Research Proposal

Artificial Intelligence has become the backbone of almost every domain of science and engineering. Machine learning, the branch of AI adopts probabilistic and statistical methods to learn from the past experience based upon the experimental output data set and detect the possible solution. In this proposal various machine learning algorithm used so far for the prediction of various problems such as optimization of process parameters, ranking of materials, validation of sisal/redmud fiber reinforced polyester composites. The process of design and optimization of the sisal/redmud fibre reinforcement in polymer composites with distinguished properties has been redefined by the machine learning approach. This proposal also highlights the role of machine learning algorithm, solution techniques and their data bases used in the different stages starting from the selection of raw materials to the end user application for the sisal/redmud fiber reinforced polymer composites. This proposal also supports readers to understand the future course of action to implement for the development of new product generation in an industry. At the end, a comparison has been made to understand the functionality of machine learning with respective to other technical tools used in the real-world problem.

Machine learning is a subset of artificial intelligence (AI) that allows computers to learn and build experience without being explicitly programmed. Machine learning is concerned with computer programmes that access and use data for themselves. The learning process begins with feedback or knowledge, followed by examples, practical experience, or direction to search for trends in data and, based on the examples, make informed judgements in the future. The basic goal of machine learning is to enable computers to automatically learn and adapt behaviours without the need for human involvement or support. Machine learning can be used to any domain where the relationship between input and output is dependent. Machine learning algorithms learn from data. It is consequently critical to select and prepare the appropriate data.

OBJECTIVES OF THE WORK

- To fabricate composite material with polyester as matrix and redmud as
- Reinforcement materials by using compression moulding technique.
- To study the characteristics of Mechanical Behaviour composites with the Artificial Neural Network (ANN), Response Surface Methodology (RSM)
- To do the erosion studies on the fabricated sisal/redmud composites composites with the Artificial Neural Network (ANN), Response Surface Methodology (RSM)
- To study the Interfacial And tensile Properties on the fabricated sisal/redmud composites composites with the Artificial Neural Network (ANN), Response Surface Methodology (RSM)
- To study the Morphological Analysis of the sisal/redmud composites failure mechanism.

Methodology

Polymer Composites	Properties	Optimization Techniques	Input Parameter	Output Parameter
Sisal fiber Polymer Composites	Mechanical Behaviour	Artificial Neural Network (ANN), Response Surface Methodology (RSM)	Ply fiber orientation	Displacement, Stress
Sisal fiber Polymer Composites	Erosion Behaviour	Artificial Neural Network (ANN), Response Surface Methodology (RSM)	Impact Angle, Erodent Discharge, Erodent velocity, Time	Erosion rate
Sisal fiber/ Redmud filled Polymer Composites	Mechanical Behaviour	Artificial Neural Network (ANN), Response Surface Methodology (RSM	Ply fiber orientation	Displacement, Stress
Sisal fiber/ Redmud filled Polymer Composites	Erosion Behaviour	Artificial Neural Network (ANN), Response Surface Methodology (RSM)	Impact Angle, Erodent Discharge, Erodent velocity, Time	Erosion rate
Sisal fiber/ Redmud filled	Interfacial And tensile	Deep Neural Network (DNN)	Layer Hybridization	Tensile strength, Tensile modulus;

Polymer Composites	Properties	Oppositional based Fire-Fly Optimization		tensile failure strain and shear strength

WORK PLAN

Description	SEM 1 (Jan-June 2024)	SEM 2 (Jul-Dec 2024)	SEM 3 (Jan-June 2025)	SEM 4 (Jul-Dec 2025)	SEM 5 (Jan-June 2026)	SEM 6 (July-Dec2026)
Course Work (4 Papers)						
Proposed Methodology						
Literature Review						
Experimental Works						
Testing and Analysis						
Publications and Conferences						
Report generation for testing and analysis						
Synopsis Preparation						
Thesis Writing						