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TOC - CCA 1 SYNOPSIS

Project Title : VEHICLE NUMBER PLATE VALIDATOR USING REGULAR EXPRESSIONS AND DFA

Submitted By

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1. Overview

A Vehicle Number Plate Validator is used to check whether a given vehicle registration number follows the correct official formatting. In India, vehicle numbers follow a structured pattern containing the State Code, District Code, Series Code, and Vehicle Number.

This project uses Regular Expressions (RE) and Deterministic Finite Automata (DFA) to validate vehicle number plate formats. The system ensures that only correctly structured registration numbers are accepted, while incorrectly formatted inputs are rejected.

2. Problem Statement

To design a system that accepts a vehicle number as input and verifies whether the number complies with the Indian vehicle registration format using Regular Expressions and DFA.

3. Indian Number Plate Format

State Code (2 Letters) District Code (2 Digits) Series Code (1–2 Letters) Vehicle Number (4 Digits)

Example

KA05MH2456

4. Regular Expression Used

[A-Z]{2}[0-9]{2}[A-Z]{1,2}[0-9]{4}

[A-Z]{2} → State Code (two uppercase letters)

[0-9]{2} → District Code (two digits)

[A-Z]{1,2} → Series Code (one or two uppercase letters)

[0-9]{4} → Vehicle Number (four digits)

5. DFA Representation (Text Description)

We design the DFA with states representing each expected part of the vehicle number

State Meaning

q0	Start (expecting first letter)
q1	1st letter matched
q2	2nd letter matched
q3	1st digit matched
q4	2nd digit matched
q5	1st series letter matched
q6	Optional 2nd series letter matched or move directly
q7	1st vehicle digit matched
q8	2nd vehicle digit matched
q9	3rd vehicle digit matched
q10	4th vehicle digit matched → Final Accept State

6. Objective

To validate vehicle number plate format using Regular Expressions.

To represent the validation logic using Deterministic Finite Automata (DFA).

To understand real-world application of Formal Language Theory.

To enhance practical knowledge of pattern-based input validation.

7. Expected Outcome

Valid vehicle numbers will be accepted.

Incorrect vehicle numbers will be rejected.

Students will understand how RE and DFA work in real systems like

Toll gates

Traffic surveillance cameras

Smart parking systems

8. Conclusion

This project proves how theoretical concepts from the Theory of Computation such as Regular Expressions and DFA are directly applied in real-world verification systems. The Vehicle Number Plate Validator bridges classroom theory with practical automated validation scenarios.

9. References

1. John E. Hopcroft, Rajeev Motwani, Jeffrey Ullman — Introduction to Automata Theory, Languages and Computation
2. Ministry of Road Transport and Highways – Vehicle Registration Rules
3. Online Regular Expression and DFA learning resources