

Engineering & Mechatronics Capstone Projects

Project Title	What It Is	Key Tools/Technologies	Skills Learned
Automated Sorting System	Sorts items based on size/color/weight	Arduino, sensors, conveyors	Sensors, logic building, mechanical integration
Self-Balancing Robot	Balances on two wheels using feedback	MPU6050, Arduino, PID control	Stability control, embedded systems
Smart Elevator Prototype	Models a multi-floor elevator with sensors	Servo motor, Arduino, IR sensors	Programming, embedded logic
Stair-Climbing Robot	Robot that climbs stairs using mechanical design	Motors, gears, Arduino	Mechanical innovation, navigation
Solar-Powered Car	Mini car powered fully by solar panel	Solar panel, DC motor, chassis	Renewable energy, wiring
Robotic Arm with Gripper	Multi-axis arm controlled manually or automatically	Servo motors, joystick, Arduino	Precision mechanics, inverse kinematics
Automatic Pet Feeder	Dispenses food at set times or remotely	RTC module, servo, Arduino	Time logic, mechanical design
Smart Trash Bin	Opens lid automatically when motion is detected	Ultrasonic sensor, servo, microcontroller	Motion sensing, real-world application
Wireless Weather Station	Displays real-time weather data from sensors	DHT11, ESP8266, OLED display	Data logging, IoT communication
Hand Gesture Controlled Vehicle	Car controlled by hand motion using accelerometer	Accelerometer, Arduino, motor driver	Wireless input, human-machine interface

Computer Science & AI Capstone Projects

Project Title	What It Is	Key Tools/Technologies	Skills Learned
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AI-Based Chatbot	Intelligent bot for website or customer service	Python, NLP, Dialogflow	Natural language processing
Face Recognition Attendance System	Marks attendance using facial detection	OpenCV, Python, Raspberry Pi	Face recognition, database linking
Fake News Detector	Classifies news as fake or real	Python, ML algorithms	Text classification, data preprocessing
Personal Finance Tracker App	Tracks expenses and income with visual charts	React, Firebase, Chart.js	Web dev, data visualization
Handwriting Recognition Tool	Converts handwriting to text using neural networks	CNN, Python, Keras	Image processing, deep learning
Smart Email Classifier	Organizes emails into folders automatically	Scikit-learn, NLP, Gmail API	Supervised learning, feature extraction
AI Resume Analyzer	Analyzes resumes and ranks candidates	Python, NLP, Flask	HR tech, text parsing
Code Auto-Completion Plugin	IDE plugin that suggests code completions	JavaScript, ML model	Language modeling, IDE integration
Cybersecurity Intrusion Detector	Detects unusual behavior in network traffic	Snort, Python, packet analyzers	Network security, anomaly detection
Mental Health Chat App	Mood-tracking + chatbot support	Python, MySQL, emotion AI	Sentiment analysis, frontend/backend systems

Robotics Capstone Projects

Project Title	What It Is	Key Tools/Technologies	Skills Learned
Maze Solving Robot	Finds and follows a path out of a maze	IR sensors, Arduino, wheels	Pathfinding, logic algorithms

Fire Fighting Robot	Detects fire and activates water sprayer	Flame sensor, water pump, Arduino	Emergency robotics, automation
Robotic Vacuum Cleaner	Smart cleaner that avoids obstacles	Lidar, ultrasonic sensor, motor	Navigation, automation logic
Swarm Robot Coordination	Group of bots working together on a task	RF modules, Arduino, coordination algorithm	Distributed logic, swarm behavior
Underwater Drone	Operates underwater and collects data	Waterproof casing, propellers, sensors	Environmental robotics
Face Tracking Robot	Moves camera to follow a face	Raspberry Pi, OpenCV	Vision processing, real-time detection
Gesture-Controlled Drone	Flies based on hand movement	Accelerometer, Bluetooth, flight controller	Wireless gesture control
Warehouse Delivery Robot	Delivers objects to selected locations	RFID tags, line sensors, mapping	Navigation + task completion
Trash Collector Robot	Picks and drops trash remotely	Arm, motors, Bluetooth, controller	Precision tasking
Soccer Playing Bot	Plays basic soccer with other bots	IR ball sensor, servo motors	Competition logic, teamwork

Internet of Things (IoT) Capstone Projects

Project Title	What It Is	Key Tools/Technologies	Skills Learned
Smart Home System	Controls lights, fan, door remotely	NodeMCU, Blynk app, relays	Remote control, device automation
IoT-Based Smart Farming	Monitors soil, temp, and water plants	Moisture sensor, ESP8266, pump	Precision agriculture
Smart Energy Meter	Tracks power usage and sends alerts	Current sensor, WiFi module, LCD	Energy analysis, web dashboard

IoT Car Parking System	Displays free/occupied slots	Ultrasonic sensor, NodeMCU, display	Real-time monitoring
Home Security Surveillance	Camera-based monitoring system	Raspberry Pi, IP camera, motion sensor	Remote surveillance
Smart Door Lock System	Unlocks door via OTP or fingerprint	Fingerprint sensor, NodeMCU, buzzer	Security tech, mobile linkage
Air Quality Monitor	Tracks indoor/outdoor air quality	MQ-135, NodeMCU, OLED	Environmental awareness
Cold Chain Tracker	Tracks temp during vaccine/food transport	Temperature sensor, GPS, GSM	Logistics innovation
IoT Pet Feeder	Feeds pet at scheduled or remote time	Servo motor, Blynk, ESP8266	Pet tech, time-based tasking
Water Usage Monitor	Tracks flow and leakage in home	Flow sensor, NodeMCU, app	Resource conservation

Science & Environmental Capstone Projects

Project Title	What It Is	Key Tools/Technologies	Skills Learned
Smart Irrigation System	Waters crops based on soil conditions	Soil moisture sensor, Arduino	Environmental sensors, agriculture automation
River Pollution Detector	Detects harmful elements in river water	pH sensor, turbidity sensor, GPS	Environmental data analysis
Solar Tracker System	Rotates panel to follow the sun	LDRs, servo motors, Arduino	Renewable energy optimization
Eco-Friendly Air Cooler	Low-power cooling using evaporation	Motor, fan, cooling pads	Thermodynamics, mechanics
Smart Compost Bin	Detects weight & fills level	Load cell, moisture sensor	Waste monitoring
Indoor Garden Automation	Smart hydroponic grow system	Nutrient pumps, light control, sensors	Plant tech, home automation

Climate Monitoring Station	Measures weather variables over time	DHT22, barometer, SD card module	Meteorological data logging
Microplastics Detector	Filters & detects plastic particles	Fine mesh, microscope, image analysis	Chemistry + AI + environment
Rainwater Harvesting Optimizer	Calculates flow rate, tank levels	Flow sensor, NodeMCU	Resource management
Earthquake Early Alert System	Detects tremors and sends alert	Accelerometer, GSM module	

Mobile & App Development Capstone Projects

Project Title	What It Is	Key Tools/Technologies	Skills Learned
Personal Finance Tracker App	Helps users track expenses & budget goals	Flutter, Firebase, Google Sheets API	Budgeting logic, mobile UI/UX
College Event Manager	Organizes college events, RSVPs, and reminders	Kotlin/Java, Firebase, push notifications	App design, cloud integration
Health Habit Tracker	Tracks water intake, sleep, steps, etc.	React Native, SQLite/Firebase	Health-focused UI design
Bus Tracking App for Campus	Real-time location updates for buses	Android Studio, Google Maps API	Location services, live tracking
Language Learning App	Teaches vocabulary using flashcards and quizzes	Flutter, text-to-speech, SQLite	Educational design, gamification
Emergency SOS App	Sends instant alert with location to contacts	GPS, SMS API, Android SDK	Safety logic, permission handling
Exam Prep Flashcard App	Interactive quiz cards with progress tracker	React Native, Redux	Memory-based learning tools
Virtual Resume Builder	Creates and exports resumes as PDFs	Flutter, HTML/CSS to PDF converter	Form design, file handling

Medication Reminder App	Alerts users when to take medicine	AlarmManager, SQLite, notification API	Time-based functions, UI clarity
Mental Health Journal	Daily log of mood, journal, and affirmations	Firebase, calendar integration	Self-care features, data storage

Renewable Energy Capstone Projects

Project Title	What It Is	Key Tools/Technologies	Skills Learned
Solar Mobile Charger	Portable solar panel that charges phones	Solar panel, battery pack, charge controller	Energy conversion, basic circuitry
Solar-Powered Street Light	Auto-on street light using solar energy and darkness sensor	LDR, battery, solar panel, LED	Power management, auto-switching
Wind Turbine for Home	DIY wind turbine generating small electricity	DC motor, fan blades, charge controller	Mechanical-to-electrical energy conversion
Hybrid Bike (Solar + Pedal)	Bike that uses solar assist motor	Solar panel, BLDC motor, battery	Hybrid vehicle design
Piezoelectric Energy Harvester	Converts footstep pressure into electric power	Piezo plates, rectifier, storage capacitor	Alternative energy research
Smart Grid Demo	Simulates intelligent energy distribution	Arduino, sensors, relay modules	Load balancing, smart switching
Tidal Energy Model	Working model of underwater turbine	Motor, transparent tank, water pump	Fluid dynamics, mechanical modeling
Energy-Efficient Smart Fan	Adjusts fan speed based on room conditions	Temperature sensor, PWM control	Green design, automation
Solar-Powered Irrigation System	Pumps water for irrigation using solar power	DC pump, solar cell, moisture sensor	Solar farming techniques

Biogas Plant Model	Demonstrates energy from organic waste	Sealed container, gas collection unit	Sustainable practices, waste reuse
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Automotive & Transportation Capstone Projects

Project Title	What It Is	Key Tools/Technologies	Skills Learned
Anti-Sleep Alarm for Drivers	Alerts if driver's eyes close	IR sensor, piezo buzzer, Arduino	Drowsiness detection, safety systems
Smart Speed Limiter	Limits vehicle speed in specific zones	GPS, Arduino, motor controller	Geo-fencing, automation
Reverse Parking Sensor	Detects obstacles while parking	Ultrasonic sensor, buzzer, Arduino	Proximity detection, vehicle safety
Smart Helmet	Sends alert on crash or fall	Accelerometer, GSM module, helmet mount	Rider safety, impact sensing
Car Accident Alert System	Sends SMS with location if car crashes	Vibration sensor, GSM, GPS	Emergency tech, location services
Autonomous RC Car	Follows lanes or avoids obstacles	IR sensors, servo motor, camera	Self-driving basics
Alcohol Detection System	Prevents engine start if alcohol is detected	MQ-3 sensor, relay, Arduino	Safety enforcement, sensor integration
Vehicle Tracking App	Real-time tracking with geo-tagging	GPS, Android Studio, Firebase	Location APIs, secure data handling
EV Battery Monitor	Monitors battery performance and temperature	Battery sensor, LCD, Arduino	Energy management, e-mobility
Smart Number Plate Scanner	Uses OCR to detect plates in images	Python, OpenCV, Raspberry Pi	Computer vision, license plate recognition

Biomedical & Healthcare Capstone Projects

Project Title	What It Is	Key Tools/Technologies	Skills Learned
Smart Medicine Dispenser	Releases correct medicine at set times	RTC module, servo motor, Arduino	Medication timing, patient safety
Heartbeat Monitor with Alert	Measures pulse and sends alert if abnormal	Pulse sensor, GSM module	Bio-monitoring, alert logic
Digital Stethoscope	Amplifies and visualizes heartbeats	Microphone sensor, OLED, amplifier circuit	Analog signal processing
Temperature + Oxygen Monitor	Reads SpO2 and body temp in real-time	MAX30100, LM35, Arduino	Vital tracking, wearable tech
Fall Detection Device	Detects when a person has fallen	Accelerometer, GSM	Elderly care, impact detection
Vision Testing App	Conducts basic vision tests on phone	Android SDK, graphics API	Accessibility tools, mobile UX
Prosthetic Arm Controller	Controls robotic limb via muscle movement	EMG sensor, Arduino, servos	Biomechanics, human interface
Smart Wheelchair Prototype	Controlled via joystick or voice	Motors, joystick, voice module	Assistive mobility
Smart Band for Chronic Patients	Monitors vitals, schedules check-ups	Sensors + app integration	Health dashboard, connected care
Contactless Fever Detector	Uses infrared to detect elevated temperature	IR thermometer module, buzzer	Hygiene-friendly automation

Game Development & Simulation Projects

Project Title	What It Is	Key Tools/Technologies	Skills Learned
2D Platformer Game	Jump-and-run game with obstacles	Unity, C#, tilemaps	Physics engine, game logic

Traffic Simulation Game	Simulates traffic behavior & lights	Python, Pygame, OOP	Simulation modeling, time events
Space Shooter Game	Spaceship game avoiding or shooting enemies	Unity, Blender (assets)	Game loops, sprite interaction
Educational Quiz Game	Interactive game for kids to learn	HTML, JavaScript, Firebase	Learning + entertainment
Virtual Physics Lab	Simulates lab experiments virtually	Unity, animation tools	Experiment simulation
Typing Speed Test Game	Tests typing speed with real-time results	JavaScript, CSS animations	Event handling, timer control
VR Environment Simulation	Walk-through or interactive room setup	Unity 3D, Oculus SDK	Immersive experience design
Multiplayer Tic-Tac-Toe Online	Classic game with online multiplayer	Node.js, Socket.IO	Real-time networking
Escape Room Puzzle Game	User solves puzzles to escape rooms	Godot Engine, logic programming	Puzzle mechanics, game flow
Traffic Control Simulation	Controls signals for smoother traffic flow	Python, Tkinter	Algorithm + GUI