# DEVELOPMENT OF TIRE STRAIN MEASUREMENT SENSOR

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This research investigates engineering of a tyre strain measurement sensor using elastomer based conductive polymer. This sensor allows monitoring the changes in vehicle tyre strain in real time. This information can be interpreted in terms of tyre performance relevant to driving safety, fuel economy and passenger comfort. An elastomeric sensor was proposed to cope with the relatively high strains expected together with the requirement to withstand a large number of flexing cycles. A Styrene butadiene rubber compound was used with conductive carbon black added to a sufficient quantity to overcome the percolation threshold of the compound. Over 10% of conductive carbon black was used in creating the compound and it was tested on a special rig to ascertain adequate response of electrical conductivity change with respect to the applied strain. According to the results most suitable range of strain was selected and a mould for the sensor was designed with sufficient dimensions to compensate for the difference in optimum strain range of the compound against the expected strain range of the tyre. The threshold concentration was chosen for the development of the sensing part due to its high sensitivity to strain. The sensor is to be applied between inner surface of the thread and wall of the vehicle tyre. Sensor part will be stretched or relaxed when deformations occur on the tyre. A circuit is designed to detect changes in resistivity within the sensing part, which directly correlates with the strain experienced by the vehicle tyre. By measuring these resistances, real-time road conditions can be determined. Based on these conditions, the driver will receive appropriate safety warnings.

**Keywords:** Elastomeric Sensor, Strain, Sensitivity