

# SPARK PLUG FAULT RECOGNITION USING CLASSIFICATION METHOD IN A SPARK IGNITION ENGINE

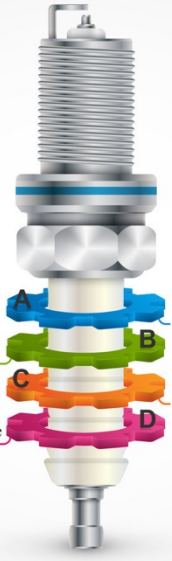
INVENTOR: AZRIN ABDUL AZIZ  
FACULTY: FTKMA  
UNIVERSITY: UMP  
EMAIL: azrynabdulazyz@gmail.com  
CO-INVENTORS: TS. DR. MUHAMMAD YUSRI BIN ISMAIL



## Background

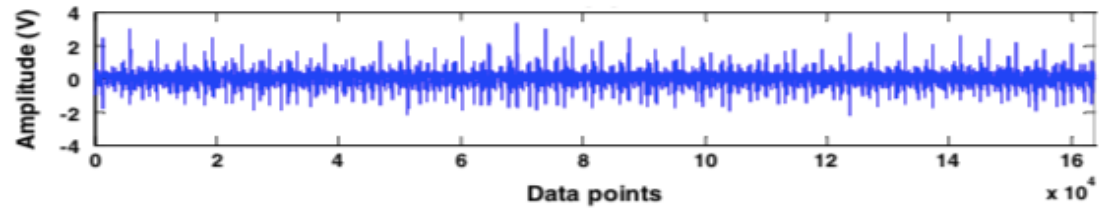
Did you know? When spark plug misfire, fuel economy can lessen by 30%. Spark plug maintenance and fault recognition is vital for spark ignition engine.

Increasing population leads to increase of registered vehicle while most users still have limited information to indicate signs of faulty spark plug. If not replaced, deteriorating spark plugs may lead to engine breakdown.



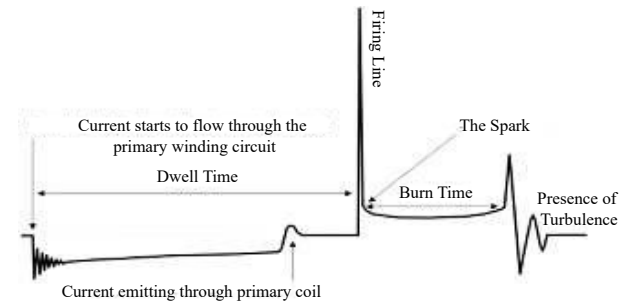
**Objectives:**  
Investigate spark plug health based on breakdown voltage signal.  
Classify spark plug status based on classification method.  
Evaluate reliability of spark plug profile based on WPS.

**Scope:**  
Engine type: 2-Stroke  
Engine runtime: 100 hours  
Python ver: v3.9  
ML type: Classification  
Image processing: Wavelet Power Spectrum

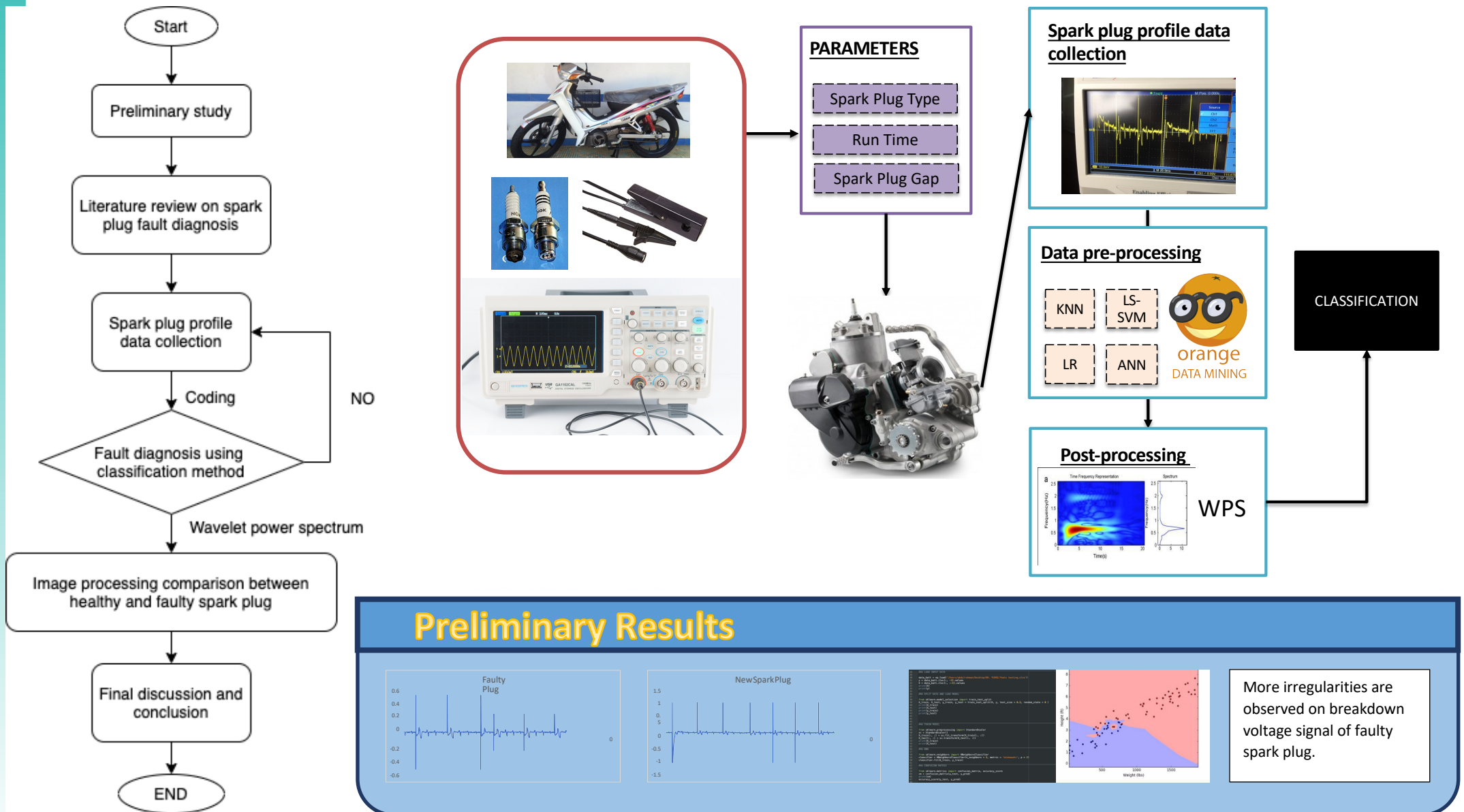


Spark plugs usually require voltage of 12,000–25,000 volts or more to 'fire' properly, although it can go up to 45,000 volts

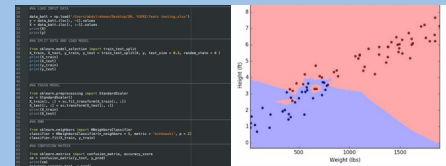
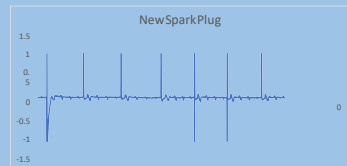
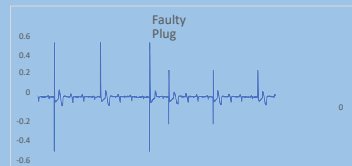
During breakdown phase, a self-created space charge is concentrated in a narrow between the electrodes wherein a partial volume has higher conductivity allowing for a higher current flux to be carried out.



## Methodology



## Preliminary Results



More irregularities are observed on breakdown voltage signal of faulty spark plug.

## Conclusion

- The best way to know if spark plugs need to be replaced is to inspect them.
- Fault recognition by classification method can reveal what is going on under the hood.
- The studied parameters are 1) Spark plug type, 2) Spark plug gap, 3) Engine runtime

### Future Work

- Classification method will improve resulting a more precise prediction of spark plug fault recognition
- Further improvement of image processing analysis to identify types of spark plug faults.

