iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 **Issue:** XII **Month of publication:** December 2025

DOI: https://doi.org/10.22214/ijraset.2025.75936

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue XII Dec 2025- Available at www.ijraset.com

Exploring Personalized Learning Systems

Madhuri Manohar Barhate, Anoushka Sharma, Anshul Meshram, Tanish Angadi, Anshul B. Wankhede, Aniket Patil, Anup M. Dubey
Department of Engineering, Sciences and Humanities (DESH), Vishwakarma Institute of Technology, Pune, Maharashtra, India

Abstract: ***Personalized Learning System (PLS) is a new innovative curriculum reform system ready to integrate AI into the teaching-learning processes for engaging educational content. Traditional teaching-learning processes tend not to accommodate diverse learning techniques varying in pace and preferences; hence students tend to suffer from lethargy and poor retention. PLS resolves these challenges by changing learning material, giving real-time feedback, and providing intelligent assessment mechanisms.***
This paper will explore the methodologies and technologies behind the personalized learning system. The study also looks into a comparative assessment of personalized learning with traditional methods, which proves to be better in student engagement, retention, and student course completion rates. One way of centering the educational process around the learner could, probably, change the face of education in our world; hence, making it far more effective, accessible, and engaging for learners everywhere.
Keywords: accommodate, effective, innovative, methodologies retention,

I. INTRODUCTION

The rising demands for personalized education have exposed the cracks of conventional teaching methods in providing for the diverse needs of students. Personalized Learning Systems (PLS) provide a very adaptive approach whereby educational content is individually tailored to each student according to needs, engagement level, and performance metrics. Such systems harness the capabilities of AI and ML to automate content modification and improve the personalization and interactivity of the learning experience.
PLS contains certain features, including real-time quiz, interaction content suggestions, and progress tracking, enabling students to learn at their own pace.
The backend utilizes Django and PostgreSQL to manage the course content efficiently, while the recommendation system powered by AI integrates a customization process in a learner's journey. PLS is unlike other traditional learning environments because it is open and inclusive.
Together with this, PLS allows teachers to track their students' progress in terms of the classroom, which allows a teacher to adjust a lesson based on data within seconds.

II. LITERATURE REVIEW

A. Machine Learning in Personalized Learning Website by Mohammed Chatti

Using machine learning algorithms can help evaluate student's data and overall progress and actually edit the course structure for each student depending on their individual performance. These algorithms can actually predict a student's success and if not do positive reinforcement so that the student keeps studying.

B. Gamification by Falsk Raza

To get students to actually being excited and enthusiastic to study there is a need to innovate something new and this is where the gamification step comes is.
Every person is competitive in a game and if we gamify some options on the website that encourages more effective and less time-consuming studying. Features such as points, scoreboard, badges boost more attention and improves student's engagement level as well as motivates them to keep studying so that they get better.

©IJRASET: All Rights are Reserved

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue XII Dec 2025- Available at www.ijraset.com

C. Cloud Based Studying by P.K Paul

Cloud computing is one of the most important factors in making online education more accessible, easy to use by everyone and bringing scalability in the education field. With the cloud tools, students and teachers can effectively share all types of work, any type of knowledge more easily and efficiently. All the personalized learning software's use cloud computing to store user data.

D. Language Processing Cristina Tabacuru:

Chatbots and virtual assistance software's will really help the student by giving her/him real time information about their progress. It will also allow the students to talk and interact with the chatbot through text inputs so that the chatbot answer their own question giving a more personalized feel to the software. Also, Ai generated summaries and facts will help make it simpler for the student to understand as well as giving them more understanding on the topic.

E. AI Problems in Education

There are some problems with Ai being implemented in education mostly it being focused on data privacy since a lot of data gets leaked and educational data is one of the biggest markets that companies require. If we want ethical Ai model being used in website transparency is a must as well as more knowledge on the Ai's decision making etc.

F. Blockchain

Blockchain is used to mostly authenticate and validate details and this will be implemented in student's login credentials as well as teacher's credentials. This stores all date about the student certificates and achievements and can also help validate that. It is very important as it ensures security of student and academic records.

G. Why is this Project Different and Unique?

Our project is different as it brings all the ideas together into one personalized learning system. This project combines assessments, AI based recommendations, progress tracking, dashboard, blockchain security into one single working platform. Hence this uses all technologies together in a better and more useful way which makes it different from any others so far.

III. METHODOLOGY

A. System Architecture

Frontend: HTML, CSS (User Interface)
Backend: Django (Content Management)
Database: PostgreSQL (User Progress Tracking)
AI Algorithm: Python-based Machine Learning

B. Personalization Algorithm

Content-Based Filtering: Adapts recommendations based on user preferences and engagement.
Collaborative Filtering: Suggests content based on other learners with similar learning patterns.
Adaptive Assessments: Dynamically adjusts quizzes based on student performance.
Real-time Feedback Mechanism: AI-driven feedback to help students understand their strengths and weaknesses.
Predictive Analytics: Uses past learning behaviors to suggest optimal learning paths for students.

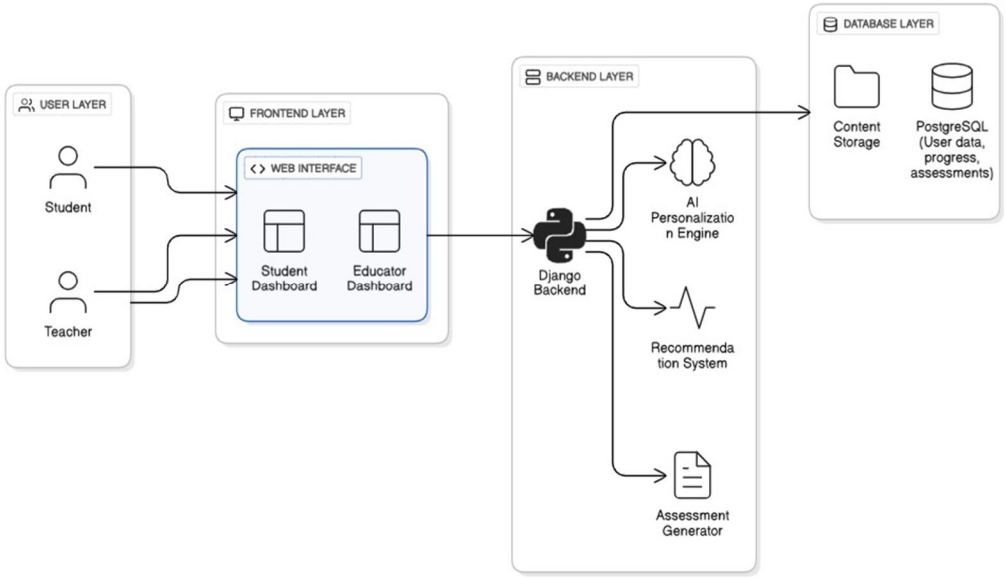
C. System Workflow

User Registration & Profile Creation - Learners register and input their preferences.
Content Delivery - AI recommends learning materials based on interactions.
Adaptive Assessments - The system generates quizzes to evaluate progress.
Performance Analysis & Feedback - Real-time monitoring of student engagement and comprehension.
Continuous Learning Optimization - The algorithm refines content delivery for an improved experience.
Educator Dashboard - Provides insights on student progress and learning effectiveness.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue XII Dec 2025- Available at www.ijraset.com

IV. ARCHITECTURE DIAGRAM



A. Explanation

It's divided into four parts as you can see the User layer, Frontend layer, Backend Layer and Database layer.
The user layer will be mainly responsible for 2 types of uses which are students and teachers.
Students will signup/login and use this platform for studying, attempting quizzes, doing assignments whereas the teacher will be monitoring the students progress through all this.
The student can also ask any doubts they could have through the doubt forum and the teacher or students will reply to them.
Now the Frontend layer is basically the part where the user interacts with the website the most.
The key features would include Student Dashboard and Teacher Dashboard. Frontend is built using basic Html, CSS.
The Backend layer is the most crucial part and the brain of the website.
This is where the AI recommendation and personalization engine works.
This engine analyzes the student's learning patterns by using AI recommendations and personalization engine. This was built using Django. This studies the student's performance and activity and accordingly suggests the right tasks and content for them.
The assessment generator is also a part of the backend and is used to create quizzes of various difficulty level according to the student.
The Database layer involves storing all the important data and information such as user accounts and passwords, quiz assessments, progress data and course data.
For this we are using PostgreSQL because it is very reliable and can handle a lot of data.
For example, whenever a student finishes a quiz, the results will be updated in the backend and the database so that the progress saved is always accurate and reliable.
Hence this architecture is proven to be very reliable offering users a stable working platform, UI/UX and helping protect their data so that every learner is getting a productive and worthwhile experience.

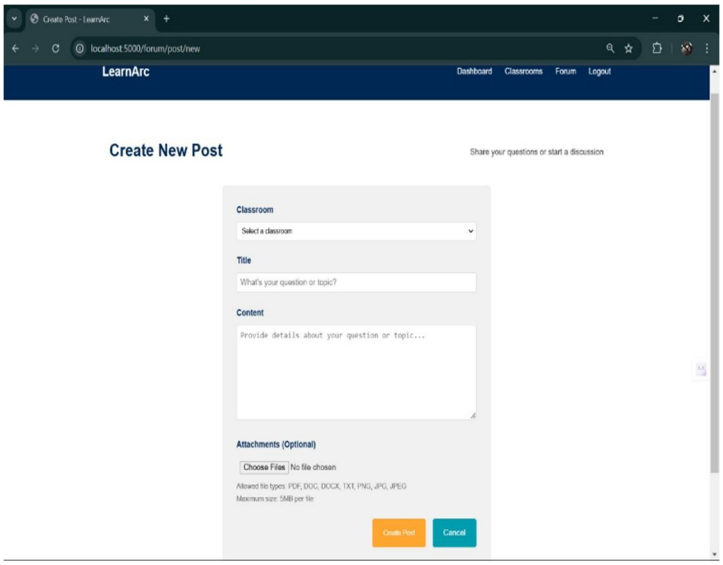
V. RESULTS AND DISCUSSIONS

This image is the first thing that will pop up once you open the page, it is the login section where the user can register or login. A student can login to check his/her assignments, progress results or to ask doubts. Whereas a teacher can also login to assign tasks and see what the students are doing.

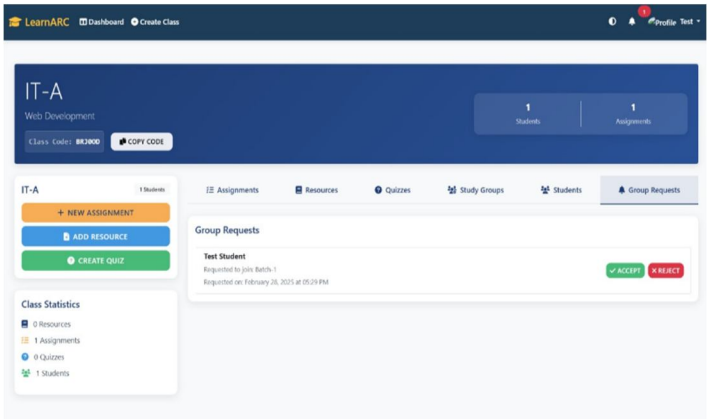
©IJRASET: All Rights are Reserved



The next picture is a create post page, where the teacher can assign a new classroom or post for students to join for submitting assignments, discussion forum or getting notes from the teachers etc.

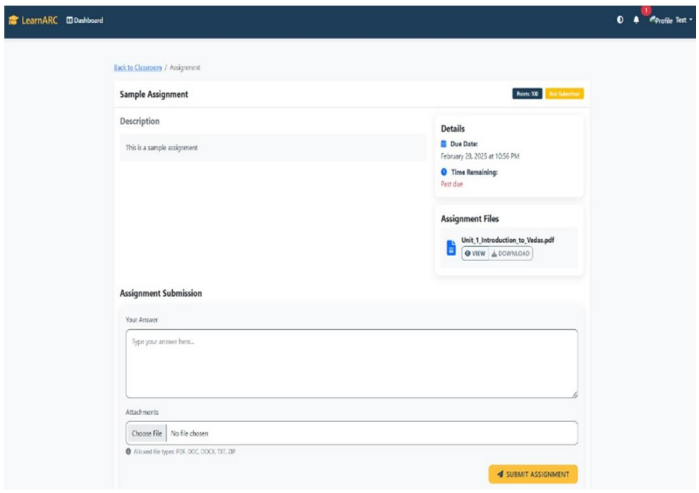


Now after the teacher logs in they have this dashboard where they can see any new notifications, how many studenst have joined the classroom. They can assign new assignments and add resources for the student to study from. They can also create quizzes. And from all of this they get to see the overall statistics of all the students.



©IJRASET: All Rights are Reserved

Now this is a sample assignment that the teacher could create. She would have to mentions details like when the assignment is due and what the details of the assignment would be and any resources that should be attached are. Its very easy for students to access and teachers also have an easier time navigating this.



VI. DISCUSSION

Personalized Learning System results will demonstrate that AI-based recommendations can really support the improvement of learning among students by implementing adaptive quizzes and tracking progress. Among the main things we have noticed, students tend to stay engaged for a longer period of time when the content shown actually matches their pace and understanding level.

Traditional classroom settings have students feel left behind or bored because everyone is taught the same material at the same speed.

Hence when the system reduces the lesson difficulty based on individual student or offers easier explanations at any lesson or point, students show more confidence and motivation to continue.

This is especially useful for learners who usually hesitate to ask doubts in front of others. When the quiz difficulty goes up or down according to student answers, it creates a more smooth learning path.

Beginners do not feel overwhelmed, while advanced students are not restricted by basic questions. This dynamic adjustment also makes it much easier for teachers to understand at what exact level a student is struggling. Instead of manually checking every student's paper, a teacher gets a clear summary of performance that allows him/her to decide whether to repeat a topic, simplify an explanation, or introduce more challenging tasks.

The dashboards also played a major role in enhancing the learning experience. The student dashboard visually indicated progress, thereby making learners more aware of strengths and weaknesses. Many students tend to underestimate or overestimate their performance, but seeing the real figures in graphs and percentage points made them realistic and focused. On the other hand, the educator dashboard was useful for teachers because it combined all data about student performance, quiz results, and activity levels in one place. This makes classroom management easier and more data-driven than based on mere guesses.

From a technical perspective, the system handled multiple users, stored data, and generated personalized suggestions without any issues. Even when several users interacted at the same time, it responded smoothly without noticeable delays. The AI recommendation engine was quite workable as well-it did not just present random content but actually chose chapters or questions that best fitted each student based on their recent activity. This, in turn, shows that in general, personalization techniques can be of value and make a difference without the need for exceedingly complex algorithms.

Despite some challenges, the general performance of the system illustrates that students feel better supported, teachers have more precise insights, and the whole learning process becomes smoother and better organized. Even such simple features as immediate feedback proved to make a difference due to the fact that learners were able to instantly correct their mistakes instead of waiting for its manual check. These small improvements put together create a more effective learning environment compared with traditional methods. In summary, results discussed above hint that the Personalized Learning System is working as it should and provides unquestionable benefits regarding engagement, understanding, and overall efficiency of learning in general. It will become even more powerful and reliable for everyday school and college use once enhanced with more accurate AI, a wider variety of content, and better analytics dashboard for daily use in schools and colleges.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue XII Dec 2025- Available at www.ijraset.com

VII. CONCLUSION

The emergence of PLS is a proof of how AI can assist in making the education sector better through offering custom learning alternatives to achieve utmost interaction and retention. PLS doesn't follow a generic education framework as most programs do, but instead, PLS evolves and becomes better at every learner based on how they grow and interact. With the use of AI based personalization techniques like content filtering, collaborative filtering, and adaptive testing, the system guarantees that every student is given material customized to their needs.

However, issues that are associated with the system, like any technology, do exist like security and bias concerns, scaling issues, and the staggering cost of development. With the promise of enhanced blockchain aided security for academic record falsification, and continued investments in AI adaptive learning models, blockchain technologies do have hope of helping solve such issues. Building the future of

PLS will also see further work on Natural Language Processing, cloud infrastructure, and videos to build an even more interactive learning experience.

Briefly, the Personalized Learning System integrates learning with technology to bridge the existing knowledge gaps by providing the learners with an intelligent, efficient, and adaptable learning framework.

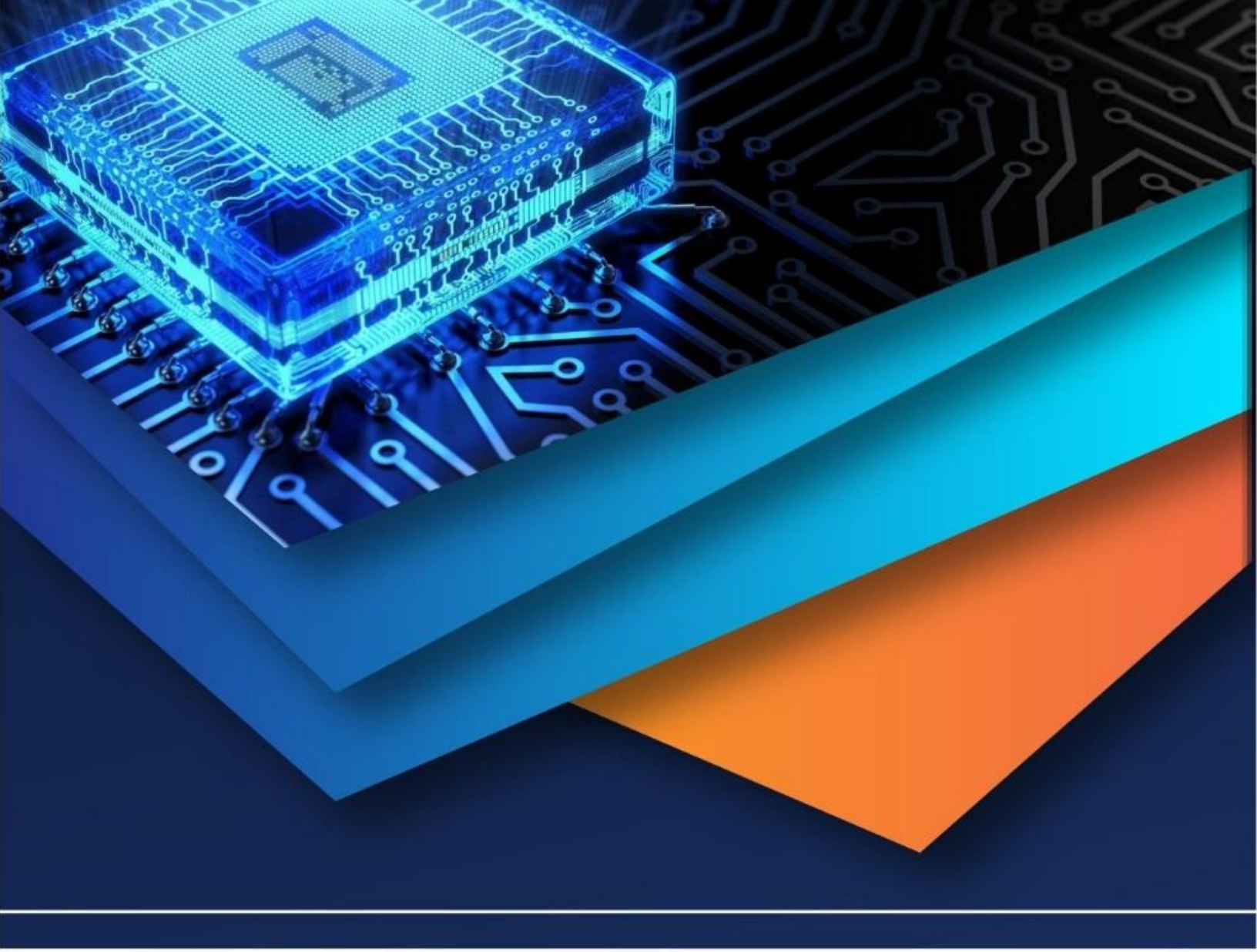
VIII. ACKNOWLEDGMENT

We are grateful that Vishwakarma Institute of Technolegy, Pune gave us the resources and infrastructure we required to complete the study. Without their assistance, this project would have been completely impossible to complete. We owe Prof. Madhuri Manohar Barhate a great deal for her consistent support throughout this attempt. Also we are very much thankful for the contribution of every individual to helped us in the development of this adaptive personalised learning platform. BY their constant support and help, motivated us to continue exploring about or project.

REFERENCES

[1] ResearchGate, "AI in Education: Personalized Learning and Adaptive Assessment," 2023.
[2] ResearchGate, "Machine Learning for Personalized Education," 2023.
[3] ResearchGate, "Gamification and Student Engagement in Adaptive Learning," 2022.
[4] ResearchGate, "Cloud Computing in Education: Future Trends," 2023.
[5] ResearchGate, "NLP-Based AI Tutors in Digital Education," 2023.
[6] ResearchGate, "Challenges in AI-Powered Personalized Learning," 2023.
[7] ResearchGate, "Blockchain for Academic Record Security," 2023.

©IJRASET: All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)