Institute of Business Management (IoBM)

College of Engineering & Sciences (CES)

Electrical Engineering Department

ABSTRACTS OF SENIOR DESIGN PROJECTS

BATCH -2020

Table of Contents

Students List

S.No	Student Name	Student ID	Project Title
1.	KAMLESH	20202-27132	Implementation of Software-Defined Network Services Using Mininet & RYU Prototype
	Karrar Muhammad Bhutto	20202-27137	
2.	Vinod Kumar	20202-27130	IoT-Based Waste Monitoring and Sorting System for Smart City
	Wazir Ali	20202-27136	
	Muhammad Zunair Khalil	20161-20401	
3.	Dildar Ali	20202-27142	IoT-Sensor Based Solid Waste Segregation using Robotic Arm and Moveable Platform
	Bilal	20202-27141	
4.	Aamir Khan	20202-27208	Coal Safe Helmet: A Life-saving Helmet with Toxic Gases Detection for Coal Miners
	AMRAT	20202-27194	
5.	Kishore Kumar	20202-27134	IoT-Based Garment Manufacturing Management System
	Jeevan Kumar	20202-27138	
6.	Hetin Maheshwari	20202-27140	IoT based Smart Clothing for Health Monitoring
	Muhammad Yaseen	20202-27131	
	Muhram Ali	20182-23348	
7.	Chaman Lal	20202-27193	Smart Wind Turbine with IoT-Based Smart Breaker for Weather- Adaptive Operation
	MUHAMMAD ZAID	20202-27207	

Project Title	**Implementation of Software-Defined Network Services Using Mininet & RYU Prototype**
Students	Kamlesh (20202-27132), Karrar Muhammad Bhutto (20202-27137)
Supervisor	Mr. M. Imran Majid
Email	imran.majid@iobm.edu.pk

ABSTRACT

A private educational network is required for data privacy and improved network performance. Software defined network (SDN) prototype addresses this issue using scalability, latency, management and addresses resources limitations of traditional networks in educational context. To compute SDN performance, software simulations based on Mininet and hardware simulation based on RYU (as SDN controller) is proposed. Here, Raspberry Pi 3B is used as Open vSwitch and controlled by a workstation. The proposed design showcases 3 topologies in Mininet followed by RYU simulation to measure latency, throughput, round trip time and implement network function virtualization (NFV). The second stage includes real-time hardware based SDN, which decouples the data plane from the control plane and measures parameters through packet transfer and file exchanges between two Windows host PCs. This deployment scenario not only demonstrate the particular of SDN in educational environment but also provides a robust solution for secure campus communication. The novelty is the design of lab-based tests and extending this to hardware-based implementation focusing on real world parameters. Further deployment and troubleshooting steps are proposed. This project has applications for building infrastructure for lab-based curriculum design, distance learning, Agri-tech and robotic surgery, contributing to improved social status and economic growth.

Project Title	IoT-Based Waste Monitoring and Sorting System for Smart City
Students	Vinod Kumar (20202-27130), Wazir Ali (20202-27136), Muhammad Zunair Khalil (20161-20401)
Supervisor	Dr. Sayed Fayaz Ahmad
Email	fayaz.ahmed@iobm.edu.pk

ABSTRACT

Since the development of an innovative standard known as the Internet of Things (IoT) and its fundamental technologies, the global industry is going through significant modifications. To benefit from this machinery using the Internet of Things (IoT), many business executives are devoting more time and resources to modernizing their contributions. Despite that, it is challenging to offer an effective and real-time waste management system. But it is the responsibility of municipal waste management authority to provide an effective, and sustainable waste management system. In this regard, this research is going to introduce a project that offers a complete solution of waste management containing software, hardware, and communications parts. The system follows an IoT-based approach where the discarded waste from the smart bin is continuously monitored by sensors that inform the filling level of each compartment, in real-time. The technology that will be used is the Internet of Things (IoT) which allows for the sorting, analysis, and broadcast of data from sensors installed on waste bins. IoT-based waste monitoring can help city authorities monitor the fill-up level of the bins, in real-time and adjust waste sorting routes leading to well-organized and cost-effective waste management. Moreover, an IoT-based waste monitoring and sorting system for smart cities, which connects to network sensors installed in waste bins, assesses the fill level of the bins and further transmits the data to the waste management system. In addition, information is processed and stored in an Internet of Things middleware, which also generates critical statistical data and information for sorting with optimized routes, allowing for precise monitoring of waste sorting in terms of resource management and community services. Next, information regarding the community waste bins is readily available to the municipal committee on the Website or mobile application. The proposed system will effectively change how to deal with garbage and optimize financial, and material resources, as demonstrated by the development of the waste management application. The recycling methods now in use are not effective due to the unavailability of a proper garbage segregation system that can be utilized for recycling purposes. As a result, early sorting of municipal solid waste is an essential step that improves the resource's efficiency. Therefore, the designed system can be used to identify and categories waste on a conveyor belt using neural network image processing for

municipal solid waste management authorities. A neural network receives images of different things from the camera and uses them to identify the kind and location of the object once it is detected. In the end, the novelty of this project is using an IoT-based waste monitoring and sorting system including a waste segregation feature which has the potential to transform the waste management system of smart cities in an effective, productive, and sustainable manner to experience excellent waste management practices.

Project Title	IoT-Sensor Based Solid Waste Segregation using Robotic Arm and Moveable Platform
Students	Dildar Ali (20202-27142), Bilal (20202-27141)
Supervisor	Mr. Rashid Qutub
Email	rashid.qutub@iobm.edu.pk

ABSTRACT

There is no denying Pakistan's rubbish collection and disposal issue. Pakistan is experiencing fast economic and technical growth, but it is also dealing with a host of other issues, such as overcrowding, insufficient municipal services, and corrosive urban planning. As of right now, no action made to appropriately manage the rubbish has produced the desired results. Additionally, the researchers are constantly searching for creative solutions to handle the enormous work of rubbish collection and segregation. This study addresses the issue of waste management and aims to offer a solution specifically, an autonomous garbage collection platform that interfaces with an Arduino controller. The moveable platform is constructed on a 30 x 40-centimeter fiber platform that runs on a 12 V, 4.5 A battery. The moveable platform's movement is controlled by motors connected to the programmed Arduino. The platform only be designed to move on hard, cemented surfaces. When it senses an obstruction, it follows the code and proceeds to lift the garbage as per the designed mechanism. All this can be achieved through Arduino which is the CPU of the bot. This project aims to develop design and implement a system that scans the presence of garbage moves towards it, classifies it, and puts it in the desired bin. This system comprises of robotic arm connected with moveable platform, separates three categories of trash, metal, organic, and plastic materials. The system has different sensors to scan the garbage and such sensors which are used for object detection and some ultrasonic sensors for obstacle-avoiding purposes. The proposed system will effectively change how to deal with garbage and optimize financial, and material resources, as demonstrated by the development of the waste management application. At the end, the novelty of this project is trash collection and segregation using IoT. This robot can share its live location to the connected system, so if it gets full, it sends a notification to the user or may not pic other trash until it becomes empty. This project can be very helpful for production and sustainability of waste management systems.

Project Title	Coal Safe Helmet: A Life-saving Helmet with Toxic Gases Detection for Coal Miners
Students	Aamir Khan (20202-27208), Amrat (20202-27194)
Supervisor	Ms. Fatima Maqbool
Email	fatima.maqbool@iobm.edu.pk

ABSTRACT

In the realm of modern mining safety, the Coal Safe Helmet project stands out as a crucial innovation for coal miners. By utilizing the ESP32 microcontroller and sensors such as DHT-11, MQ-2, MQ-135, and MAX30102, we address the urgent need to enhance safety measures underground and transmit the measured parameters to the control room. This project integrates IoT technology to automate safety protocols, ensuring miners can work securely and efficiently. Mining poses various hazards, including toxic gases, suffocation, heart issues, and gas explosions. To address these risks, we developed a Coal Safe Helmet, a life-saving helmet for coal miners with toxic gas detection. With the help of DHT-11, we measured temperature (°C), humidity (%), pulse rate (BPM), and gas status (ppm) in mining. Gas sensors MQ-2 and MQ-135 are attached to the helmet to detect the gas inside the mine and MAX30102 is used to monitor the pulse rate of minor. It will also start buzzing when the hazardous gases are detected. The helmet will also be transmitting real-time data to the control room via Bluetooth on the cellular phone. The implementation of the Coal Safe Helmet aims to significantly reduce the incidents of gas-related accidents in coal mines. This device represents a critical step towards enhancing industrial safety standards in the coal mining industry which plays a crucial role in enhancing the economy of the country. This proposed project is cost-effective, and flexible in wearing, an IoT-based smart system for monitoring the environmental and toxic gases present in the mine and plays a crucial role in economic growth.

Project Title	**IoT-Based Garment Manufacturing Management System**
Students	Kishore Kumar (20202-27134), Jeevan (20202-27138)
Supervisor	Ms. Tahniyat Aslam
Email	tahniyataslam@hotmail.com

ABSTRACT

The garment manufacturing industry often faces inefficiencies and errors due to traditional tracking methods, resulting in delays and difficulties in monitoring production progress. This project introduces an automated system leveraging QR codes and Internet of Things (IoT) technology to enhance operational efficiency, optimize production processes, and ensure real-time data collection and analysis. Our system integrates custom software with an intuitive, user-friendly dashboard accessible to workers, supervisors, managers, administrators, and owners. Key features include a secure login system using JSON Web Tokens (JWT) and QR code generation and scanning. By connecting the customs software with a QR code scanner via an applications programming interface (API), the system facilitates the monitoring of worker's activities and productivity. This IoT-based garment production management system addresses the shortcomings of manual data collection methods, providing stakeholders with valuable insights. The projects aim to improve control over worker's activities, controlling the industry's sustainability and efficiency. The project's scope includes various applications within the garments industry, offering significates benefits such as enhanced workflow management and improved decision-making. The project workflow involves tasks managed on the admin side, including user creation and QR code generation, and IoT-based tasks involving QR scanning and data transmission. By transforming traditional methods with cutting-edge technology, this project promises to revolutionize garment manufacturing operations, ensuring timely and accurate production data while promoting sustainability and operational excellence.

Project Title	**IoT Based Smart Clothing for Health Monitoring**
Students	Muhram Ali (23348) Hetin Maheshwari (27140) Muhammad Yaseen (27131)
Supervisor	Dr. Sayed Fayaz Ahmed
Email	fayaz.ahmed@iobm.edu.pk

ABSTRACT

This project investigates how to use smart clothes to create a suitable, remote wellbeing monitoring framework for those who has not immediate access to healthcare professionals. This wearable device provides continuous vital sign observation by successfully integrating open sensors such as temperature, heart rate, SpO2, and ECG into clothing. A D1 Small ESP8266 Wi Fi module enables remote data transmission to a secure Internet of Things platform. This enables clinical personnel to assess patient well-being from a distance and intervene instantly. A smart clothesline architecture that uses a D1 mini ESP, a too smaller-than-normal ESP8266 module and natural sensors are used to address challenges. To avoid precipitation-related injury. The two frameworks place an emphasis on being straightforward to incorporate in any event, even persons with low expert awareness, making them suitable for employment in various geologically diverse places. This project shows that it is feasible to include healthcare functions into clothing, which advances wearable technology. It demonstrates how IoT may be used for data logging and remote healthcare communication, with the ultimate goal of enhancing patient outcomes and healthcare accessible in disadvantaged regions. The implementation of this IoT-based smart clothing system has the potential to significantly reduce healthcare disparities by providing remote health monitoring solutions to underserved populations. This technology can facilitate early detection of health issues, allowing for timely medical intervention and reducing the burden on healthcare facilities. Moreover, the data collected can be used for extensive health research and analytics, contributing to the broader field of wearable technology and IoT applications in healthcare. This project not only demonstrates technical innovation but also highlights the importance of accessible healthcare solutions in achieving sustainable development goals.

Project Title	**Smart Wind Turbine with IoT-Based Smart Breaker for Weather-Adaptive Operation**
Students	Chaman Lal (20202-27193), Muhammad Zaid (20202-27207)
Supervisor	Mr. Rashid Qutub
Email	rashid.qutub@iobm.edu.pk

ABSTRACT

In reaction to significant environmental challenges, with the imminent danger of the global warming in especially, investigations into sources of renewable energy has grown tremendously. Wind energy is the most prominent renewable energy resource among them, which makes it shine out as an impressive contender. However, significant improvements in technology are still required for wind energy generating optimizations. In order to meet this requirement, the Smart Wind Turbine with IoT-Based Smart Breaker project makes use of advanced IoT technology that has been accompanied by real-time monitoring characteristics. The ultimate objective of this innovative approach is to entirely alter wind turbine performance, especially while dealing with unpredictable weather. Through the implementation of cutting-edge safety standards, such programmed braking systems in the case of adverse weather, as well as real-time operational alterations and strong safety measures, the project promises to boost wind turbine operations' reliability as well as productivity.