF ABSTRACTS

COMPSPEX-22

Computer Science Senior Project Exhibition Spring 2022

22ND JUNE 2022

Organized by the

Department of Computer Science in collaboration with the Office of Research, Innovation, and Commercialization (ORIC). Forman Christian College (A Chartered University)

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Forman Christian College (A Chartered University) Ferozepur Road, Lahore 54600, Pakistan.

http://www.fccollege.edu.pk

INTRODUCTION

Forman Christian College, established in 1864, is one of the oldest institutions of its kind in the subcontinent. During its Lifetime FCC has produced many Luminaries of the subcontinent including politicians, judges, educationists, social workers, and scientists. After going through many phases of change in its long history, FCC was decentralized in 2003 to run as an independent institution. The college received its charter in 2004 to function as a degree-awarding institution-The Forman Christian College University (FCCU). During almost one and a half decades of its existence, the FCCU has undergone phenomenal development in terms of infrastructure, academic programs, and student facilities.

The Department of Computer Science is part of the Faculty of Computer and Mathematical Sciences. It offers a rigorous academic program for able and motivated students who are excited by the influence of computing in our lives and who want to tackle the challenges of the future. Computer Science is a fast-changing field and our program aims to equip students with fundamental knowledge that enables them to keep abreast of the latest developments.

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• Di. Syed Wananinad Inteza	• Dr. Maria
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	• Dr. Ayesha Khan
 Dr. Usama Ijaz Bajwa 	• Mr. Rauf Butt
• Dr. Muhammad Waqas Anwar	• Dr. Saad
• Dr. Muhammad Tayyab Chaudhary	• Mr. Fakhir

PROJECT EXHIBITION DETAILS

MORNING SESSION 0900 - 1300

S320							
Roll Numbers	Names	Primary Advisor	Project Title	External Evaluator	Internal Evaluator	Internal Evaluator	
22-10234	Mohsin Zahid		"Watch-Out" Obstacle				
21-10539	Anushka Adnan	Salman Chaudhry	Avoidance and Localization for visually		Dr. Ayesha	Dr. Nazim	
21-10673	Haris Ali		impaired				
22-10337	Muhammad Ahtir Saeed	Dr. Sidro	Automating Campus Counseling Center at	Ma Morkoa			
22-10369	Ruslan Khan	Dr. Slura Minhos	Forman Christian College	Mr. Maznar	Dr. Ayesha	Dr.Nazim	
22-10162	Ossama Bin Raza	winnas	University through a mobile application	Javed			
22-10216	Ahmed Yasser		Mobile Application to				
22-10067	Rifa Salman	Dr. Sidra	Convert English Text and		Dr Avecha	Dr. Nazim	
22-10483	M. Hassan Shakoor Rana	Minhas	Audio to Pakistan Sign Language Video Lexicons		Dr. Ayesna	DI. Mazilli	

	S319						
Roll Numbers	Names	Primary Advisor	Project Title	External Evaluator	Internal Evaluator	Internal Evaluator	
22-10507	Muhammad Umar Ali					Zeeshan	
20-11372	Muqeetussame e Ghauri	Fakhir Shaheen	Mobile Game Development		Dr. Saba		
22-10134	Komal Amjad Butt			Dr. Faiza			
22-11028	Aeiman Afzal	Fakhir	3D Ray Tracing Engine for Interior Designing		Dr. Saba	Zeeshan	
22-11368	Abu Bakar	Shahaan					
22-10070	Ayesha Wajid	Shaheen					
21-11214	Abdullah Khalid						
22-10653	Komail Raza Zaidi	Fakhir Shaheen	Trading Bot Simulator		Dr. Saba	Zeeshan	
21-11485	Umram Yaqoob	Shulloon					

			S219			
Roll Numbers	Names	Primary Advisor	Project Title	External Evaluator	Internal Evaluator	Internal Evaluator
22130044 8	Mahnoor Hassan	Dahranaa				
22-11043	Abdul Moeed	Rabranea	Voice Illustrator		Dr. Sarwan	Akheem
21-11447	Mutahra Salman	Вqа				
22-11262	Tabish Amjad		Meal Retreat: A Mobile	Dr Sved		
22-11388	Zohaib Ullah Khan	Samia Asloob	Application to Prevent Food Wastage with A.I	Muhamma d Irteza	Dr. Sarwan	Akheem
22-10476	Menahil Zafar	Qureshi	Qureshi Object Recognition and Recommendation	u nteza		
22-11210	M. Abdullah Tayyab	Dr Sidra Minhas	Dr Sidra Mall Management and		Dr. Somuon	Altheom
22-11211	Asim Arif		with a Mobile Application		Di. Sarwali	Akileeiii
22-10462	Zohaib Amir		with a Moone Application			

	S218							
Roll Numbers	Names	Primary Advisor	Project Title	External Evaluator	Internal Evaluator	Internal Evaluator		
22-11157	Hamza Zahid	Dr.Mubas	ATM SUDVEILLANCE					
22-10367	Joshua Naeem	har	ATWISURVEILLANCE SVSTEM		Dr. Maria	Ali Faheem		
22-10650	Arun Zaheer	Mushtaq	SISIEM					
19-11217	Humza Ashraf							
22-11091	Ali Humza	Asma	App that detects and reports	Dr Asma	Dr Maria	Ali Fahaam		
22 11266	Muhammad	Basharat	hate speech	Naseer	DI. Maria	All Palleelli		
22-11200	Sheraz			INASCEI				
22-11025	Hassan Afzal	Salman						
22 11245	Muhammad	Chaudhar	SpotCarbaga		Dr. Maria	Ali Echoom		
22-11545	Shehryar Rana	Chaudhar	spotGarbage		Di. Maria	An raneem		
22-11007	Mir Hassan	У						

S317							
Roll Numbers	Names	Primary Advisor	Project Title	External Evaluator	Internal Evaluator	Internal Evaluator	
22-10673	M.Muzzamil Raza	Dr.					
22-10307	M.Abdullah Bin Tariq	ad	Autonomous Campus Delivery Robot	Dr. Awesho	Dr. Saad	Dr. Sarwan	
22-10569	M.Fahad Anwar	Shakeel		Altaf			
21-10479	Ali asghar						
22-10090	Hamza zahid	Rauf Butt	Vechicle security system		Dr. Saad	Dr. Sarwan	
21-10321	Rana ali afzal						

AFTERNOON SESSION

1400 - 1700

S319							
Roll Numbers	Names	Primary Advisor	Project Title	External Evaluator	Internal Evaluator	Internal Evaluator	
22-11016	Amir Sarfraz						
22-11065	Syed Samar	Asma	Smart Driver Monitoring				
22-11087	Sheikh Muazzin Azeem	Basharat	System		Ali Faheem	Dr. Maria	
22-10212	Aashir Ahmed		Skin Lesion				
22-11146	Ansar Aziz		Segmentation Using				
22-10071	Bilal Ahmed kashmiri	Dr. Maria	Ensemble of Different Image Processing Methods	Rabia Sirhindi	Ali Faheem	Fakhir	
22-10281	Yesheb Jeremiah Mark		Intelligent Image				
22-10622	Huzaifa dar	Dr. Aasia	Processing Framework		Ali Eshaam	Dr. Maria	
22-10008	Asad shehzad	khanum	for Paediatric Brain		An raneem	Di. Maria	
22-11372	Abdullah saigal		Tumor Analysis				

	S320							
Roll Numbers	Names	Primary Advisor	Project Title	External Evaluator	Internal Evaluator	Internal Evaluator		
22-10558	Shoun Paul	Dr.						
22-11081	Muhammad Waleed	Muhammad Haroon	Smart Mirror for Gym Training		Dr. Nazim	Akheem		
22-10586	Abdul Rauf	Shakeel						
22-10137	Muhammad Usjad Chaudhry	Dr. Muhammad Haroon	Way Back Home: A Computer Vision based Missing Persons Finder	Dr. Usama Jiaz Bajwa	Dr. Nazim	Akheem		
22-10019	Ahmed Ikram	Shakeel	Mobile Application	ijuz Duj (ru				
22-10193	Tahir Mubeen	Shakeei	Woone Application					
22-10658	Rabia Tahir	Dr.	Finding Lost Pets					
22-10588	Ahmad Ibtehaj	Muhammad	through Viewpoint		Dr Nazim	Akhaam		
22-10208	Hamza Khan	Haroon Shakeel	Independent Image Matching			ANICCIII		

S219							
Roll Numbers	Names	Primary Advisor	Project Title	External Evaluator	Internal Evaluat or	Internal Evaluator	
22-10391	Salman Anwar	A 1:	Undy Mashing Deading		Dr.		
22-10457	Eraj Khurshid	All Fahaam	Comprehension		Ayesha	Rauf Butt	
22-10582	Zarek Asif	Faneem	Comprehension		Khan		
22 10460	Muhammad						
22-10409	Aalian	A 1;	Pasuma Screening and Job	Dr	Dr.		
22-10201	Muhammad	All Faheem	Recommendation	DI. Muhammad	Ayesha	Rauf Butt	
22-10201	Awais	1 anceni	Recommendation	Wagas Apwar	Khan		
22-10068	Hamza Aqeel			waqas Anwar			
22-10295	Zainab Imran				Dr.		
22 11248	Masseera	Salman	Music/Color therapy by		DI. Avosho	Douf Butt	
22-11348	Khurshid	Chaudhry	emotion detection		Ayesna Vhor	Kaul Duu	
22-10309	Rahim Hassan				miall		

	S218							
Roll Numbers	Names	Primary Advisor	Project Title	External Evaluator	Internal Evaluato r	Internal Evaluator		
22-10245	Muhammad Emad Zaheer		Plack Varda: AL and					
231- 459429	Amna Sheikh	Rabranea Bqa	Block hain based Web App	Dr. Muhammad Tayyab	Dr. Saba	Dr. Saad		
22-11251	Abdullah Tariq		for Keal-Estate					
22-10336	Mohammad Omer Sajid	Samia	Project Incube		7 1			
22-10326	Talha Irshad	Asloob Ouroshi			Zeeshan	Dr. Saad		
22-10023	Izma Azhar	Quiesiii						
21-10832	Akhamas balouch			Chaudhary				
22-10305	Hamza Imran	Dr.						
21-10862	Sadrak Basharat Maul	Mubashir Mushtaq	System		Zeeshan	Dr. Saad		
21-10534	Muhammad Azan Shazad							

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Lost Pet Finder Through Viewpoint Independent Image Matching	
Child Security System	
Soothify	
Driver Monitoring System	
Spot Garbage	

Smart Mirror for Gym Training

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ABSTRACT

Everyone strives for a healthy lifestyle and is fitness conscious in this modern era. Therefore, people tend to join gyms in anticipation of getting trained appropriately by a trainer. Most of the time, finding a certified and experienced trainer who will help a beginner or intermediate person reach their goals by teaching the best angles and number of repetitions is challenging. Furthermore, it is impractical for a gym trainer to give equally focused time and attention to every gym member. Therefore, there is a need for an automated system that can guide gym members without human intervention. Thus, we aim to design a smart mirror that will use computer vision to detect the human body and guide the users to train correctly according to their selected exercise types by calculating the angle of reps. The smart mirror would take input from cameras and would give real-time feedback on an LCD. This will provide an opportunity for the self-trainee to make goals and achieve those goals without human supervision. This mirror would also be connected to a mobile app to keep historical records of the users, their calories burned, and progress made.

Keywords: Computer Vision, Pose Estimation, Mobile App Development, IoT

Watch-Out

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ABSTRACT

This project is aimed to develop an Obstacle Detection application for the visually impaired people. Having to cope up with sight loss or low vision is merely one of the demanding situations that the visually impaired must deal with in their daily lives. We help develop a sense of security and commitment using the app "Watch-Out" that will serve as a tool, globally for 43 million people living with blindness and 295 million people living with moderate-to-severe visual impairment. Most individuals take their ability to walk around a town with no consideration, so they get lost if forced to close their eyes and navigate using reminiscence. For most blind human beings, it is imperative to maintain a clean mental image of their environment. Our android based mobile application serves as a medium for any kind of navigation or detection that our low sighted users face in their daily lives. These days, many of the commercial solutions for visually impaired localization and navigation assistance are based on the Global Positioning System (GPS). However, these solutions are not suitable for the visually impaired community due to low accuracy, signal loss and the inability to work for indoor environments. Moreover, GPS cannot provide local information about the obstacles in the surroundings of a person in need of assistance. We develop a cost-efficient, user friendly and practically viable solution for low sighted people to aid their mobility and environment by having to carry nothing more than a mobile phone. The project uses object detection in coordination with surface detection, both of which employee machine learning to achieve their goals.

Keywords: Obstacle Detection, Visually Impaired, Cost-Efficient, User friendly, Low vision.

Voice Illustrator

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ABSTRACT

Speech to Digital Image generation has been a relatively unexplored area in terms of development. Users cannot verbally describe images that are in their native language and expect the machine to produce an image that is unique (an abstraction of pre-existing images) or an image that is pre-existing and can be viewed in a different perspective. There exists no mobile or web-based application that use speech as input and can cater to non-English speakers. The only applications that are available are web based and use text prompts to generate images.

Our proposed application: Voice Illustrator, will fill the vacuum of applications by being a vailable on mobile and web platforms. Additionally, it will be the first of its kind by being a speech to image generation application by recognizing multiple languages. Voice Illustrator would use VQGAN (Vector Quantized Generative Adversarial Network) along with CLIP (Contrastive Language Image Processing), an architecture that generates images given prompt. The application will be free of cost, unlike other image generation websites and it will generate images within 3-minute timeframe. Our website is fast and responsive.

Keywords: Web Development; Image Generation; Voice Input; multiple languages; VQGAN; CLIP

Block yards

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Saamia Asloob Qureshi^{*}

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ABSTRACT

There are multiple websites and apps that have been implemented to market real estate properties but none of them have an online system of verified transactions. A seller or a buyer must go through lengthy processes of property registration and ownership paperwork which is usually done in person and has no means of an instant, authenticated proof on the internet. Block yards solves such limitations by putting every detail regarding the properties and their transactions on a public Ethereum blockchain. This benefits everyone including the users and the law enforcement agencies to keep track of any person or organization's assets, since a public blockchain allows public view for the activity and assets' transfer history of a particular address/hash on that network. This technology follows a consensus mechanism that will help maintain the integrity of asset transactions by ensuring that a transaction record (once verified by the majority of the nodes of this network), can never be changed, updated, or hacked, making the logs immutable. Furthermore, Block yards comes packed with a tool that helps predict the real and accurate value of a property, using artificial intelligence and machine learning based upon detailed attributes of the property asset. This feature will help eliminate the practice of inaccurate estimations of real-estate price and will allow users to list their property value with confidence. In conclusion, Block yards will allow users to buy or sell any property according to its actual value, once certain conditions are met, by normalizing the transparency of the property market on the internet, using the power of blockchain.

Keywords: Blockchain; Ethereum; Real-estate; Artificial Intelligence; Machine learning.

Automating Campus Counseling Center at Forman Christian College University through a mobile application

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Abstract

Mental health is a taboo in Pakistan due to which mental health problems are often overlooked and undiscussed. Recent surveys show that students are more prone to develop mental health issues which later impact their social and economic status. Constant stress of studies, hormonal changes, social and environmental factors aggravate the situation. Fortunately, Campus Counselling Centre (CCC) of Forman Christian College aims to assist the Forman community to focus on their mental wellbeing. However, automation of the Campus Counselling Centre operations was required to enhance its efficacy and efficiency as compared to manual entries. We developed a user-friendly mobile application through which users can book appointments with their desired counsellors over a click instead of visiting the premises. User profiles were stored locally at the time of admission of a student or appointment of a faculty member. The admins of CCC can also post updates regarding seminars and upcoming events directly to everyone using the applications hence reducing the communication gap. The student data being stored in the application can be used for further data analysis and benefit optimization of the CCC. Most important feature of this application was the Mental Health Monitor (MHM) which aims to handle the reluctance observed before visiting a mental health counsellor. MHM aimed to provide an initial assessment to a student regarding his mental state. After answering a series of questions, the user is intimated whether he needs to visit a counsellor or not. MHM is an intelligent module designed specifically for students. We used the 'Mental Health Questionnaire' dataset which consisted of 23 questions and 3 class labels. We sifted the features according to their weights using Logistic regression and selected the top 13 features. Later we trained a model using 4-fold cross validation and obtained an accuracy of 94.3%. This module was developed in Python and integrated in the mobile application using Flask. This application is deployed and currently being used by CCC of Forman Christian College. It is easily extendible to other educational institutes as well. Once the application is under full use and we gather ample data, we will retrain the MHM module to suit FC students specifically.

Urdu Machine Reading Comprehension

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ABSTRACT

Machine Reading Comprehension (MRC) is a challenging task in natural language processing (NLP). It creates systems that can answer questions according to a specific context. Recently, machine reading comprehension has gained progress with different models achieving outstanding result on variety of multilingual datasets. Nevertheless, none of these models adapted the Urdu Language. Our work explores the Urdu language question answering dataset which is made up of by translating SQuAD dataset. The Stanford Question Answering Dataset (SQuAD) is a reading comprehension dataset consisting of 100,000 questions posed by crowd workers on a collection of encyclopedia report. It is the compilation of the Wikipedia articles with human-annotated question and answer. We translated SQuAD dataset into Urdu Language by using Google Cloud Platform's translation API. In this research we are applying rule-based techniques which includes Sliding window technique, cosine similarity, semantic embedding and deep learning technique which includes Roberta and MT5 on this translated dataset to develop Machine Reading Comprehension system for Urdu language. Furthermore, we evaluate these models with F1 Score, ROUGE and Exact Match respectively.

Keywords: Natural language processing, question answering, Urdu machine reading comprehension, baseline techniques, deep learning, literature review.

ATM Surveillance System

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ABSTRACT

Transaction of money from the ATMs can be risky at times especially during midnight when there can be a possibility of an unfortunate incident occurring. To create a safe environment for people using ATMs, we have designed a system to assist the functionality to detect weapons (knives and pistols) and keep the live count of people inside the ATM room. To establish the video surveillance system a CCTV camera will be installed inside the ATM room which will concurrently perform both the functionalities together. We have designed a web application using the Django framework, which will be used by the security team for live video surveillance. To implement these functionalities, we are using Deep Learning and Digital Image Processing. The weapon detection technique is implemented through Python's Yolov3 package, we have used the volov3 dataset which consists of one class label ("weapon") with an accuracy of 97.13%. The headcount technique is implemented through Python's OpenCV library, we have used the haar cascade frontal face dataset with an accuracy of 96.24%. Since these functionalities have not been applied in any of the ATMs in Pakistan, we have chosen this domain specifically to fulfill the niche. Both these functionalities (weapon detection and head counter) can significantly help in securing the ATMs as compared to the traditional security system of ATMs. We have made sure that not more than two people should be present in the ATM room to avoid any suspicious activity. By implementing our proposed software, a robust and secure environment can be created inside the ATM room and evaluate whether the user uses any weapons inside the ATM or user headcount exceeds the limit. In the future another functionality of automatically locking the door could be added, in that scenario, if someone is detected with weapons, he/she won't be able to run away since the ATM doors will be locked and could only be unlocked by the security team.

Keywords: ATM; Yolov3; OpenCV; weapon detection; headcount; buzzer

Meal Retreat: A Mobile Application to prevent Food Wastage

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ABSTRACT

Pakistan is a Third World Country where majority of people do not get two meals a day, yet tons of food get wasted every day. A study reveals that 40% of food wasted globally is in Pakistan. This food is enough to feed 1 billion people in the world. Therefore, we designed an application that would manage food wastage anticipation on both small scale and large scale. In small scale our objective is to prevent food wastage from homes and in large scope we will manage Banquet lobbies, cafes, Hotels etc. Our project is based on Android Mobile Development. Initially, the UI of this application has been designed using XML, which is a markup language. Later, Firebase has been integrated into our mobile application for Database Storage and functionalities; followed by implementing the Backend part of the application in Java Language. The most significant part of this application is its straightforward usability, free of cost maintainability and availability of lifetime services for both the food provider and the consumer. Henceforth, in our application, we assume that it will assist public to find food at discounted prices or free of cost to reduce food wastage in Pakistan and to utilize excess/extra food to help needy people.

Keywords: Android Mobile Application; food wastage; needy people; reduce food wastage.

Mobile Application to Convert English Text and Audio to Pakistan Sign Language Video Lexicons

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Abstract

As of 2021, 10 million Pakistanis were born with a hearing disability out of which only 5% go to special school, and 95% deaf community is unschooled and untrained. There is a huge communication gap between us and people with hearing impairment. The teachers even in special schools find it difficult to interact with large numbers of deaf students because of lack of knowledge of Pakistan Sign Language. So, we developed a mobile application to bridge this communication gap. This application is a real-time translating app from English/Urdu sentences to Pakistan sign language in the form of videos. It offers multiple features to allow the users to use the app according to their ease. Users can use image, voice, and type directly to convert English/Urdu into Pakistan Sign Language. This app requires a stable internet to be fully functional as multiple APIs are integrated, several requests and responses are being received from the server. We have a database of only 6000+ words which is insufficient but using NLP technique we were successfully able to make our app to translate daily life sentences into understandable sign language sentences. The text generated by different inputs is sent to our server where we parse the sentence and then apply tokenization on the whole sentence. After tokenization we lemmatized the generated stream of tokens to convert them into simple present tense as available in our database. In case of unavailability of any word in our database we find the synonyms by using wordnet dictionary available in nltk library. Then we pick the most relevant synonym that is also present in our database. Then the processed sentence is sent to the application, and then sent to the cloud to fetch the videos and stream them in the app. This app can be used as a learning app to learn sign language and as a teaching app to educate the children with hearing impairment who are unable to go to special schools. This application is user friendly and fully portable which does not require any additional hardware requirement other than a smartphone and android operating system (minimum version of Lollipop 5.0) with stable internet. There was no real-time translation

mobile application for Pakistan sign language before. In future, we plan to upgrade this application to internet-independent by introducing offline mode in it. Two-way communication can be introduced where hand gestures can be captured to generate text. Furthermore, other regional languages of Pakistan can also be introduced.

Skin Lesion Segmentation Using Ensemble of Different Image Processing Methods

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ABSTRACT

In recent years, the occurrence of skin cancer has escalated considerably and is seriously threatening human life. Automated detection plays a vital role in early detection of different skin diseases, but presence of several artifacts makes this a challenging task. There are many variations in dermoscopic images of skin lesion such as undesirable hair artifacts, ruler markers, boundaries which make automatic analysis quite difficult. To overcome these challenges, an optimal thresholding value is required to divide an image into foreground and background regions. Due to presence of inhomogeneity, noise and other artifacts, no single thresholding method gives best segmentation result for skin lesions. Initially some basic preprocessing is performed to improve image quality. In this research, we propose an ensemblebased method which will select an optimal thresholding among different algorithms based on an objective function. Some state-of-the-art thresholding methods (Harris hawk, Otsu, Gray thresh and Kapur) are used and our algorithm will pick best among all the methods (based on objective function's value). All experiments are performed on the publicly available skin dataset ISIC 2016 dataset. We used different evaluating metrics to show that the proposed approach gives superior results as compared to the other state-of-the-art methods. Accurate segmentation will help in better classification of skin lesions as benign or malignant.

Keywords: Ensemble; Segmentation; Skin lesion; Thresholding; ISIC; Pre-processing

Autonomous Campus Delivery Robot

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ABSTRACT

Autonomous delivery robots have been getting popular in society since 2015. In the case of Pakistan, no start-up tried to implement such an autonomous delivery solution. Currently, automation of various tasks is still in the early stages in Pakistan. This project aims to design and develop an automated food delivery robot on university/college campuses. Such automated delivery robots are already implemented on various campuses abroad, such as Star link, SMU campus, BSU campus, etc. So, keeping the growth of campuses pursuing automated delivery robots and the number of campuses in Pakistan, the demand projection for delivery robots is very high. After initial research and analysis of the delivery robots being used by foreign campuses, in this project, we aim to build a functional food delivery robot that will also be connected to a mobile app to order and track food delivery. Due to budget constraints and limited resources available in Pakistan, the objective is to achieve this with as minimal cost as possible without considering the aesthetics of the robot's outlook. This robot is one of the earliest developed autonomous delivery robots in Pakistan and is an excellent opportunity for a start-up in the country.

Keywords: Computer Vision, Embedded Systems, Mobile App Development, IoT

Project In cube

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ABSTRACT

A lot of potential lies within final year projects and research theses of fresh graduates from all over Pakistan. Without proper direction, individuals are unable to launch their work in the industry when nearing or after graduation. Thus, the Pakistani market remains devoid of innovative and cutting-edge technology. Not only do most of these projects remain undiscovered but worse, they might be capitalized off of by others without due rights. Despite the presence of a few incubation centres scattered across the country, there is an absence of an online platform that can help launch fresh graduates into the market. With Project In cube, our goal is to launch a blockchain-based online incubation centre that will help connect software houses and reputable organizations to the work of final-year students while they are working on their projects. This way, if a project has prospects, organizations will be able to provide the respected authors with mentorship, guidance, and even finances so that they are able to put forward the best industry-ready work possible. Project In cube will prevent the loss of valuable time spent by pupils to figure out how they can take their ideas further. It will also aid organizations to recruit talent more efficiently. Conclusively, our web application will not only benefit students in furthering their genius but will also help bring innovation and advancements to the public of Pakistan.

Keywords: Blockchain; Incubator; Solidity; Ethereum; FYP

Mall Management & Indoor Positioning System

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ABSTRACT

The malls are becoming massive every day which eases the shopping experience by providing everything in one place but on the other hand, makes it harder to locate your favorite brand. It would have been a lot easier if you were able to locate the shops and find the paths with the help of your mobile. With this project, we are focusing on providing the malls with a convenient and effective solution that helps their customers to enjoy their shopping experience in the mall. We designed an android application for the Gold Crest Mall which focuses on overcoming this issue and provides the user the option to locate any shop in the mall from the current location. We have implemented Indoor Positioning System which allows the customer to find the shortest path from his current location to the destination. In addition to this, our application can also keep the user updated with the upcoming sales and the user can also search the shops of a specific category. Custom maps of the building are generated and kept in the server of the application. A table is maintained regarding pixel location and the associated shop. Drop-down menus are used to find the customer's location which is highlighted on the map. The user then needs to select the destination location from another drop-down menu and then the destination is highlighted and the path from the current location to the destination location is shown. We developed Android App on Native Java Android and Linked it to the Firebase Database which contains data of our Shops such as Addresses, Name, Offers, Categories, and their owner Authentication ids. We have also developed a Custom API on Python Flask which is using OpenCV to draw a path between user location and Shop location and that API then sends back that Image to Android App which then displays it to the user on Activity Screen. Category-wise highlighting of shops is shown on the map. Apart from this, all shops having sales going on are also highlighted on the map. Our project makes it all possible on the mobile phone of the user which minimizes the hardware cost and makes it a faster method as compared to the previous projects. In the future, we plan to make it compatible with iOS and iPad OS to make it available to more users. We are also planning to target more malls and make the application a one-stop solution for users of many malls. This mobile app is a solution for every shopaholic person and those who love to keep up with the trends, sales, and overall love shopping and visiting malls.

Keywords: Mall Management, Mobile App Development, Indoor Positioning System, pixels

Vehicle Security System

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Abstract

Interest in embedded systems and smart cars was the motivation which prompted behind this project. Our work deals with problems that are of grave concern such as vehicle and passenger safety because of over speeding and rash driving. These problems are common in Pakistan and many other countries which lead to accidents and amongst these many prove fatal for human lives as well as resulting in unnecessary wear and tear and in some cases severe damage to the vehicle. Vehicles are also prone to theft which make anti-theft systems very useful in such situations. The approaches used in our project are embedded systems, IOT and web application. State of the art sensors like GPS monitoring sensor, accelerometer, vibration sensor, ESP cam are used. The IQR outlier detection algorithm determines the outlier value which is then compared to the input provided by the device on the server. If the input is greater than outlier values, the data is entered in the violations table in the web app hence the owner of the car can know when their vehicle is misused. ESP CAM 32 is used to get the car's internal live recording. Vibration sensor is used to detect theft and there is control provided to remotely turn off the vehicle. Web app is used to display the data results and database is integrated with that web app which contains the result of rash driving behaviours. Sensors have been tested and they are providing accurate measurements and results and our web App is also displaying the results as expected. The approach we used solves the problem to a great extent and may save many lives and cost in damages if widely used by people who own cars. Still there is always room for improvement and more features can be added in the future and these systems will help save millions of lives worldwide.

3D Ray-Tracing Engine for Interior Designers

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ABSTRACT

The Ray Tracing Engine works to provide a new vision for architects and the interior designing industry in general. The ideology is to provide a basic real-time environment which allows one individual to visualize how a specific place would look after certain pieces of furniture and accessories are added to it. Ray tracing techniques are used to render good quality photorealistic 3D image for the architects for the purpose of interior designing. The tool uses Unity for the front end which provides users with a display to place different objects in a built-in room, and the scene is fed into the backend Ray-Tracing engine in the form of an XML and OBJ file. These files contain information related to the front-end user designed 3D model i.e., detail of all the objects in the scenes like their positions, rotations, and scales plus, details of the triangular meshes of each object through which they are formed. The backend engine is written solely in C++ language on the concepts of linear algebra and physics rules to implement the mentioned technique. This tool is not only for the professionals but also for individuals who are enthusiastic for high quality visualization of 3D models.

Key words: Raytracing, XML, OBJ, Unity

Way Back Home

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ABSTRACT

Globally, thousands of children and adults are reported as missing every year. Finding and identifying them is a challenging process for the relevant authorities. According to statistics, the registered cases of missing people noticeably outnumbered those of retrieving the missing. Consequently, the families and the victims often suffer from permanent emotional damage. The prevalence of smartphones and cameras alongside the rapid development of Machine Learning renders the urgent need to develop a concise and well-designed mobile application that features facial recognition. This social cause-based mobile application called "Way Back Home" shall help the authorities and the citizens to reconnect to their lost ones to speed up the searching and identification process, ultimately rebuilding broken bonds. Way Back Home keeps a comprehensive track of variables such as age, gender, ethnicity, etc., to ensure the most possibly accurate facial detection. This proposed mobile application solution also features over a million instances dataset for training and testing the model. The dataset includes people from different ethnicities, gender, age, various lighting conditions, and backgrounds. Additional, prominent features include labelled faces in the wild (LFW) and Flickr Faces HO (FFHO) datasets, which serves as a benchmark for face verification. These components help generate the facial recognition result of 98.34%.

Keywords: Mobile Application; Machine Learning; Flutter; Firebase; Computer Vision; Facial Recognition.

Resume Screening and Job Recommendation Using Machine Learning and Deep learning

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ABSTRACT

Post covid the process of manual job hunting has almost shifted to the digital domain however the transition has been anything but smooth for job seekers. There is no standard platform for job seekers and recruiters. Recruiters post their job position on multiple platforms (company websites, newspaper and social media ads, online job platforms) and receive applications via multiple modalities i.e., emails, hardcopies, and online job platform submissions. For recruiter it is very challenging task to analyze the job applications in different modalities and on the other hand it's very complicated task for job seeker to keep track of relevant jobs on multiple platforms. To overcome these problems, we are presenting a web application that will ease the process of job hunting and candidate selection for job providers. The web application provides convenience to jobs seeker by presenting the relevant open job advertisements from popular online job portals. System automatically extracts the information from the users CV and presents the relevant job offerings. Similarly for job providers system analyzes the pool of CV's, extracts and analyzes the information and ranks the CV according to the job requirements.

To analyze and extract information system uses different NLP techniques including, Sentence Bert Embeddings, NLTK, Spacy and different machine learning classification algorithms

Keywords: Selenium, Cosine Similarity, Flask, Spacy, NLTK, Machine Learning

Intelligent Image Processing Framework for Pediatric Brain Tumor Analysis

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ABSTRACT

Due to the rapid anatomical, metabolic, and functional changes that occur in the brain and non-specific or conflicting imaging results, the diagnosis of brain tumors in children is a scientific concern. A child's age, the location and incidence of the tumor, the patient's medical history, and imaging (MRI or CT) findings are among the diagnostic clues used to diagnose pediatric brain tumors in clinical practice. For the methodology of training the dataset, after splitting and checking the distribution of the labels, we converted the categorical labels to a numeric format to feed it into the data frame as it handles large datasets efficiently and provides a more streamlined form of data representation. We stored labels into 4 classes i.e. (glioma, meningioma, no tumor, pituitary tumor). The model architecture was built using CNN. We used NASNetMobile, VGG16 and DenseNet201. With DenseNet201 being the most accurate with the accuracy of 0.7 (70%).

Finally, the medical and technical limitations of the deep learning-based approach have been included to establish open research issues and guidance for future study in this emerging area.

Keywords: Artificial Intelligence, Machine Learning, Image Processing, Research

Lost Pet Finder Through Viewpoint Independent Image Matching

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ABSTRACT

Finding a lost pet by circulating brochures is a time-intensive and futile exercise, which rarely results in much success. Our project aims to design an online system to find lost pets with the help of artificial intelligence and digital image processing. The picture of the animal will be posted onto the platform by the owner of the pet and the person who found it. Our system will then be able to find the pet with the highest similarity match and notify both the owner and the finder. A reliable automatic image matching is an integral component of such a system. However, image matching is sensitive to the viewpoint of the photograph taken. We also aim to develop a viewpoint independent, reliable approach for image matching. Thus, we intended to make two contributions. (1) A platform for lost and found pets, and (2) the development of a robust viewpoint independent image matching model. We trained our AI model on large amounts of images to get accurate results. We demonstrate the effectiveness of this model on the images of cats, but the model is flexible enough to be used for other pets.

Keywords: Image matching; Web Development; Deep Learning; Siamese Network.

Child Security System

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ABSTRACT

Child security system is an AI based security system to protect the children from the school pickups. Our security system is created using React.JS, Bootstrap, Python Django, SQLite3 and other DevTools. It features attendance tracking of the child, children record of exiting the school, it used Biometric and Facial Recognition to recognize the person came to pick the child. It is designed and developed in a way that it sends notifications to the user added in the system about when the student entered or left the school premises. Our project has WEB app as well as Mobile App which is based on Django server and synced with APIs. In this model of security system, we're linking face recognition cameras with database directly, as the child enters the school a notification will be sent to parents through web and mobile app that child is present and entered the school. At the time of exiting the child will come out to waiting area so is the guardian, guardian will get scanned and the database will mark them present in the waiting area, then child will face a camera for the face recognition and then from the database guardian will get the message that student is now in the waiting area and they will be able to pick the child, when both guardian and child is exiting the school they will scan there thumb on their way out and a notification will be sent on the mobile app. This security systems holds utmost importance in the near technological future where the safety stays priority number one, this system holds AI which will keep recognizing and storing data in the database.

KEYWORDS: Face, Fingerprint, Child, Security, Database

Soothify

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ABSTRACT

Facial emotion detection has been around for quite a while now and many professionals have exploited this field to bring out fruitful results. Human emotions can be detected and interpreted through deep learning and image processing. The purpose of this project is to provide accessibility of music and colour therapy to common users while they are oblivious to the in-depth details of these types of treatments. This app helps in giving a short-term relief from psychological burdens and tries to create a healthy environment for its users. Thus, signifying the purpose behind its name – Soothify. Colour therapy and healing (also known as chromo therapy or light therapy) is a type of holistic healing that uses the visible spectrum of light and colour to affect a person's mood and mental health. Each colour consists of a specific frequency and vibration, which is considered to possess certain properties, that can be used to affect the energy and frequencies within our bodies. Music therapy is a practice in which music is used to actively support people as they strive to improve their health, functioning and wellbeing. This idea was more recognized after the chaotic effects of the recent pandemic where psychological problems such as depression, stress, and anger issues increased. This project is divided into four main phases of the web application: face detection, feature extraction, emotion classification and colour/music allocation. The facial expressions are extracted and recognized from the live feed of computer's camera. Machine learning is employed for this purpose. The app creates a soothing atmosphere for the users for their mood based on their facial expressions and accordingly, makes changes to the colour and music. This is done using a web application and the future work includes the development of iOS and android mobile applications.

Keywords: Facial Emotion Detection, feature extraction, image processing, face detection, emotion classification, colour therapy, music therapy

Driver Monitoring System

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ABSTRACT

According to the annual report by Gulf news, almost 15,233 drivers have been fined only 2 dollars for using mobile phones while driving since 2021. In Pakistan, Islamabad Traffic Police (ITP) has registered 53 accidents of vehicles hitting bikes, 21 accidents of vehicles hitting pedestrians, and 30 collisions in January 2022. At least 69 of these car accidents were fatal. These fatalities were easily avoidable. A solution to this problem is an ML-based system to monitor people while they drive. The Driver Monitor System (DMS) or Safe Driver Coaching System (SDCS) is only offered by a few organizations in Pakistan. It only serves a miniscule population and does not provide the level of care that our community demands. A developing country like Pakistan can't invest in luxurious cars with integrated driver monitoring systems. Our system provides cheaper and standalone solution to resolve this issue. Our Driver Monitoring System provides a practical ongoing vision-based driver distraction detection system with qualities such as low cost, ease of setup, and high accuracy. Our prototype has a Raspberry Pi circuit with an attached camera. We use Machine Learning model to detect distracted drivers. Our model will also be able to categorize and report 10 classes of distraction such as talking on the mobile phone, drinking, looking behind etc. Our prototype also detects if the driver does not use a seat belt and generates an alarm. The reports are stored in a database for logging and audit. This portable device is extremely useful for both commercial and private use, globally. Logistics companies would appreciate a device that can help them keep monitor on their drivers. It will allow us to have safer roads and better drivers.

Keywords: Driver Monitoring System, Safer roads, Machine Learning, Raspberry Pi Circuits, Portable, Affordable.

Spot Garbage

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ABSTRACT

In developing countries, maintaining a clean and hygienic environment is a very difficult due to poor management and lack of sufficient resources. There is no proper waste management system currently in Pakistan which can handle this daunting task. The aim is to facilitate and engage the citizens to track and report the street garbage around them. For this purpose, this paper presents a smartphone app called Spot Garbage. This app allows people to capture an image and send this image along with the geo coordinates (Longitude and Latitude) to the municipality for clean-up and take necessary actions. This app works directly from the mobile device and does not require any auxiliary hardware. This app detects the garbage in the captured images, to validate the submission, usinstate-of-the-art computer vision and machine learning techniques. In addition, this app performs route optimization and route planning for the waste disposal trucks. The route is mapped for all the pictures received in a specific time slot for a specific area.

Keywords: Machine learning; Image Processing; Neural Networks; Object Detection