The University of Faisalabad

Student Innovations:

A selection of Final Year Projects

Edition 1

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Office of Research, Innovation and Commercialization

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Chairman, Board of Governors
The University of Faisalabad

At The University of Faisalabad, we take immense pride in advancing a culture of research, innovation and academic excellence. We uphold the values of Excellence, Diversity, Synergy, Integrity and Sustainability, ensuring that our academic and research initiatives create a lasting impact. By embracing a multidisciplinary and inclusive approach, we empower our students and faculty to collaborate, innovate and drive transformative solutions that benefit both society and the environment.

TUF Innovation Catalogue is a testament of our students' and faculty's dedication to pioneering research and technological advancements. Each project presented here represents the ingenuity, problem-solving capabilities and unwavering commitment of our young innovators to shaping a brighter and more sustainable future. With over 60 global collaborations and a strong commitment to cutting-edge research, we empower our students and faculty to develop ground breaking solutions that address real-world challenges. Our dedication to innovation has been recognized internationally, as evidenced by our ranking at 218th in WURI (World University Rankings for Innovation) in 2024, placement within the 410-600 in the Times Higher Education Impact Rankings 2024, and recognition as the 356th globally, 11th overall and 6th among private universities in UI GreenMetric Rankings 2024.

As we continue to build on this legacy of excellence, I extend my heartfelt appreciation to all contributors who have worked tirelessly to shape this remarkable compilation of ***TUF Innovation Catalogue***. May these innovations inspire further advancements and collaborations, contributing to the greater good of society and reinforcing TUF's position as a leading institution in global academia.

Prof Dr Aman Ullah Malik

Rector, The University of Faisalabad

Research and Innovation are at the heart of The University of Faisalabad's mission to create a knowledge-driven society. Over the years, TUF has established itself as a hub of academic excellence, producing research that not only meets international standards but also addresses critical societal and industrial challenges. Our global collaborations, state-of-the-art research facilities, and industry-academia partnerships have enabled our students and faculty to pioneer innovative solutions across multiple disciplines.

TUF Innovation Catalogue reflects the exceptional creativity and dedication of our students and faculty, highlighting innovative solutions across multiple disciplines. Each project featured here represents not just an academic achievement but also a step towards a real-world impact and sustainable development.

Our university remains committed to providing an environment where students can explore, experiment, and excel. I encourage all stakeholders, students, faculty, industry professionals, and researchers to engage with these innovations and collaborate for a brighter and sustainable future.

Congratulations to all contributors on this remarkable accomplishment. May your ideas continue to inspire and lead to meaningful transformations.

Innovation 1: Steady-Aid

Students:
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Sabeen Naz
Eisha Rifat

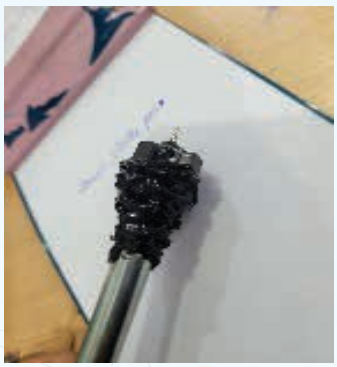
Supervisor:
Dr. Izza Ayub; PT
Dr. Maryam Safdar; PT

Introduction/Significance

An innovative pen designed specifically for individuals with Parkinson's disease or other conditions causing tremors. By integrating ergonomic design and magnetic stabilization, it helps users regain the ability to write independently and confidently.

Empowering Smooth Strokes & Tremor-Free Writing with Weighted Tools & Ergonomic Design

Prototype/Process



Prototype Pen Designed with Magnetic Stabilization to Assist Individuals with Hand Tremors Regain Writing Control

Target Industries/Users

- Essential (kinetic) Tremors
- Parkinson's Disease (Action tremor)
- Cerebellar Tremor
- Multiple Sclerosis (MS)
- Hyperthyroidism

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Innovation 2: Arthro Flex

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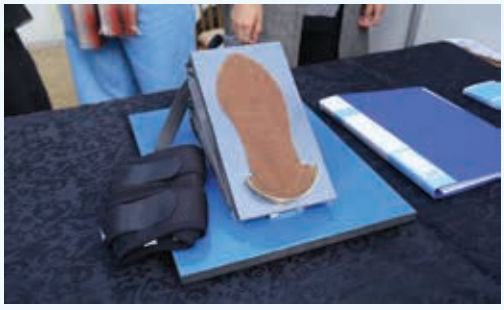
Dr. Rubina Zulfqar; PT

Introduction/Significance

Device features a cobalt-blue floor base, a resistive 6-spring mechanism with each offering a different range of resistance, a pedal for controlled pressing, and a stretchable band attached to the thigh with a strap

Prototype/Process



A Functional Rehabilitation Prototype Featuring A 6-Spring Resistance System For Joint Mobility Training

Close-up of Arthro Flex's Spring-loaded Platform, Showcasing Adjustable Resistance System For Targeted Therapy

Target Industries/Users

1. Individuals Diagnosed With Arthritis Or Joint Pain
2. Rehabilitation Centers And Physiotherapy Clinics
3. Elderly Individuals Facing Joint Stiffness And Mobility Challenges
4. Feet Pain Or Patients With Diabetes

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Innovation 3: Wonder Box

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Dr. Rubina Zulfqar; PT

Introduction/Significance

The Wonder Box is a delightful sensory tool designed to spark curiosity and support a child's development through playful exploration. Filled with a variety of textures, colours, sounds and objects, it provides a rich sensory experience that engages the child's sight, touch, and hearing. By encouraging hands-on interaction, the Wonder Box promotes fine motor skills, cognitive growth, and imaginative play. Whether used at home, in the classroom, or in a therapeutic setting, the Wonder Box offers a fun and educational way for children to explore their environment and learn through their senses.

Prototype/Process

A Multi-sensory Surface Designed To Spark Curiosity and Tactile Exploration in Children

Sensory Toys to Promote Motor Skills and Sensory Integration

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Target Industries/Users

1. Children (especially toddlers and preschoolers)
2. Children with Special Needs (ADHD and Autism)
3. Parents and Caregivers
4. Therapists and Educators
5. Rehabilitation Centers and Clinics

Innovation 4: ECO Ergonomic Mini Stationery Rehab Rider

Students:
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Introduction/Significance

The Eco-Ergonomic Mini Stationery Rehab Rider is a compact, sustainable, and user-friendly rehabilitation device designed to assist individuals in physical therapy, especially for lower limb mobility. Integrating eco-conscious materials with ergonomic design, it offers a low-impact, stationary cycling experience ideal for home or clinical use. Its portability and ease of use make it a valuable tool in promoting recovery, mobility, and cardiovascular health.

Prototype/Process

Eco-Ergonomic Mini Stationery Rehab Rider Prototype

A Budget-friendly Stationary Mini Rehab Cycle Designed For Improving Mobility and Strength

Target Industries/Users

1. Children (especially toddlers and preschoolers)
2. Children with Special Needs (ADHD and Autism)
3. Parents and Caregivers
4. Therapists and Educators
5. Rehabilitation Centers and Clinics

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Innovation 5: Smart Foot Therapy Device

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Dr. Rubina Zulfqar; PT

Introduction/Significance

The Smart Foot Therapy Device is an innovative solution designed to provide comprehensive foot care and rehabilitation through intelligent features and user-friendly design. Tailored for individuals experiencing foot pain, diabetic neuropathy, poor circulation, or muscle stiffness, this device combines advanced sensor technology, adjustable massage functions, heat therapy, and real-time feedback to promote healing and relaxation.Whether used in a clinical setting or at home, it offers targeted therapy to stimulate blood flow, relieve tension, and support mobility recovery. With programmable modes, a sleek ergonomic design, and app-based control options, theSmart Foot Therapy Device ensures a personalized and effective therapy experience. Its integration of smart technology makes it ideal for modern healthcare environments where convenience, efficiency, and precise care are priorities.

Prototype/Process

Diabetic Footwear Integrating Pressure Sensors and Vibration Therapy

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Target Industries/Users

1. Healthcare Providers and Clinics (Podiatrists, Physiotherapists)
2. Elderly Individuals and Senior Care Facilities
3. Individuals with Chronic Foot Conditions (e.g., Diabetic Neuropathy)
4. Rehabilitation Centers and Wellness Clinics
5. Home Healthcare Providers and Personal Wellness Users

Innovation 6: Adaptive Resistance Band

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Bisma liaqat
Hafsa Arooj
Isma Ahsan

Supervisor:
Dr. Rubina Zulfqar; PT

Introduction/Significance

Adjustable resistance band tailored for fitness enthusiasts, athletes, and individuals undergoing rehabilitation.

Prototype/Process

An Adjustable Resistance Band Designed For Fitness Training and Rehabilitation

Adaptive Resistance Band Prototype

Target Industries/Users

1. Fitness enthusiasts looking for versatile workout tools.
2. Athletes seeking efficient training equipment.
3. Rehabilitation patients requiring adjustable resistance for gradual progress.

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Innovation 7: Cardiwave

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Hadia Noor

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Introduction/Significance

A portable ECG (Electrocardiogram) device is a compact, user-friendly medical device designed to record and analyze the electrical activity of the heart.

Target Industries/Users

1. Clinical settings
2. Physiotherapists

Prototype/Process

Cardiwave Prototype – A portable ECG device designed for easy and accurate monitoring of heart's electrical activity in clinical and physiotherapy settings

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Innovation 8: Neuro Tap Trainer Web

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Rimsha Shahbaz

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Introduction/Significance

The Neuro Tap Trainer Web is an innovative online platform designed to enhance cognitive training through interactive exercises and techniques that stimulate brain activity. Focused on neuroplasticity, this web-based application offers users the opportunity to improve their mental agility, memory, concentration, and problem-solving skills. Using scientifically backed methods, the Neuro Tap Trainer Web provides a variety of exercises and cognitive games tailored to different skill levels. The goal of this platform is to empower individuals of all ages to enhance their cognitive abilities and maintain brain health. Whether for personal use, educational purposes, or professional development, the Neuro Tap Trainer Web serves as an accessible, effective, and engaging tool to boost brain performance and cognitive wellness.

Prototype/Process

Neuro Tap Trainer Web Interface

Target Industries/Users

1. Healthcare & Medical
2. Medical Technology & Research
3. Elderly & Assisted Living Services
4. Physical & Occupational Therapy
5. Sports & Military Rehabilitation

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Innovation 9: Dynamic KAO

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Introduction/Significance

Dynamic Knee-ankle orthosis (KAO)with extension assist to prevent knee buckling in early stance phase of gait. An orthosis which mainly help the people with quadriceps gait (who has weak or paralyzed quadriceps muscles which help in extending the knee) walk by placing hand on their knee to extend knee and suffer with additional lower back problems so that they can walk without using their hand by only wearing the orthosis.

Prototype/Process

Dynamic KAO Enhancing lower limb stability and alignment for improved mobility and function

Supportive and adjustable KAO designed for joint protection, controlled motion, and rehabilitation of lower limb conditions

Target Industries/Users

1. Healthcare &Quadricep Gait
2. Knee Buckling Due To ACL Tear or Laxity
3. Post-operative ACL Weakness
4. Post -Stroke Hemiplegia Gait , Knee Osteoarthritis

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Innovation 10: Rejecsu DFAFO

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Dr. Maryam Safdar; PT

Introduction/Significance

Caters to the unique needs of individuals with foot drop. This innovative device is engineered to provide neutral foot placement, which helps to normalize the gait pattern and promote a more natural walking motion.

Target Industries/Users

1. Healthcare & Individuals with Foot Drop
2. Stroke Survivors.
3. Individuals with Neurological Conditions

Prototype/Process

Fig 1. Lightweight and adaptive Rejecs DFAFO, designed to assist dorsiflexion, enhance balance, and ensure functional walking patterns

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Innovation 11: Rigid Joint Modified Ankle Foot Orthosis

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Introduction/Significance

The Rigid Joint Modified Ankle Foot Orthosis (AFO) is an advanced medical device designed to provide optimal support, stability, and mobility to individuals with ankle and foot impairments. This modified AFO integrates a rigid joint mechanism, offering enhanced control over ankle movement while maintaining a comfortable, customized fit. The design aims to aid individuals with conditions such as drop foot, cerebral palsy, or neurological impairments, helping them improve their gait, balance, and overall functionality. By offering increased rigidity at key points and maintaining flexibility where necessary, the Rigid Joint Modified AFO provides a unique blend of support and comfort, allowing users to regain independence in their daily activities. This device represents a significant advancement in orthotic technology, designed for individuals seeking improved mobility and quality of life.

Prototype/Process

Rigid Joint Modified AFO

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Target Industries/Users

1. Children (especially toddlers and preschoolers)
2. Children with Special Needs (ADHD and Autism)
3. Parents and Caregivers
4. Therapists and Educators
5. Rehabilitation Centers and Clinics

Innovation 12: Orthotics

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Zoha Nasir
Sehrish Abbas
Areej yousaf
Laiba Nazir

Supervisor:
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Dr. Leiza Iftikhar; PT

Introduction/Significance

Orthotics refers to the science and practice of designing, fabricating, and fitting orthopaedic devices known as orthoses. These devices are externally applied to the body to support, align, prevent, or correct deformities, or to improve the function of movable parts of the body. Commonly used in rehabilitation medicine, orthotics play a vital role in managing musculoskeletal and neurological conditions by enhancing mobility, reducing pain, and preventing further injury. Orthoses can range from simple shoe inserts to complex braces and splints designed for the spine, limbs, or joints. They are often custom-made to meet the specific needs of individuals with conditions such as cerebral palsy, stroke, scoliosis, or sports-related injuries. With advances in materials and technology, modern orthotic devices are becoming lighter, more comfortable, and more effective in improving the quality of life for patients across all age groups.

Prototype/Process

Custom-made Orthotic Shoes For Personalized Comfort, Support and Foot Alignment.

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Target Industries/Users

1. Healthcare and Rehabilitation Centres
2. Sports Medicine and Athletic Performance
3. Geriatric Care
4. Pediatric Care
5. Occupational Health and Ergonomics

Innovation 13: Nebulizer

Students:
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Khadija Bibi
Areeba Amanat
Hamna Shakeel
Laiba Zafar

Supervisor:
Dr. Izza Ayub; PT

Introduction/Significance

We have developed an affordable and user-friendly nebulizer device, designed to provide effective respiratory treatment in the comfort of one's home. This cost-efficient solution ensures that individuals with respiratory conditions can easily access the therapy they need without the high expenses typically associated with medical devices.

Target Industries/Users

1. Healthcare and Medical Devices
2. Pharmaceutical Industry
3. Home Healthcare Services
4. Elderly Care and Assisted Living
5. Retail and Online Health Stores

Prototype/Process

Breathe easy with the Nebuliser – your compact companion for managing respiratory conditions

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Innovation 14: Magnetic Breathables

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Introduction/Significance

Magnetic Breathables is an innovative product designed to combine the benefits of magnetic therapy with breathable fabrics for enhanced comfort and wellness. This technology aims to improve circulation, reduce muscle tension, and promote overall well-being while maintaining breathable, lightweight fabric for daily wear. Ideal for those seeking both therapeutic and comfort-based clothing, Magnetic Breathables offers a cutting-edge solution for individuals with active lifestyles.

Target Industries/Users

1. Healthcare and Medical Devices
2. Pharmaceutical Industry
3. Home Healthcare Services
4. Elderly Care and Assisted Living
5. Retail and Online Health Stores

Prototype/Process

Promotes Healing With Airflow and Magnetic Stimulation For All-day Wearability

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Innovation 15: Mirage

Students:
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Dr. Maryam Safdar; PT

Introduction/Significance

MIRAGE is an interactive, reliable, and easily accessible information guide designed to support undergraduate physical therapy students. The platform enhances the learning experience by providing quick, accurate, and well-organized insights directly sourced from trusted physical therapy textbooks. With a focus on clarity and convenience, MIRAGE bridges the gap between theoretical knowledge and practical understanding, serving as a valuable companion throughout the academic journey of future physical therapists.

Prototype/Process

A Visionary Step In Rehabilitation Technology, Merging Style with Support

Target Industries/Users

1. Medical and Health Education
2. Physical Therapy Institutions
3. E-Learning and EdTech Platforms
4. Hospitals and Rehabilitation Centres
5. Undergraduate Physical Therapy Students

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Innovation 16: VR with Movement Tracking System

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Abeera Maqsood
Amna Zahid
Maira Arshad
Asra Ahmad
Kinza Ashfaq

Supervisor:
Dr. Izza Ayub; PT

Introduction/Significance

An Advanced Motion Tracking Software That Transforms The Way We Assess And Treat Patients With Shoulder and Elbow Impairments. Traditional Goniometry, While Effective In Static Measurements, Falls Short When Capturing Dynamic Movement Patterns.

Target Industries/Users

1. Healthcare and Rehabilitation
2. Gaming and Entertainment
3. Education and Training
4. Sports and Fitness
5. Research and Development (R&D) Institutions

Prototype/Process

Revolutionizing Rehab Through Interactive Real-time Motion Therapy

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Innovation 17: PAK Hifazat App

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Maira Arshad
Asra Ahmad
Kinza Ashfaq

Supervisor:
Dr. Izza Ayub; PT

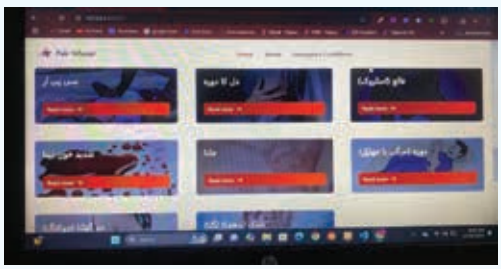
Introduction/Significance

An online platform designed for the people of Pakistan to provide critical emergency information in their native language, Urdu. The project focuses on bridging the information gap that arises due to language barriers.

Target Industries/Users

1. Emergency Services
2. Healthcare Sector
3. Government and Public Safety
4. General Public (Urdu-speaking)
5. Rural and Underserved Communities

Prototype/Process



Digital Shield For Health Awareness, Vaccination Tracking and Pandemic Protection.

Innovation 18: Signsational

Students:
Arwa Nadeem
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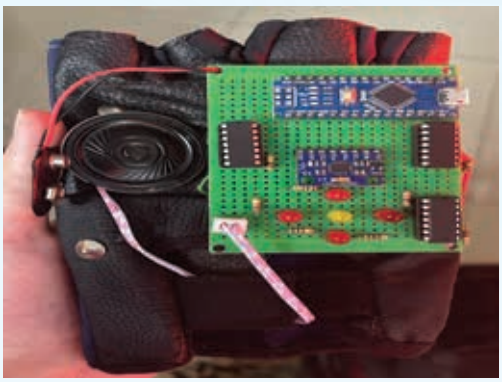
Hadia Javed
Maheen Wadood

Supervisor:
Dr. Izza Ayub; PT

Introduction/Significance

"Signsational" is an innovative assistive device designed to bridge communication gaps for individuals with speech impairments or disabilities. By leveraging advanced gesture recognition technology, this device enables users to express themselves through hand and body movements, which are then converted into vocalized speech. The primary goal of Signsational is to provide an intuitive, non-verbal means of communication, empowering individuals to interact more effectively with others. Whether for personal use or in therapeutic settings, this groundbreaking technology aims to enhance independence, increase self-expression, and improve overall communication for those with speech challenges.

Prototype/Process



Bridging Communication Gaps Through The Power of Sign Language Innovation.

Target Industries/Users

1. Healthcare and Rehabilitation Centers
2. Assistive Technology Providers
3. Individuals with Speech Impairments or Disabilities
4. Speech Therapists and Occupational Therapists
5. Educational Institutions (Special Education Programs)

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Innovation 19: PVC Walker

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Introduction/Significance

PVC Walker is a lightweight and durable mobility aid designed to assist individuals with limited upper body strength. Constructed using high-quality PVC material, this walker offers ease of maneuverability and stability, making it an ideal choice for elderly users, patients in rehabilitation, or individuals recovering from injury. Its ergonomic design ensures comfort and ease of use, promoting independence and safety in daily mobility tasks.

Prototype/Process

PVC Walker – A lightweight, durable mobility aid designed for safety and ease of use

Target Industries/Users

1. Healthcare & Rehabilitation Centers
2. Elderly Care Facilities
3. Home Healthcare Providers
4. Orthopedic Clinics
5. Medical Equipment Suppliers

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Innovation 20: Cranial Remolding Helmet

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Hafsa Nawaz
Neha Murtaza
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Supervisor:
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Introduction/Significance

The Cranial Remolding Helmet, branded as Little Align, is a specialized and fully customized medical device designed to support infants recovering from conditions such as hydrocephalus, particularly following surgical intervention. Hydrocephalus, characterized by an abnormal buildup of cerebrospinal fluid in the brain, often leads to irregular cranial growth or asymmetry. After surgical treatment, maintaining and guiding the natural growth of the skull becomes crucial for achieving a symmetrical and healthy head shape. Little Align serves this purpose by providing gentle yet consistent external pressure to specific areas of the skull, encouraging proper cranial development. The helmet is meticulously tailored to fit each patient's head anatomy using modern scanning and molding techniques, ensuring comfort, safety, and effectiveness. Its lightweight, breathable materials and ergonomic design make it suitable for daily wear, promoting continuous correction without compromising the infant's comfort.

Prototype/Process

A Custom-designed, non-invasive solution to gently reshape an infant's Skull, promoting healthy head development

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Target Industries/Users

1. Pediatric Hospitals & Clinics
2. Orthotics & Prosthetics Centers
3. Neurosurgery Departments
4. Rehabilitation & Therapy Centers
5. Medical Device Manufacturers (Pediatric Focused)

Innovation 21: Rehab Toys for Children

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Fatima Zahid
Naimal Batool

Supervisor:
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Introduction/Significance

Rehabilitation toys play a vital role in the physical, cognitive, and emotional development of children undergoing therapy due to injury, developmental delays, or neurological conditions. These specialized toys are designed not only to entertain but to support therapeutic goals through engaging and purposeful play. By incorporating elements that promote fine motor skills, coordination, sensory integration, and problem-solving, rehab toys help children participate in activities that are both enjoyable and developmentally beneficial.

For children with physical or sensory challenges, traditional toys may not meet their unique needs or may even discourage play. Rehabilitation toys are adapted to be accessible, safe, and stimulating, encouraging children to interact with their environment and with others. These tools often become an essential part of occupational, physical, or speech therapy programs, helping children improve function, build confidence, and reach key developmental milestones.

Prototype/Process

Therapeutic toys designed to stimulate and support sensory development, helping children with sensory processing challenges enhance their tactile, visual, auditory, and motor skills

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Target Industries/Users

1. Pediatric Therapy Clinics
2. Special Education Schools & Centers
3. Parents and Caregivers of Neurodiverse Children
4. Occupational and Developmental Therapists
5. Toy Manufacturers and Educational Product Designers

Innovation 22: Postural Assessment Device

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Muqaddas Rasool
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Supervisor:
Dr. Izza Ayub; PT

Introduction/Significance

The Postural Assessment Device is an innovative tool designed to evaluate and monitor a person's posture with precision and ease. This device uses advanced sensors and image analysis technology to identify misalignments and deviations in body posture, providing real-time feedback and detailed reports. It aids healthcare professionals in diagnosing postural issues, developing corrective plans, and tracking improvements over time. Ideal for use in clinical, athletic, and rehabilitation settings, this device enhances the accuracy and efficiency of posture-related assessments, promoting better musculoskeletal health and injury prevention.

Prototype/Process

A wearable system designed with embedded sensors and vibration feedback to monitor, support, or correct body posture

Target Industries/Users

1. Physiotherapy and Rehabilitation Centers
2. Chiropractic Clinics
3. Sports Medicine and Athletic Training Facilities
4. Ergonomic and Occupational Health Departments
5. Hospitals and Orthopedic Clinics

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Innovation 23: ECG Machine

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Fatima Zahid
Naimal Eman Babar

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Introduction/Significance

An Electrocardiogram (ECG) Machine is a vital medical device used to monitor and record the electrical activity of the heart. By placing electrodes on the skin, the ECG machine detects the heart's electrical impulses and converts them into waveforms that healthcare professionals can analyze for signs of heart conditions such as arrhythmias, heart attacks, and other cardiovascular diseases. This non-invasive procedure is critical for diagnosing and monitoring heart health, providing valuable information for early detection, treatment, and management of heart-related issues in both emergency and routine medical settings.

Prototype/Process

A portable, home-based electrocardiogram device designed to monitor heart activity

Target Industries/Users

1. Hospitals and Healthcare Centers
2. Cardiology Clinics
3. Emergency Medical Services (EMS)
4. Ambulance and Mobile Health Units
5. Diagnostic Laboratories

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Innovation 24: Hand-Ease

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Aleeza
Ansa Kiran

Supervisor:
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Introduction/Significance

The Hand-Ease Wearable Device is an innovative solution designed to help individuals with limited hand mobility and strength regain functionality. This device uses vibration-based therapy to stimulate hand muscles and joints, promoting improved circulation and reducing stiffness. Whether due to injury, neurological conditions, or age-related issues, Hand-Ease is tailored to provide patients with a non-invasive, easy-to-use therapy option that enhances hand mobility, strength, and overall dexterity. Ideal for at-home or clinical use, the device offers a personalized therapeutic experience, aiding in the rehabilitation process and supporting independence in daily activities.

Prototype/Process

A wearable vibration-based therapeutic device

Target Industries/Users

1. Post-Knee Surgery Patients
2. Patients with Joint Injuries
3. Post-Orthopedic Surgery Recovery
4. Individuals with Limited Mobility
5. Burn Victims

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Innovation 1: Mosquito Repellent Candle

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Noor Fatima
Zainab Munir
Roha Noor
Virka Fatima

Supervisor:
Ms. Mariam Naeem

Introduction/Significance

Mosquito repellent candle focused on the aesthetic and convenient environment, specially for those who are allergic to anti-mosquito spray. It is an online business, but is usually physical by stalls or e-shops. Secondly, it contains organic waxes like soya wax and bee wax to improve the environment and breathing. Many ventures use paraffin waxes that are cheap and destroy the environment.

Prototype/Process

Eco-friendly mosquito repellent candle made with organic waxes for a natural, allergen-free solution.

Target Industries/Users

1. Environmentally Conscious Consumers.
2. Home-décor Enthusiast.
3. Wellness-focused Individuals.
4. Aromatherapy Individuals.
5. Allergic To Mosquito Spray

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Innovation 2: Rames ECO Pencils

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Areeba
Momina Nasir
Warda Sattar
Sheri Nawal
Kinza Gori
Minahil Fatima

Supervisor:
Ms. Mariam Naeem

Introduction/Significance

In today's world, sustainability is no longer just an option but an essential requirement for preserving our planet. Our business presents a unique and innovative solution by introducing eco-friendly pencils made from recycled waste paper. This initiative is designed to tackle two significant environmental challenges: deforestation and waste management. By repurposing waste paper into a practical and sustainable product, we not only reduce the demand for traditional wooden pencils but also contribute to minimizing landfill waste. These eco-friendly pencils serve as a simple yet impactful step toward promoting an environmentally responsible lifestyle, encouraging

Prototype/Process

Revolutionizing sustainability with eco-friendly pencils crafted from recycled waste paper, reducing deforestation and minimizing landfill waste

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Target Industries/Users

1. Schools, Colleges and Educational Institutions.
2. Corporations With Eco-friendly Policies.
3. Retail Customers Seeking Sustainable Products.
4. Simplified Production Process Requires Less Energy and Labour.
5. Repurposing Waste Paper Eliminates Landfill Disposal Costs.

Innovation 3: Lustratherapy Organic Soap

Students:
Sadia Mariam
Umme Aimen
Momina Usman
Amna Basharat Ali
Shania Imran
Kashaf Zainab
Kinza Tahir
Areeba Mubarak
Warda Saleem
Areeba Sajad

Supervisor:
Ms. Mariam Naeem

Introduction/Significance

Lustra Therapy soaps are handcrafted using organic ingredients like beetroot, turmeric, coconut oil and essential oils. They are free from harmful chemicals such as parabens, sulfates and artificial dyes. Offer moisturizing, anti-aging and rejuvenating properties for all skin types.

Prototype/Process

Pure, organic skincare for rejuvenation

Target Industries/Users

1. Women And Men Aged 18-45, Urban and Suburban Dwellers
2. Health and Eco-conscious Individuals Seeking Premium Skincare Solutions
3. Initial Launch In Metropolitan Cities, Followed By Nationwide Expansion
4. Formulated With Natural Ingredients Like Coconut Oil, Turmeric, Beetroot
5. Healthy, Glowing Skin Without Compromising on Affordability

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Innovation 1: EMERGIFY

Students:
M. Basam Farooq
Asra Bukhair
Syed Moin Haider

Supervisor:
Ms. Rabee Imran

Introduction/Significance

Increasing crime rates, disasters, and accidents give victims little time to think. Requesting for help is the most instant procedure a victim can follow. SOS (which stands for Save Our Souls) is primarily a standard sign for help. An extended integrated mobile application is embedded with SOS. The main objective of our study is to provide people with easy access to emergency services by creating a one-click app to share current situations through live video streaming and provide real-time location information to emergency services. Emergency services can provide timely assistance in the event of serious cases. We are introducing a platform that will be available to the public, for services including fire, police, and ambulance. Each service has its own unique capabilities and requirements, and it is important for all services to understand the situation and make themselves aware of all the victims so that they can access them.

Prototype/Process

Emergify working process

Target Industries/Users

1. General Public
2. Law Enforcement Agencies
3. Emergency Medical Services (EMS)
4. Fire and Rescue Departments
5. Disaster Management Authorities

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Innovation 2: Gym Management System

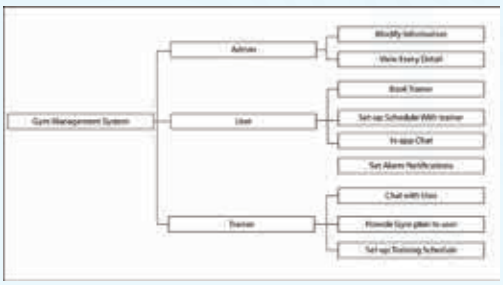
Students:
Musab Raza
Sufyan Rehmani
Muhammad Ibrahim

Supervisor:
Mr. Muhammad Umer Latif

Introduction/Significance

This project introduces a Gym Management System (GMS) aimed at enhancing the efficiency of fitness facilities. The GMS employs an intuitive interface, centralized member databases, and automated scheduling to reduce administrative tasks by 25%, increase member satisfaction by 15%, and improve equipment maintenance by 20%. Beyond operational streamlining, the GMS contributes to sustained growth and efficiency, benefiting both administrators and members. In conclusion, this Gym Management System offers a user-friendly and effective solution, revolutionizing the landscape of fitness facility management.

Prototype/Process



Gym management block diagram

Target Industries/Users

1. Fitness Centers and Gyms
2. Personal Trainers and Coaches
3. Health Clubs and Wellness Studios
4. Corporate Fitness Programs
5. University and School Sports Facilities

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Innovation 3: Mentor at Hand

Students:
Muneer Asad
Maaz Haider
Abdullah Nazakat

Supervisor:
Dr. Uzair Saeed

Introduction/Significance

"Mentor at Hand" is a groundbreaking tutor web app designed to connect users with qualified tutors for Islamic education, language learning, and career guidance. It offers users a user-friendly platform with a wide range of features to help users pursue their personal and professional goals all available in one place. It will connect users with qualified tutors for Islamic education, benefiting Muslims worldwide who may not have access to Islamic education institutions. The platform will provide user-friendly features that include Multilanguage support, time scheduling, resource sharing, budget negotiation, and an automated counseling service. These features aim to help users to make choices that are best suited to their interests. "Mentor at Hand" will be a comprehensive solution for Islamic education, language learning, and career guidance, making it easier for individuals to pursue their personal and professional goals.

Prototype/Process

Block Diagram

Target Industries/Users

1. Students Seeking Islamic Education
2. Language Learners
3. Career Seekers and Professionals
4. Educational Institutions and Online Academies
5. Counseling and Guidance Centers

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Innovation 4: Smart Shopping Cart

Students:
Saad Javed
Ali Mansoor
Mahnoor Akbar

Supervisor:
Mr. Muhammad Abubaker

Introduction/Significance

The smart shopping cart with a forward-facing display screen is a groundbreaking innovation that aims to revolutionize the traditional in-store shopping experience. This project addresses enhancing customer engagement and convenience in physical retail environments. As customers load their shopping carts with various items, the traditional checkout process involving manual scanning of barcodes and standing in long queues can be time-consuming and frustrating. Scanning errors and the need for cashiers to manually input barcode numbers only exacerbate the inefficiency. The main objective of this project is to develop a shopping cart integrated with a user-friendly front-facing display screen. This display provides real-time product information, recommendations, and store navigation, making the shopping experience more interactive and informative. The Smart Shopping Cart was particularly beneficial for individuals with disabilities and senior citizens, making the shopping process more accessible and convenient.

Prototype/Process

Block Diagram

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Target Industries/Users

1. Retail Stores and Supermarkets
2. Elderly and Special Needs Shoppers
3. Shopping Mall Chains
4. Smart Retail Technology Providers
5. Customer Experience and UX Design Firms

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Innovation 5: Hajj-Mate App

Students:
Hassan Amjad
Ali Akbar
Syed Momin Hassan

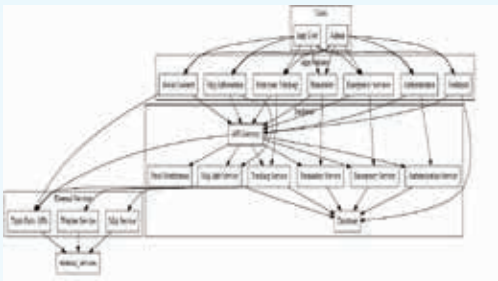
Supervisor:
Ms. Maryam Tanveer

Introduction/Significance

The "Hajj-Mate App" is an innovative mobile application designed to enhance the pilgrimage experience for first-time Hajj and Umrah travelers. Acknowledging the challenges faced by newcomers during these sacred journeys, the app offers a comprehensive solution. It provides essential tips and tricks, an Ihram Guide, and a dynamic map that not only pinpoints significant locations but also offers step-by-step directions with complete details at each step. Estimated travel times and the number of steps required to reach the next point, along with detailed instructions for each step. Additionally, the app features a built-in Quran reader and audio player, enabling users to read and listen to the holy Quran within the application. The inclusion of multiple language options ensures accessibility for a diverse user base.

The "Hajj-Mate App" contributes to the spiritual and practical success of these sacred journeys, fostering efficiency, and accessibility.

Prototype/Process



Block Diagram

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Target Industries/Users

1. First-Time Hajj and Umrah Pilgrims
2. Travel Agencies Specializing in Religious Tourism
3. Islamic Centers and Organizations
4. Hajj and Umrah Tour Operators
5. Mobile App Developers for Religious Services

Innovation 6: AI Based Employee Hiring System

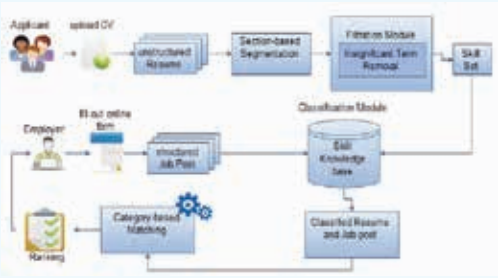
Students:
Muhammad Gulfam
Usman Khan
Noman Sharif

Supervisor:
Mr. Muhammad Umer Latif

Introduction/Significance

An efficient and effective hiring process is a step-by-step process for hiring a new employee, whereby an organization identifies its talent needs, recruits from its talent pool and eventually hires the most qualified candidates. Most companies have their own hiring processes. What follows are the most common steps in the hiring process across industry and regardless of company size. However, the specific details of the hiring process are unique to each company. The purpose of this application is to help in the hiring process of the employs in every field of daily life. It works in all the industries and the companies with the help of this software candidate fill the form online and give all the detail in the form and this software creates the points on the basis of the given detail and CV and on the basis of experience of candidates shortlists top 50 or 20 candidates which have top scores and mailes them for online test. So it helps in all the ways of the hiring of the employs. User may also select and reject the candidates.

Prototype/Process



Architecture Diagram

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Target Industries/Users

1. Human Resource Departments
2. Recruitment Agencies
3. Corporate Organisations (All Industries)
4. Startups and Small Businesses
5. Educational and Training Institutions (for hiring faculty/staff)

Innovation 7: Dairy Wiz

Students:
Abdullah Bin Shahzad
Sadaf Noreen
Umar Hamza

Supervisor:
Ms. Maryam Tanveer

Introduction/Significance

Dairy farming is a complex business that requires careful management of many different factors, including herd health, nutrition, production, and finances. A dairy farm management system (DFMS) is a software tool that can help dairy experts automate and streamline many of dairy farming tasks, leading to improve efficiency, profitability, and sustainability. Traditional dairy farm management systems are often manual and time-consuming, making it difficult for Dairy Experts to track all of the data, they need to make informed decisions. Additionally, many dairy experts lack the expertise to analyze complex data sets on their own. The main objective of this project is to develop a DFMS that is easy to use and provides Dairy Experts with the real-time data and insights they need to make better decisions about their farms.

This data is then analyzed and presented to Dairy Experts in a clear and concise format. The DFMS is a valuable tool that can help dairy experts to improve the management of their businesses.

Prototype/Process

Block Diagram

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Target Industries/Users

1. Dairy Farmers and Farm Owners
2. Veterinarians and Animal Health Experts
3. Agricultural Consultants and Advisors
4. Dairy Cooperatives and Milk Processing Companies
5. Agritech and Farm Management Software Providers

Innovation 8: Health Convention

Students:
Muhammad Mutaf
Ashir Nadeem
Abrar Ahmed

Supervisor:
Prof. Dr. Majid Hussain

Introduction/Significance

The Health Nutrition Convention project aims to address the growing concern surrounding health and nutrition by developing a comprehensive system that facilitates the organisation and management of nutrition conventions. This project visualises a platform that consistently connects health-conscious individuals, experts, and organisations to share knowledge, promote healthy living, and create a conducive environment for the exchange of information and resources. This proposed system aims to revolutionise the way health and nutrition conventions are planned, conducted, and experienced. The Nutrition Health App is a user-friendly and informative platform that combines the power of technology and community support to enhance users' understanding of their dietary choices and ultimately improve their overall health and well-being.

Prototype/Process

Architecture Diagram

Target Industries/Users

1. Health and Wellness Organizations
2. Nutritionists and Dietitians
3. Healthcare Providers and Clinics
4. Health-Conscious Individuals and Communities
5. Event Management Companies (for Health & Wellness Events)

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Innovation 9: AI Legal Assistant

Students:
Hira Qayyum
Mahroshaq Ihsan
Zarak Khan

Supervisor:
Dr. Uzair Saeed

Introduction/Significance

Our project AI Legal Assistant will address the time-consuming document analysis, tedious searching for legal statutes, case laws and judgements and uncertain case outcomes. With its three core modules, that is, comprehensively summarising legal jargon, recommendation of penal code sections and a case prediction system based on historical data, it aims to revolutionise the judicial system. This project will also benefit the general public by making legal knowledge easily accessible. By using cutting-edge technologies and employing machine learning for AI Legal Assistant, we believe this system will be a novel solution for critical legal issues. We have adopted the spiral model for the development of this project due to its alignment with risk mitigation, iterative development and addressing AI project complexities.

Prototype/Process

Process Diagram

Target Industries/Users

1. Law Firms and Legal Professionals
2. Judiciary and Courts
3. Corporate Legal Departments
4. Government and Regulatory Bodies
5. General Public (for Accessible Legal Knowledge)

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Innovation 10: Online Tutor Web Application

Students:
Amina Imran
Tooba Rasheed
Momna Sadiq

Supervisor:
Mr. Hassan Iftikhar

Introduction/Significance

In a time of swift technological progress, having access to high-quality education and resources is crucial. The fragmentation of educational resources is a persistent concern that our integrated online education platform initiative attempts to address over several websites. This project is important because it can transform the educational system to make learning more convenient, accessible, and effective. We address the following two issues: Students and lifelong learners are frequently challenged to locate thorough instructional resources, while educators and tutors struggle to establish a connection with their students. Our main goal is to combine the content from three different websites. Our strategy consists of user-centered design, open evaluations and ratings, instantaneous communication, and a dedication to ongoing development. Users benefit from significant time savings as well as an adaptable and engaging learning environment.

Prototype/Process

Data Flow Diagram

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Target Industries/Users

1. Students and Lifelong Learners
2. Educators and Tutors
3. Educational Institutions and Universities
4. Online Learning Platforms and EdTech Companies
5. Corporate Training and Development Programs

Innovation 11: E-Vaccine

Students:
Fahad Naseer
M. Raheel Anjum
Ahmad Shafiq

Supervisor:
Ms. Amna Iqbal

Introduction/Significance

The sole purpose of this project is to provide an application to make it easy for parents to get their children vaccinated. This application is designed to streamline and enhance the process of managing child vaccinations, ensuring timely and accurate administration of vaccines. So, in the heart of Pakistan, where the land owns rich culture and prestigious soil, a silent battle unfolds. Where many preventable diseases come across to nation's child. The major reason for these preventable diseases is untimely vaccinations, it has become a challenge that echoes through the corridors of public health. According to the surveys, only 66% of the children are vaccinated of aged 12-13 months but remaining 44% has do not receive their vaccination. In the backdrop of these challenges the vision of E-Vaccine took route. By harnessing the power of technology, data, and community engagement, this project aspires to make a significant impact on childhood vaccination rates, thereby reducing the burden of preventable diseases and fostering a stronger foundation of our children's life.

Prototype/Process

Work breakdown structure diagram

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Target Industries/Users

1. Parents and Guardians of Children
2. Healthcare Providers and Pediatricians
3. Public Health Authorities and Government Health Departments
4. Non-Governmental Organizations (NGOs) Focused on Child Health
5. Community Health Workers and Vaccination Campaigns

Innovation 12: AI Based Auto Park Assistant

Students:
M. Basit Adeel
M. Zohaib
M. Qasim

Supervisor:
Mr. Muhammad Javed

Introduction/Significance

The AI Based Auto Park system is a barcode-based reservation vehicle parking system which is designed to streamline the parking process by allowing users to reserve parking spaces in advance using barcodes. The system aims to provide a more efficient and convenient parking experience for users while optimizing parking space utilization.AI Based Auto Park system has been one of the leading designers of mechanical automatic parking systems and automatic storage & logistics equipment's. AI Based Auto Park system is designed to streamline the parking process by allowing users to reserve parking spaces in advance aims to provide a more efficient and convenient parking experience for users while optimizing parking space utilization. This system is designed under the domain of the web development by using some languages.

Prototype/Process

Data Flow Diagram

Target Industries/Users

1. Urban Cities and Municipalities
2. Shopping Malls and Commercial Complexes
3. Corporate Offices and Business Parks
4. Public Transportation Hubs (Airports, Bus Stations, etc.)
5. Parking Management and Facility Operators

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Innovation 1: ECO Friendly Brick

Students:
Abdullah
Ahmad Raza
Aashan Ali

Supervisor:
Engr. Arslan Sami

Introduction/Significance

Clay bricks are produced by the drying and firing of clay. Pakistan is home to one of the largest brick kiln industries in the world, with more than 18,000 brick kilns operating across the country. These kilns are responsible for producing an estimated 60 billion bricks each year, which are used for construction. Currently, there is a focus on developing eco-friendly bricks. These bricks are constructed using major industrial wastes such as Egg shell powder (ESP) and marble waste powder, cement waste. The intention is to mitigate environmental impact by repurposing these industrial by-products in the construction process.

Prototype/Process

Brick Preparation and Testing

Target Industries/Users

1. Construction Industry (residential, commercial, infrastructure)
2. Real Estate Developers (green buildings, smart cities)
3. Government and Public Sector (housing schemes, infrastructure projects)
4. Environmental Organizations and NGOs (sustainability initiatives)
5. Brick Kiln Owners and Manufacturers (eco-friendly alternatives)

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Innovation 2: Optimizing Concrete Mixture: A Comparative Study of Corn Cob Ash and Bagasse Ash as Partial Cement Replacements

Students:
Syed Ghalib Shabbir
Samar Abbas Khan
Saad Sajid

Supervisor:
Engr. Yasir Iftikhar

Introduction/Significance

Cement production is a major source of carbon emissions, driving the search for sustainable alternatives. This study explores the use of Corn Cob Ash (CCA) and Bagasse Ash (BA), agricultural by-products, as partial replacements for cement in concrete mixtures. The research focuses on comparing the effects of CCA and BA on the strength, durability, and performance of concrete, with the goal of optimizing a more eco-friendly concrete mix.

Using corn cob ash and bagasse ash as partial cement replacements can result in inconsistent concrete quality, reduced early strength, and higher water demand, leading to potential shrinkage. Processing costs and environmental concerns from ash production, along with limited regional availability and transportation costs, may further offset their benefits.

Prototype/Process

Concrete cylinders preparation, workability testing and curing

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Target Industries/Users

1. Construction Industry (residential, commercial, and infrastructure projects)
2. Cement and Concrete Manufacturers (sustainable material development)
3. Real Estate Developers (green and sustainable buildings)
4. Government and Public Sector (roadways, bridges, public infrastructure)
5. Environmental Organizations and NGOs (climate-friendly construction initiatives)

Innovation 3: Eco-Friendly Utilization Of Bagasse Ash and Cor Cob Ash as a Partial Replacement of Fly Ash Based Geopolymer Concrete

Students:
Muhammad Usman Kharal
Ali Haider
Muhammad Zain Tahir

Supervisor:
Engr. Saqib Hussain

Introduction/Significance

The demand for sustainable construction materials is driving the exploration of eco-friendly alternatives to cement and fly ash. This study investigates the use of Bagasse Ash (BA) and Corn Cob Ash (CCA) as partial replacements for fly ash in geopolymer concrete. These agricultural by-products help reduce industrial waste and lower carbon emissions. The research focuses on assessing the strength, durability, and workability of BA and CCA-based geopolymer concrete. By utilizing these waste materials, the study promotes resource efficiency and greener construction practices. The findings aim to support the development of sustainable and high-performance concrete solutions.

Prototype/Process

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Laboratory practices in concrete preparation and testing

Target Industries/Users

1. Construction Industry (residential, commercial, and infrastructure projects)
2. Cement and Concrete Manufacturers (sustainable material production)
3. Real Estate and Companies (ash recycling and processing)

Innovation 4: Assessing the Strength and Durability Properties of Concrete Incorporating Tertiary Blended Cementitious Materials

Students:
Muhammad Usman Kharal
Ali Haider
Muhammad Zain Tahir

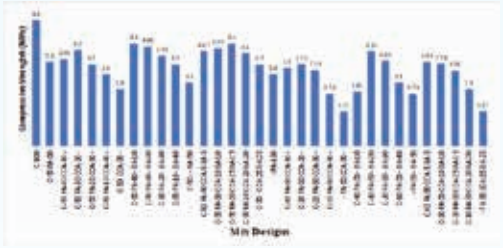
Supervisor:
Engr. Saqib Hussain

Introduction/Significance

Concrete remains vital in construction due to its strength and durability. Integrating supplementary cementitious materials (SCMs) like fly ash, slag, and silica fume enhances performance and sustainability. Using tertiary blended SCMs, combining three SCMs in one mix promises superior mechanical properties and durability. This study assesses concrete with these blends to unlock new potential in sustainable, high-performance construction materials.

Prototype/Process

Concrete condition under harsh environment



Compressive strength of mortar cubes with different ash percentages

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Target Industries/Users

1. Construction Industry (residential, commercial, and infrastructure projects)
2. Cement and Concrete Manufacturers (production of blended cement)
3. Real Estate Developers (sustainable and high-performance buildings)
4. Government and Public Sector (roads, bridges, public infrastructure)
5. Environmental Organizations and NGOs (green construction advocacy)

Innovation 1: Design and Development of a Solar-Powered Grass Cutting Vehicle

Students:
Hamza Ilyas
Waqar Hameed
Awais Raza

Supervisor:
Dr. M Arshad Shahzad
Hassan

Introduction/Significance

The proposed project focuses on the design and development of a solar-powered grass cutting vehicle, aligning with modern trends in green and sustainable energy applications. According to recent advancements in electric mobility and renewable energy integration, solar-powered systems are increasingly being used to reduce dependency on fossil fuels and lower carbon emissions. The vehicle operates as an electric vehicle (EV) driven by a 2kW DC motor, powered by five high-capacity rechargeable batteries. A photovoltaic (PV) panel mounted on the roof charges the batteries during the day, ensuring extended operation, while the battery reserve supports usage during night hours. The system not only provides a cost-effective and eco-friendly alternative to conventional fuel-based cutters but also offers convenience and efficiency in daily lawn maintenance tasks.

Prototype/Process

Prototype of the solar-powered grass cutting vehicle, showcasing sustainable energy integration

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Target Industries/Users

1. Municipal Corporations and City Parks Departments
2. Agricultural Sector
3. Educational Institutions (Schools, Colleges, Universities)
4. Housing Societies and Real Estate Developers
5. Golf Courses and Sports Grounds

Innovation 2: Hybrid Balancer for Lithium-ion Batteries

Students:
Muhammad Alamgir
Haseeb Ashraf
Muhammad Zeeshan

Supervisor:
Dr. M Arshad Shahzad
Hassan

Introduction/Significance

With the global shift toward renewable energy, lithium-ion (Li-ion) batteries play a vital role in ensuring reliable and sustainable power storage. This research proposes a hybrid battery management system (BMS) using state-of-charge (SoC)-based balancing techniques, enhancing battery performance, lifespan, and safety. Integrating IoT, the system enables real-time monitoring, ensuring continuous updates for users worldwide

Target Industries/Users

1. Essential Renewable Energy Sector
2. Electric Vehicle (EV) Industry
3. Consumer Electronics
4. Smart Grid and Energy Storage Systems
5. Industrial Automation and Robotics

Prototype/Process

Hardware implementation of hybrid balancer for lithium-ion batteries

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Innovation 3: IOT-Based Smart Solar Tracking System

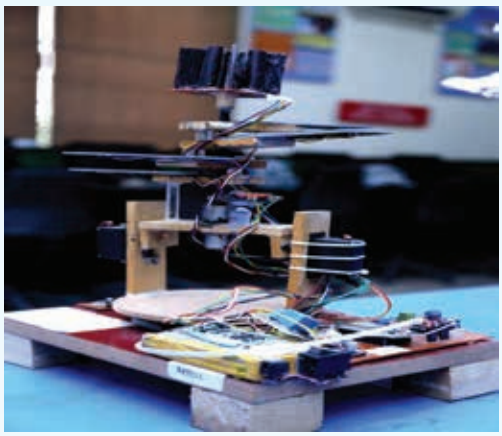
Students:
Malik Arbaz Khurram
Junaid
Muhammad Jamil

Supervisor:
Dr. M Arshad Shahzad
Hassan

Introduction/Significance

The growing global population and the depletion of non-renewable energy sources have emphasized the need for sustainable alternatives like solar energy. However, the efficiency of solar energy systems is often hindered by the daily and seasonal variations in the sun's position. This project addresses this challenge by designing a dual-axis solar tracking system controlled by the Esp32 microcontroller, ensuring optimal alignment of solar panels with the sun throughout the day. By incorporating light-dependent resistors (LDRs) for sun tracking and implementing precise control mechanisms, this system enhances solar energy capture efficiency, leading to higher power generation. This project holds significant potential to improve renewable energy utilization, contributing to a more sustainable and reliable energy supply while reducing dependency on traditional energy sources

Prototype/Process



Target Industries/Users

1. Renewable Energy Sector
2. Residential and Commercial Solar System Providers
3. Smart Grid and Energy Management Systems
4. Agriculture Sector
5. Educational and Research Institutions

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Innovation 4: Grid Tied Inverter

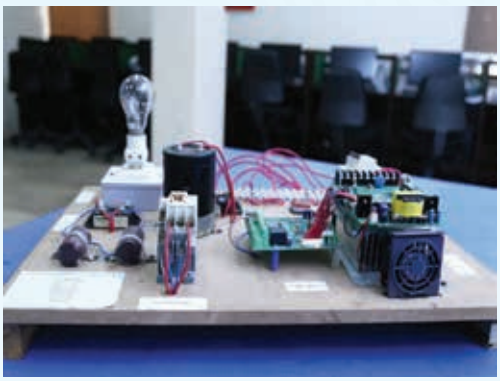
Students:
Malik Arbaz Khurram
Junaid
Muhammad Jamil

Supervisor:
Engr. Talha Saleem

Introduction/Significance

This project focuses on developing a prototype that achieves synchronization between AC and DC power through power electronics-based controllers. Synchronization involves matching key parameters such as frequency, voltage, and phase between the PV system and the grid. Poor synchronization not only reduces efficiency but can also lead to grid instability or blackouts. By incorporating advanced microprocessors, communication interfaces, and power electronics, the proposed system equalizes these parameters, ensuring seamless integration of renewable energy into the grid. This innovation addresses the challenges of intermittent solar power generation and variable grid conditions, contributing to the global transition toward cleaner and more resilient energy systems.

Prototype/Process



Target Industries/Users

1. Renewable Energy Companies
2. Power and Utility Companies
3. Government and Regulatory Agencies
4. Commercial and Industrial Sectors
5. Residential Solar Energy Consumers

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Innovation 5: Smart Glasses for Blind and Visually Impaired People

Students:
Muhammad Saad
Muhammad Mahboob

Supervisor:
Engr. Danyal Zahid

Introduction/Significance

The aims to utilise the capabilities of the Raspberry Pi Model 3B to develop a groundbreaking solution that enhances the independence and quality of life for individuals with visual impairments. By leveraging computer vision and integrating cutting-edge technologies, including text recognition, text-to-speech synthesis and optical character recognition (OCR) technologies, these smart glasses provide a portable and intuitive solution that promotes independence and accessibility for users.

The primary objective of the smart glasses is to enable users to read and understand printed text using a text-to-speech method. Equipped with a camera module, the glasses capture live video feeds, which are processed using computer vision algorithms to extract text from the images.

The Raspberry Pi then employs text-to-speech synthesis techniques to convert the recognised text into spoken words which are relayed to the user via earphones or a speaker.

The smart glasses prioritise user comfort and convenience, with a lightweight and ergonomic design that can be customised to suit individual preferences. The Raspberry Pi Model 3B's compact form factor enables discreet integration within the glasses, making them visually appealing and user-friendly.

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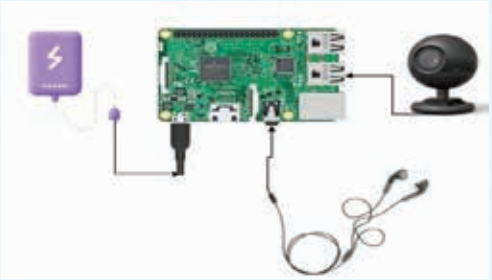
Prototype/Process



Target Industries/Users

1. Assistive Technology Industry
2. Healthcare and Rehabilitation
3. Educational Institutions
4. Wearable Technology Industry
5. Retail and Accessibility Services

Innovation 6: Predictive Maintenance of Power Substation Equipment by Infrared Thermography

Students:
Jawad Hassan
Ali Raza
Rana Hamza
Dil Shad

Supervisor:
Engr. Umar Farooq

Introduction/Significance

Thermography is a non-destructive fault detection technique. In this method, the equipment is analyzed without opening it. Computer vision approaches are used for the analysis of the thermal images. For the analysis, we're using Convolutional Neural Networks that will detect defective and nondetective images by comparing it to the images that were stored it previously. This is called the training of the network. Convolutional Neural Network has an accuracy of over 70%. Convolutional Neural Network is a modified form of Artificial Neural Networks. It is used for the recognition systems such as face recognition and image recognition. It processes the data that is in the form of pixel data. It is a deep learning network that analyzes the data of the images.

In this network, we use an algorithm to reduce the recognize objects in images. The convolution is used to reduce the dimensions of input images. This makes the extraction of features from the input images. In a normal class of images, the temperature of the components is below the bearing limits of the component. The red dots in the thermal image are less.

Prototype/Process

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Target Industries/Users

1. Power and Energy Sector
2. Utility Providers
3. Industrial Maintenance Companies
4. Thermal Imaging and Sensor Technology Manufacturers
5. Renewable Energy Sector

Innovation 1: Laser-Induced Breakdown Spectroscopy & ML for Cancer Detection

Students:
Amna Hameed
Fizza Azam
Rabia Nawaz

Supervisor:
Dr. Bushra Sana Idrees

Introduction/Significance

The diagnosis and treatment of cancer is one of the most challenging problems faced by the global medical and healthcare systems. At present, there are still difficulties in the diagnosis and treatment of cancer, and more accurate and feasible technical solutions need to be provided. Malignant gastrointestinal stromal tumor (GIST), prostrate cancer, Cardiovascular diseases (CVDs), Polycystic ovary syndrome (PCOS), thalassemia and breast cancer are common malignant tumors, which can be effectively treated by surgical resection in the early stage, and have a high survival rate; however, the survival rate decreases significantly after metastasis. Therefore, early and accurate diagnosis of different types of cancer is crucial to improve the survival rate of patients. Laser Induced Breakdown Spectroscopy (LIBS) can clearly distinguish pathological tissue and blood from chemical composition, not only has great significance for clinical application of stem cells, but also promotes the study of the pathogenesis of tumours. Laser-induced breakdown spectroscopy will be proposed as a diagnostic tool assisted with machine learning for early diagnosis of different diseases. This will also differentiate between healthy and cancer samples using blood or tissue by the analysis of elemental composition in cancer patients using machine learning algorithms. A robust and reliable method will be developed for cancer detection for better classification of diseased and healthy samples and its staging.

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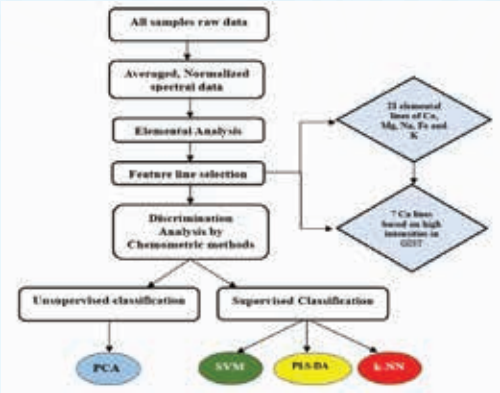
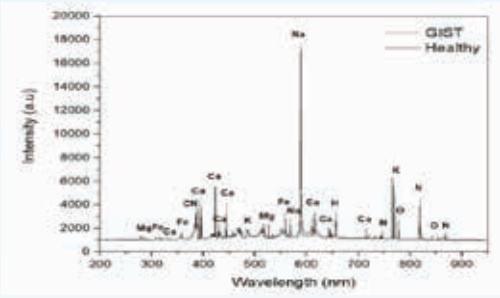
Prototype/Process



Flowchart Indicates The Research Process



LIBS Spectra Of GIST Tissues

Target Industries/Users

1. Healthcare Industry
2. Medical Research & Laboratories
3. Cancer Research Institutes
4. Diagnostic Equipment Manufacturers
5. Pharmaceutical Companies

Innovation 2: Design and Implementation of a Street Lighting Control Circuit Using Series Connected Resistors and Switching Mechanism

Students:
Rabeeha Tariq
Muhammad Umer
Zainab Naeem

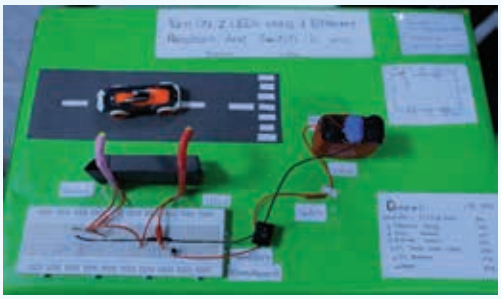
Supervisor:
Dr. Bushra Sana Idrees

Introduction/Significance

The aim of this experiment is to connect resistance in series combination on the breadboard and turn on light 2 Light Emitting Diodes (LEDs) with a switch, such that after the resistance, even the current is given to LEDs. Drive the chain from a constant current source (there are LED driver chips that do this). By connecting a PNP transistor across LEDs 2 and 3, with the collector to cathode and emitter to anode. On the basis of each transistor, a circuit that will feed current to the base until the appropriate time interval elapses from application of power. Without doing a detailed circuit design, a capacitor from the base to ground, with a resistor from the base to the input of the power source for the constant current circuit.

Insert a resistor in series with the base to limit base current - capacitors can draw a lot of current when charging up and don't want too much current running through the base.

Prototype/Process



Target Industries/Users

1. Assistive Technology Industry
2. Renewable Energy Sector
3. Hospitals, Homes and Institutes
4. Commercial and Industrial Sectors

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Innovation 1: Eggcelerate Protein Bar

Supervisor:
Dr. Anum Nazir

Introduction/Significance

The Eggcelerate Protein Bar is a high-protein snack designed to utilize egg protein as a primary ingredient, offering a highly bioavailable and allergen-friendly alternative to whey, soy, and plant-based proteins. This study aims to develop and evaluate an innovative egg-based protein bar by optimizing its formulation, assessing its nutritional and functional properties, ensuring storage stability, and analyzing consumer acceptability.

The goal is to create a market-ready, nutritious, and appealing protein bar that meets the growing demand for high-quality protein snacks. While the market for protein bars is expanding, many commercially available options rely on whey, soy, or plant-based proteins. Egg protein, being highly bioavailable and rich in essential amino acids, presents an excellent alternative.

Prototype/Process

Target Industries/Users

1. Sports Nutrition Industry
2. Health and Wellness Consumers
3. Fitness Enthusiasts and Athletes
4. Snack and Protein Bar Manufacturers
5. Retail and E-commerce Distributors

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Innovation 2: Nourisha: Baby Formula

Supervisor:
Dr. Anum Nazir

Introduction/Significance

Infant malnutrition and inadequate nutrient intake are significant concerns, particularly in regions where access to high-quality baby formula is limited. Existing formulas may lack optimal nutrient composition, bioavailability, or digestibility, affecting infant growth and development.

This study aims to develop and evaluate Nourisha, a scientifically formulated baby formula enriched with essential nutrients to support infant growth, immunity, and cognitive development. The research will focus on optimizing ingredient composition, assessing nutrient bioavailability, and ensuring compliance with international safety and nutritional standards.

Prototype/Process

Target Industries/Users

1. Infant Nutrition Industry
2. Healthcare and Paediatrics
3. Baby Care Products Manufacturers
4. Research and Development in Nutritional Science
5. Regulatory Bodies and Food Safety Agencies

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