

MECHATRONICS BOOK SERIES SYSTEM DESIGN AND SIGNAL PROCESSING VOLUME 1

Editors

Asan G. A. Muthalif
Amir Akramin Shafie
Siti Fauziah Toha
Iskandar Al-Thani Mahmood



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CHAPTER 10

Design and Development of Intelligent Wiper for Vehicle Windshield: Electrical Designs

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10.1 Introduction

Windshield wipers are widely used in all kind of transports nowadays; from the cars, trains even the planes have the windshield wiper. But the windshield wipers used on these transports normally have three speeds control: slow, medium and fast. The speeds of the windshield wiper are fixed during manufacturing and the limited range of the speeds at most of the time cannot meet different raining conditions especially in the sub-tropical country where the rain can be really heavy.

For the system developed, the windshield wiper mechanism system is embedded with two types of sensors in order for the system to automatically start and adjust its speed and intermittent interval according to the amount of water drops on the windshield. The key element of the system is the sensor to measure the amount of water on windshield wiper. In most automatic wiper systems, an optical sensor is used for this purpose [1]. This type of sensor uses the fact that the refraction angle and the amount of reflection of the light are different when the windshield is wet. The optical rain sensors have some disadvantages even though they are widely used. One of disadvantages is its sensitivity to external light. That is why many systems have a dark filter on the windshield surface where the sensor is attached in order to block the external light. Another shortfall is the sensing area which is relatively small area of windshield. This makes the system operates with limited information [2, 3]. The wiper system may fail to activate when there are some raindrops on the driver's line of sight, but not on the sensing area.

For the system developed, the conductive circuit is embedded on the windshield and functions to activate the system when the first rain drop is detected on the windshield. The speed of the wiper is controlled by the amount of water collected by a smart water collector. The smart water collector is used to measure the weight of the collected water and the information is used by the microcontroller to vary the wiper speed. The block diagram of the system is shown in Fig. 10.1 and the whole system setup is shown in Fig. 10.2.

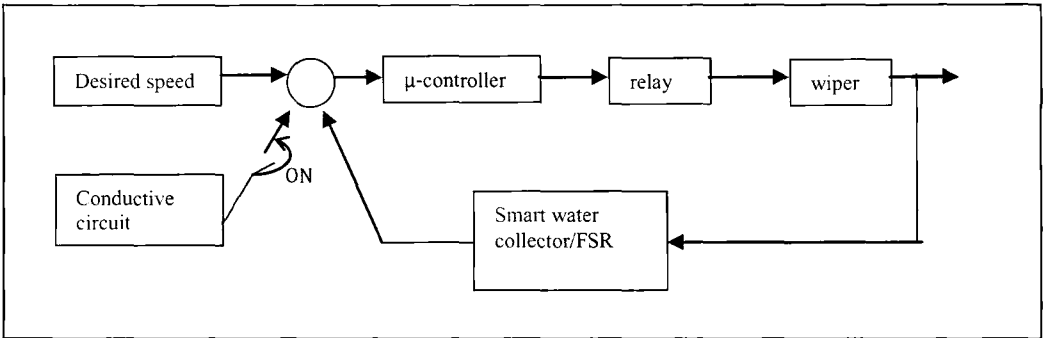


Figure 10.1: System block diagram