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Tesis

The Design of an Automatic Proportional Electronic Flow Control System for Applying Agricultural Pesticides

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The Design of an Automatic Proportional Electronic Flow Control System for Applying Agricultural Pesticides

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Abstract. The following research work is focused on the design of an electronic control system proportional to the height of the plants, for the optimization of pesticides used in the agricultural sector, in order to reduce the risk of human intoxication by direct contact, as well as reducing the imminent impact on the contamination of ecosystems due to the excessive use of agrochemicals for pest control thanks to the benefits it brings, which carry a series of risks if they are not properly managed. This device allows, through the use of infrared range sensors, to obtain individualized information on each plant or vegetables for fumigation according to their position and size within the fields, for its materialization the VDI 2206 design methodology was taken as a basis. As a result, a mechatronic spraying device was obtained with proportional control governed by an embedded system that processes information collected by proximity sensors, for the selective dosage requested by each plant. Concluding that proportional control is suitable for this remote system because it not only allows the farmer to remain isolated from pesticides, but also has a high response time ideal for the application of agrochemicals selectively.

Keywords: Spraying, electronic control, agrochemicals, flow, pesticides.

1 Introduction

The human being is exposed to different dangers, during the execution of their day-to-day tasks, one of these cases is that of farmers, who when cultivating and trying to protect their crops from pests, through of the use of agrochemicals and organophosphates [1], which according to the WHO are potentially causing acute or chronic toxic effects, and cause specific problems in the health of people [2]. The indiscriminate use of these pesticides can have serious consequences for the nervous, immune and reproductive systems, up to the point of causing cancer [3], and that these not only affect humans, but also animals [4][5]. In Peru, according to the Ministry of Health (MINSA), 82.1% of the cases of acute pesticide poisoning (IAP) are concentrated in six departments, among them Lima, Arequipa and Junín are regions with a higher number of reported by IAP in 2018 and 2019 [6].

In recent years, new contributions of technology have been developed in precision agriculture, in order to increase its production, as well as to safeguard the physical