Department of CSE-IOT (Internet of Things)

Event: - Future Oriented Software testing through Automation and AI Integration

Date: 10-09-2025

Organized By: - Department of CSE-IOT Ramachandra college of Engineering

Venue: - Ramachandra college of Engineering Autonomous

Guest Lecture by: - MR.K.NANAJEE Automation testing Engineer Qualfon PVT LTD Guragon

Introduction — the New Era of Software Quality

"Quality at speed is the new normal."

- Traditional testing focused on defect detection.
- Modern testing focuses on defect prevention and continuous quality.
- With **DevOps**, **Agile**, and **continuous delivery**, testing must evolve faster than ever.
- **AI and automation** are now transforming testing into an intelligent, self-optimizing process.

Quote:

"In the future, testing won't just find bugs — it will predict them."

Evolution of Software Testing

Generation	Description	Tools/Approach
Manual Era	Testers executed test cases manually using requirement documents	Checklists, Excel sheets
Automation Era	Scripts automated repetitive tasks	Selenium, QTP, Junit
Continuous Era	Testing integrated into DevOps pipelines	Jenkins, GitHub Actions, CI/CD
AI-Driven Era	Testing uses ML & AI for intelligence	Testim, Mabl, Functionize, Copilot Test

Automation testing is the process of using tools, scripts, and frameworks to perform test cases automatically.

Key Advantages:

- Faster execution and early feedback
- Reduces human error
- Increases test coverage
- Enables continuous integration and delivery

Common Automation Tools:

- **Selenium, Playwright, Cypress** – Web UI
- **Junit, TESTING, PyTest** – Unit tests
- **Postman, Rest Assured** – API testing
- **JMeter, Load Runner** – Performance testing

AI Integration in Software Testing

What AI Brings to Testing?

Artificial Intelligence introduces **learning, adaptation, and prediction** to traditional automation.

AI Capability	Testing Application
Natural Language Processing (NLP)	Auto-generate test cases from requirements or user stories
Machine Learning (ML)	Predict defect-prone areas, flaky tests
Computer Vision	Visual testing & layout comparison
Generative AI	Create test scripts, data, and reports automatically
Reinforcement Learning	Optimizing test execution sequences

Practical AI Use-Cases

Test Case Generation

AI reads user stories or code comments and generates test cases automatically.

Example: ChatGPT or Copilotgenerating Selenium scripts.

Self-Healing Tests

If a webpage button ID changes, AI updates the locator automatically.

Example: Tools like **Testim** and **Mabl**.

Test Prioritization

ML predicts which test cases are more likely to fail → run them first.

Reduces CI execution time.

Defect Prediction

AI analyzes code churn, commit history, and previous bugs to find risky modules.

Visual & Accessibility Testing

AI compares screenshots pixel-by-pixel and highlights UI shifts.

Example: **Applitools Eyes**.

Automated Test Data Generation

AI produces realistic synthetic data without using real customer information

Future-Oriented Testing Approaches

Predictive and Preventive Testing

- AI predicts where defects are likely to occur *before* execution.
- Integrates analytics with development metrics.

Continuous & Autonomous Testing

- Tests triggered automatically on every commit.
- AI agents decide what to test, when, and how.

Shift-Left & Shift-Right Testing

- **Shift-Left:** Early testing during design & coding using static analysis.
- **Shift-Right:** Testing in production using observability, monitoring, and chaos testing.

Intelligent Test Orchestration

- Coordinating multiple AI models to run, heal, and triage tests automatically.

Synthetic Data and Privacy-Aware Testing

- Replace sensitive data with synthetic data for safe testing environments.

Agentic AI Testing (2025+ Trend)

- Autonomous agents can test, analyze logs, file bug reports, and even suggest fixes.

Real-World Industry Applications

- **Microsoft & Google** use ML to detect flaky tests in CI pipelines.

- **Netflix** uses chaos testing and AI for resilience validation.

- **Amazon** applies ML to monitor production logs and trigger regression suites automatically.

- **Start-ups** use ChatGPT-based bots to generate and maintain automation scripts.

The Road Ahead

- Testing 2030 Vision:
- Autonomous AI agents validating apps end-to-end.
- 100% test coverage via self-learning algorithms.
- Test results used for predictive maintenance of software.
- Test environments as digital twins of real systems.
- AI co-pilots assisting QA engineers daily.

Conclusion

- Future-oriented testing is not about replacing humans — it's about augmenting intelligence.
- Automation ensures speed and consistency.
- AI ensures adaptability and prediction.
- Together, they create a continuous quality ecosystem — a must for next-generation software.

HoD   **Dean-Academic**   **Principal**