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SIGNAL ACQUISITION APPROACH USING GAS PRESSURE SENSOR FOR SPARK IGNITION ENGINE BEHAVIOUR

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ABSTRACT
In general, an engine is made up by the mechanism of converting any reliable energy into another form of energy sequential, repetition and efficient to run the engine. In research perspective, a study on an engine combustion is needed to improve its efficiency and performance. As the engine behave differently at different speed, a study about this condition is very important to detect engine misfire and compensate to increase its efficiency and performance. Oxygen sensor could be used to detect this condition. Nevertheless, pressure sensor is used to analyst pressure profile inside exhaust manifold in order to identify appropriate location for oxygen sensor installation. In this study, the experiments will be held to acquire pressure response signal from the engine. Conditions has been set in order to achieve its objective which will starting by collecting data signal of running engine at certain condition when the sensor is placed along the exhaust manifold. Signal response of the gas pressure of four stroke engine is observed through the signal response of exhaust gas pressure. The pressure profile in terms of voltage signal from the sensor along the exhaust pipe could be seen. It is started by connecting the sensors to the exhaust and to the oscilloscope. Then, oscilloscope will catch the signal response and transfer it to the computer for signal conditioning. This study can be verified by both experiment and using simple computational fluid dynamic simulation. Finally, a conclusion could be made based on these outcomes, a place to install the oxygen sensor can be suggested to prove the outcomes that can be used in engine misfire detection.

Keywords: Pressure Sensor, Pressure Profile, CFD, Discrete Signal Processing.

Figure 1. Pressure Sensor location as red circle and sequence number
### Table 1. Maximum pressure signal for engine run

<table>
<thead>
<tr>
<th>Location</th>
<th>Condition 1: Idle 1300 RPM</th>
<th>Condition 2: 1800 RPM</th>
<th>Condition 3: 2300 RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.3899</td>
<td>0.3995</td>
<td>0.3996</td>
</tr>
<tr>
<td>2</td>
<td>0.4153</td>
<td>0.3736</td>
<td>0.4020</td>
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<tr>
<td>3</td>
<td>0.4357</td>
<td>0.3908</td>
<td>0.4068</td>
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<tr>
<td>4</td>
<td>0.4739</td>
<td>0.4355</td>
<td>0.3851</td>
</tr>
<tr>
<td>5</td>
<td>0.3970</td>
<td>0.4315</td>
<td>0.3884</td>
</tr>
</tbody>
</table>

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