

AUTOMATION OF A MOVABLE COVER ON A CEMENT PATIO

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Abstract

The project aims to automate the movable cover on a cement patio for coffee beans drying developed by EMBRAPA - Rondônia. The cover opens and closes automatically according to the weather, sunny or not. An Arduino as the physical programming platform, a rain sensor, a light sensor and a timer have been used for the automation. The automatic cover has improved the drying and it has enhanced the quality of the grains.

Key words:

Coffee drying, microcontroller, sensors

Introduction

According to the Ministry of Agriculture, Brazil is the world's largest producer and exporter of coffee besides being the second largest consumer. In order to keep these positions Embrapa has recommended to the growers a new technology for drying coffee beans. This technology is called Barge Coffee Dryer (BCD) and consists of a movable cover with a light metal structure which is easy to operate. This cover has been built in transparent tiles to allow the fruit during process, even when it is closed. For the optimization of the dry operation, the movable cover must remain open during sunny periods and closed during the night and periods of rain thus ensuring a homogeneous drying and higher grain quality.

The goal through this work was to develop an instrumentation and control of the BCD, so that it performs automatically. A microcontroller, a rain sensor, a light sensor and a programmed timer have been used by the microcontroller.

Results and Discussion

For automation, a box has been produced in order to store all the electrical and electronic parts internally making it easier to handle all the apparatus. Furthermore, openings have been made to fit the timer, sensors and horn which sounds every time the coffee barge opens or closes. Another resource the system has is the option of opening and closing the cover whenever necessary through the timer.

The hardest part of the Project was the communication among the sensors, the timer and the microcontroller which had to be thoroughly analyzed for the effective functioning of the programming along with the electronics.

The automated system was installed in the experimental field of Embrapa Rondônia and has provided a faster drying compared to traditional systems such as cement or suspended patios. The grain quality was considered superior based on coffee sensory analysis. Moreover, the system provided a lower need for manpower and adds speed to the barge operation.

Picture 1 (A) shows a rain sensor (left) and a luminosity sensor (right) which have been installed on the barge while Picture 1 (B) shows the cement patio where the installation has been done, along with the automation box.

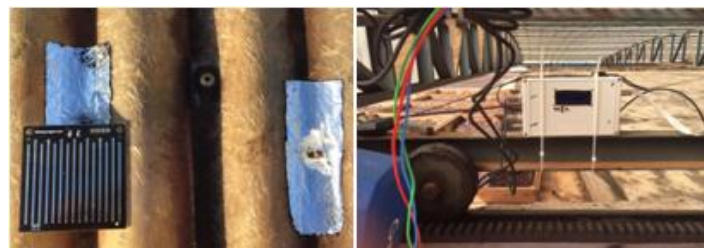


Image 1. (A) Sensors (B) Cement patio

Conclusions

The automation of the BCD has represented a huge improvement in this area since sensorial analysis have demonstrated an enhancement in the quality of the grains, as well as a reduction in the labor force and more efficiency in the barge operation.

This technology is bound to cause significant impact in Brazilian's economy by improving the coffee production and exportation, especially when the use of this apparatus is implemented in other states in Brazil.

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Ministério da Agricultura. Available in: <http://www.agricultura.gov.br/vegetal/culturas/cafe/saiba-mais>. Access on: July 20th, 2016.