



# PANIMALAR ENGINEERING COLLEGE

AN AUTONOMOUS INSTITUTION  
(A CHRISTIAN MINORITY INSTITUTION)



JAISAKTHI EDUCATIONAL TRUST ACCREDITED BY NATIONAL BOARD OF

ACCREDITATION

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#2 ISSUES

**TECH NEWS**  
DEPARTMENT OF COMPUTER AND SCIENCE

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### DEPARTMENT VISION

TO PROVIDE AN ACADEMICALLY  
CONDUCTIVE ENVIRONMENT FOR  
INDIVIDUALS TO DEVELOP AS  
TECHNOLOGICALLY SUPERIOR, SOCIALLY  
CONSCIOUS AND NATIONALLY  
RESPONSIBLE CITIZENS.

**PEO1: EMPLOYMENT/HIGHER STUDIES** TO  
IMPART AND DISSEMINATE SOUND  
KNOWLEDGE TO THE STUDENTS ON THE  
FUNDAMENTALS OF MATHEMATICS AND  
ADVANCED FIELDS OF COMPUTER SCIENCE  
AND INTERRELATED DISCIPLINES TO SOLVE  
SIMPLE AND COMPLEX ENGINEERING  
PROBLEMS AND TRAIN THEM TO ACHIEVE  
SUSTAINABLE GROWTH IN THEIR  
PROFESSIONAL CAREER

**PEO 2: DISCIPLINE KNOWLEDGE** TO ENHANCE  
THE ABILITY OF STUDENTS TO EVALUATE THE  
SPECIFIC REQUIREMENTS OF SOFTWARE  
INDUSTRY AND PROVIDE INNOVATIVE  
ENGINEERING SOLUTIONS AND EFFICIENT

### PRODUCT DESIGN:

**PEO 3: INDIVIDUAL SKILLS:** TO FACILITATE THE  
STUDENTS TO MAKE USE OF THEIR TECHNICAL  
COMPETENCY TO IDENTIFY AND DEVELOP  
APPROPRIATE PRODUCT DESIGN, DEVELOPMENT,  
TESTING, MAINTENANCE, ANALYSIS OF PROBLEMS  
AND PROVIDE CORRECTIVE MEASURES.

**PEO 4: -PROFESSIONAL PERSONALITY AND  
PRESENTATION:** TO ENABLE THE STUDENTS TO  
DEVELOP STRONG LEADERSHIP QUALITIES WITH  
AGGRESSIVE OPTIMISM, MULTIDISCIPLINARY SKILLS,  
EXCELLENT COMMUNICATION SKILLS AND FUNCTION  
AS EFFECTIVE AND RELIABLE TEAM MEMBERS GIVING  
IMPORTANCE TO PROFESSIONAL AND ETHICAL  
PRINCIPLES.

**PEO 5: ENVIRONMENT:** TO INCULCATE IN THE  
STUDENTS TO ASSOCIATE IN SOCIAL NETWORKING  
PURSUE CONTINUED LEARNING OF THE LATEST  
DEVELOPMENTS IN COMPUTER SCIENCE AND  
INVOLVE IN HIGHER RESEARCH AND CONTRIBUTE TO  
THE DEVELOPMENT OF SOFTWARE INDUSTRY AND  
RELATED ENGINEERING FIELDS.

### DEPARTMENT MISSION MI

TO DEVELOP OUR DEPARTMENT AS A CENTER OF  
EXCELLENCE, IMPARTING QUALITY EDUCATION,  
GENERATING COMPETENT AND SKILLED MANPOWER,  
M2: TO PREPARE OUR STUDENTS WITH HIGH DEGREE  
OF CREDIBILITY, INTEGRITY, ETHICAL STANDARDS AND  
SOCIAL CONCERN. M3: TO TRAIN OUR STUDENTS TO  
DEVISE AND IMPLEMENT NOVEL SYSTEMS BASED ON  
EDUCATION AND RESEARCH.

### PROGRAM SPECIFIC OBJECTIVES (PSOS)

**PSO 1:** TO INCULCATE TECHNICAL SKILLS TO ANALYZE,  
DESIGN NETWORKING, WEB SERVICES, MULTIMEDIA,  
BIG DATA ANALYTICS AND RECENT TOPICS OF VARYING  
COMPLEXITY.

**PSO 2:** TO DEVELOP THE CAPABILITY TO COMPREHEND  
AND SOLVE THE INTERDISCIPLINARY PROBLEMS  
THROUGH APPROPRIATE TECHNOLOGY WITH THE  
UNDERSTANDING OF CONTEMPORARY BUSINESS  
ENVIRONMENT.

**PSO 3:** TO DEVELOP AN ABILITY TO UTILIZE THE  
LATEST TECHNOLOGY AND PLATFORMS TO BECOME A  
TRIUMPHANT PROFESSIONAL, SUCCESSFUL  
ENTREPRENEUR AND AN EDGE FOR PURSUING HIGHER  
STUDIES.

### PROGRAM OUTCOMES (POs)

**PO1 (ENGINEERING KNOWLEDGE):** APPLY THE  
KNOWLEDGE OF MATHEMATICS, SCIENCE, ENGINEERING  
FUNDAMENTALS, AND AN ENGINEERING  
SPECIALIZATION TO THE SOLUTION OF COMPLEX  
ENGINEERING PROBLEMS. **PO2 (PROBLEM ANALYSIS):**

IDENTIFY, FORMULATE, RESEARCH LITERATURE, AND  
ANALYZE COMPLEX ENGINEERING PROBLEM READING  
SUBSTANTIATED CONCLUSIONS USING FIRST  
PRINCIPLES OF MATHEMATICS, NATURAL SCIENCES,  
AND ENGINEERING SCIENCES.

**PO3 (DESIGN/DEVELOPMENT OF SOLUTIONS):** DESIGN  
SOLUTIONS FOR COMPLEX ENGINEERING PROBLEMS AND  
DESIGN SYSTEM COMPONENTS OR PROCESSES THAT  
MEET THE SPECIFIED NEEDS WITH APPROPRIATE  
CONSIDERATION FOR THE PUBLIC HEALTH AND SAFETY  
AND THE CULTURAL, SOCIETAL, AND ENVIRONMENTAL  
CONSIDERATIONS. **PO4 (CONDUCT INVESTIGATIONS OF  
COMPLEX PROBLEMS):** USE RESEARCH-BASED  
KNOWLEDGE AND RESEARCH METHODS INCLUDING  
DESIGN OF EXPERIMENTS, ANALYSIS AND  
INTERPRETATION OF DATA, AND SYNTHESIS OF THE  
INFORMATION TO PROVIDE VALID CONCLUSIONS.

**PO5 (MODERN TOOL USAGE):** CREATE, SELECT, AND  
APPLY APPROPRIATE TECHNIQUES, RESOURCES, AND  
SOFTWARE ENGINEERING AND IT TOOLS INCLUDING  
PREDICTION AND MODELING TO COMPLEX ENGINEERING  
ACTIVITIES WITH AN UNDERSTANDING OF THE  
LIMITATIONS. **PO6 (THE ENGINEER AND SOCIETY):** APPLY  
REASONING INFORMED BY THE CONTEXTUAL  
KNOWLEDGE TO ASSESS SOCIETAL, HEALTH, SAFETY,  
LEGAL AND CULTURAL ISSUES AND THE CONSEQUENT  
RESPONSIBILITIES RELEVANT TO THE PROFESSIONAL  
ENGINEERING PRACTICE. **PO7 (ENVIRONMENT AND  
SUSTAINABILITY):** UNDERSTAND THE IMPACT OF THE  
PROFESSIONAL ENGINEERING SOLUTIONS IN SOCIETAL  
AND ENVIRONMENTAL CONTEXTS, AND DEMONSTRATE  
THE KNOWLEDGE OF, AND NEED FOR, SUSTAINABLE  
DEVELOPMENT. **PO8 (ETHICS):** APPLY ETHICAL  
PRINCIPLES AND COMMIT TO PROFESSIONAL ETHICS  
AND RESPONSIBILITIES AND NORMS OF THE  
ENGINEERING PRACTICE. **PO9 (INDIVIDUAL AND TEAM  
WORK):** FUNCTION EFFECTIVELY AS AN INDIVIDUAL AND  
AS A MEMBER AND LEADER IN DIVERSE TEAMS, AND IN  
MULTIDISCIPLINARY SETTINGS. **PO10 (COMMUNICATION):**  
COMMUNICATE EFFECTIVELY ON COMPLEX ENGINEERING  
ACTIVITIES WITH THE ENGINEERING COMMUNITY AND  
WITH SOCIETY AT LARGE, SUCH AS BEING ABLE TO  
COMPREHEND AND WRITE EFFECTIVE REPORTS AND  
DESIGN DOCUMENTATION, MAKE EFFECTIVE  
PRESENTATIONS, AND GIVE AND RECEIVE CLEAR  
INSTRUCTIONS. **PO11 (PROJECT MANAGEMENT AND  
FINANCE):** DEMONSTRATE KNOWLEDGE AND  
UNDERSTANDING OF THE ENGINEERING AND  
MANAGEMENT PRINCIPLES AND APPLY THESE TO OWN AS  
A MEMBER AND LEADER IN A TEAM TO MANAGE  
PROJECTS AND IN MULTIDISCIPLINARY ENVIRONMENTS.

**PO12 (LIFE-LONG LEARNING):** RECOGNIZES THE NEED FOR  
AND MAKE THE PREPARATION AND ABILITY TO ENGAGE  
IN INDEPENDENT AND LIFE-LONG LEARNING IN THE  
BROADEST CONTEXT OF TECHNOLOGICAL CHANGE.

## ARTIFICIAL NEURAL NETWORK

ANN IS BASED ON A COLLECTION OF  
CONNECTED UNITS OR NODES CALLED  
ARTIFICIAL NEURONS, WHICH  
LOOSELY MODEL THE NEURONS IN A  
BIOLOGICAL BRAIN. EACH  
CONNECTION, LIKE THE SYNAPSES IN  
A BIOLOGICAL BRAIN, CAN TRANSMIT  
A SIGNAL TO OTHER NEURONS. A  
NETWORK IS TYPICALLY CALLED A  
DEEP NEURAL NETWORK IF IT HAS AT  
LEAST 2 HIDDEN LAYERS.SOME OF  
THE MAIN BREAKTHROUGHS INCLUDE:  
CONVOLUTIONAL NEURAL NETWORKS  
THAT HAVE PROVEN PARTICULARLY  
SUCCESSFUL IN PROCESSING VISUAL  
AND OTHER TWO-DIMENSIONAL  
DATA;LONG SHORT-TERM MEMORY  
AVOID THE VANISHING GRADIENT  
PROBLEM AND CAN HANDLE SIGNALS  
THAT HAVE A MIX OF LOW AND HIGH  
FREQUENCY COMPONENTS AIDING  
LARGE-VOCABULARY SPEECH  
RECOGNITION, TEXT-TO-SPEECH  
SYNTHESIS, AND PHOTO-REAL  
TALKING HEADS

## CYBERSECURITY

1. CYBERSECURITY FOR ROBOTICS IS A  
MULTIDISCIPLINARY RESEARCH DOMAIN  
GROWING IN RELEVANCE AND  
IMPORTANCE DUE TO THE CONTINUOUS  
GROWTH OF ROBOTICS SYSTEMS AND THE  
INCREASE IN CYBERSECURITY, SAFETY  
RISKS, AND CHALLENGES. CYBER  
SECURITY OF ROBOTS IS AN IMPORTANT  
RESEARCH TOPIC, FOCUS OF SEVERAL  
SEVERAL STUDIES FOCUSED ON THE  
SECURITY OF ROS, THE MOST SPREAD  
MIDDLEWARE IN THE ROBOTIC FIELDS.

2. CYBER SECURITY OF ROBOTS HAS BEEN  
ANALYZED CONSIDERING PHYSICAL,  
OPERATING SYSTEMS, AND NETWORK  
SECURITY.

LITERATURE HAS BEEN DIVIDED IN ATTACKING,  
PROTECTING, AND AFFECTING ROBOTS AND  
FOR SPECIFIC KINDS OF ROBOTS.THREATS  
CAN PENETRATE ALL THE WAY TO THE SHOP  
FLOOR WHERE THE PRODUCTION TAKES  
PLACE, AFFECTING THE CONSUMERS. SAFETY  
STANDARDS DEMAND A SECURITY MECHANISM  
THAT PROTECTS THE ROBOT ENDPOINTS AND  
FULFILLS ALL THE SECURITY REQUIREMENTS.  
A ROBOT ENDPOINT PROTECTION PLATFORM  
(REPPI). SELF-DRIVING CARS COULD BE  
HACKED WITH RANSOMWARE, NOT ALLOWING  
OWNERS TO ENTER, START OR EXIT THE  
VEHICLE UNTIL A RANSOM IS PAID. TERRORIST  
HACKERS COULD DISABLE NETWORKS, RANGE  
SENSORS, AND CAMERAS, RESULTING IN  
MULTIPLE COLLISIONS

## BITCOINS AND BLOCKCHAIN

### BITCOINS

- **DEFINITION:** BITCOIN IS A DECENTRALIZED DIGITAL CURRENCY, OFTEN REFERRED TO AS A CRYPTOCURRENCY. IT ALLOWS PEER-TO-PEER TRANSACTIONS WITHOUT THE NEED FOR AN INTERMEDIARY, SUCH AS A BANK.
- **CREATION:** BITCOIN WAS INTRODUCED IN A 2008 WHITEPAPER BY AN ENTITY OR INDIVIDUAL KNOWN AS SATOSHI NAKAMOTO. IT WAS IMPLEMENTED IN 2009 AS AN OPEN-SOURCE SOFTWARE.
- **MINING:** BITCOIN TRANSACTIONS ARE VALIDATED AND ADDED TO THE BLOCKCHAIN THROUGH A PROCESS CALLED MINING. MINERS USE POWERFUL COMPUTERS TO SOLVE COMPLEX MATHEMATICAL PROBLEMS, AND THE FIRST ONE TO SOLVE THE PROBLEM GETS TO ADD A NEW BLOCK TO THE BLOCKCHAIN AND IS REWARDED WITH NEWLY CREATED BITCOINS.

### BLOCKCHAIN

- **DEFINITION:** A BLOCKCHAIN IS A DECENTRALIZED, DISTRIBUTED LEDGER THAT RECORDS TRANSACTIONS ACROSS A NETWORK OF COMPUTERS IN A SECURE, TRANSPARENT, AND TAMPER-RESISTANT MANNER.
- **STRUCTURE:** IT CONSISTS OF A CHAIN OF BLOCKS, EACH CONTAINING A LIST OF TRANSACTIONS. ONCE A BLOCK IS FILLED WITH TRANSACTIONS, IT IS LINKED TO THE PREVIOUS BLOCK, FORMING A CHRONOLOGICAL AND IMMUTABLE CHAIN.
- **DECENTRALIZATION:** THE BLOCKCHAIN IS MAINTAINED BY A NETWORK OF NODES (COMPUTERS) THAT VALIDATE AND AGREE ON TRANSACTIONS, ENSURING DECENTRALIZATION AND ELIMINATING THE NEED FOR A CENTRAL AUTHORITY.

## BIG DATA PROCESSING

BIG DATA PROCESSING IS A SET OF TECHNIQUES OR PROGRAMMING MODELS TO ACCESS LARGE-SCALE DATA TO EXTRACT USEFUL INFORMATION FOR SUPPORTING AND PROVIDING DECISIONS. IN THE FOLLOWING, WE REVIEW SOME TOOLS AND TECHNIQUES, WHICH ARE AVAILABLE FOR BIG DATA ANALYSIS IN DATACENTERS. SIMPLY PUT, FROM THE PERSPECTIVE OF THE LIFE CYCLE OF BIG DATA, THERE ARE NOTHING MORE THAN FOUR ASPECTS:

- BIG DATA COLLECTION.
- BIG DATA PREPROCESSING.
- BIG DATA STORAGE.
- BIG DATA ANALYSIS.

BIG DATA COLLECTION IS THE COLLECTION OF STRUCTURED AND UNSTRUCTURED MASSIVE DATA FROM VARIOUS SOURCES. BIG DATA PREPROCESSING REFERS TO A SERIES OF OPERATIONS SUCH AS 'CLEANING, FILLING, SMOOTHING, MERGING, NORMALIZATION, CONSISTENCY CHECK' AND OTHER OPERATIONS ON THE COLLECTED RAW DATA BEFORE DATA ANALYSIS, IN ORDER TO IMPROVE THE DATA QUALITY LAYS THE FOUNDATION FOR LATER ANALYSIS WORK. DATA PREPROCESSING MAINLY INCLUDES FOUR PARTS: BIG DATA STORAGE REFERS TO THE PROCESS OF USING MEMORY TO STORE THE COLLECTED DATA IN THE FORM OF A DATABASE IN THREE TYPICAL ROUTES: FROM VISUAL ANALYSIS, DATA MINING ALGORITHMS, PREDICTIVE ANALYSIS, SEMANTIC ENGINE, DATA QUALITY MANAGEMENT, ETC., THE PROCESS OF EXTRACTING, REFINING AND ANALYZING THE CHAOTIC DATA.

## FEEDFORWARD NEURAL NETWORK

- THE SIMPLEST KIND OF FEEDFORWARD NEURAL NETWORK (FFNN) IS A LINEAR NETWORK, WHICH CONSISTS OF A SINGLE LAYER OF OUTPUT NODES. THE INPUTS ARE FEED FORWARD TO THE OUTPUTS VIA A SERIES OF WEIGHTS.
- THE SUM OF THE PRODUCTS OF THE WEIGHTS AND THE INPUTS IS CALCULATED AT EACH NODE. THE MEAN SQUARED ERROR BETWEEN THESE CALCULATED OUTPUTS AND THE GIVEN TARGET VALUES ARE MINIMIZED BY CREATING AN ADJUSTMENT OF THE WEIGHTS. THIS TECHNIQUE HAS BEEN KNOWN FOR OVER TWO CENTURIES AS THE METHOD OF LEAST SQUARES OR LINEAR REGRESSION.
- NEURAL NETWORKS ARE TYPICALLY TRAINED THROUGH EMPIRICAL RISK MINIMIZATION. THIS METHOD IS BASED ON THE IDEA OF OPTIMIZING THE NETWORK'S PARAMETERS TO MINIMIZE THE DIFFERENCE, OR EMPIRICAL RISK, BETWEEN THE PREDICTED OUTPUT AND THE ACTUAL TARGET VALUES IN A GIVEN DATASET.

### Q1: Q2 TIME

1. WHICH COMPANY DEVELOPED THE WIDELY USED OPEN-SOURCE OPERATING SYSTEM "LINUX"?
2. WHICH POPULAR VERSION CONTROL SYSTEM IS WIDELY USED IN SOFTWARE DEVELOPMENT FOR TRACKING CHANGES IN SOURCE CODE?
3. WHICH TOOL IS COMMONLY USED TO DESCRIBE THE PRACTICE OF DISGUISSING ONLINE IDENTITY OR PERSONAL INFORMATION?

ANSWER: 1. LINUS TORVALDS  
2. GIT  
3. PROXY