



Title: Medical gas monitoring design applying image processing

Authors: CORDOVA-MANZO, Jesús Fausto, CORDOVA-ESCOBEDO, Jesús Fausto, MENDOZA-GONZÁLEZ, Felipe and LÓPEZ-LIÉVANO, Adolfo

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ECORFAN-México, S.C.
 143 – 50 Itzopan Street
 La Florida, Ecatepec Municipality
 Mexico State, 55120 Zipcode
 Phone: +52 1 55 6159 2296
 Skype: ecorfan-mexico.s.c.
 E-mail: contacto@ecorfan.org
 Facebook: ECORFAN-México S. C.
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Introduction

- The medical gas network is the fundamental facility for any health institution .
- the applications vary according to the guest being handled.
- the medical gas system participates in different units and departments of the hospital such as the intensive care unit, emergency room, operating rooms, among others.
- To ensure the correct supply and distribution of gases, certain basic elements must be considered in the installation of medical gases.
- **Manifold**
- System that allows the noninterrupt supply of a gas at constant pressure.





Methodology

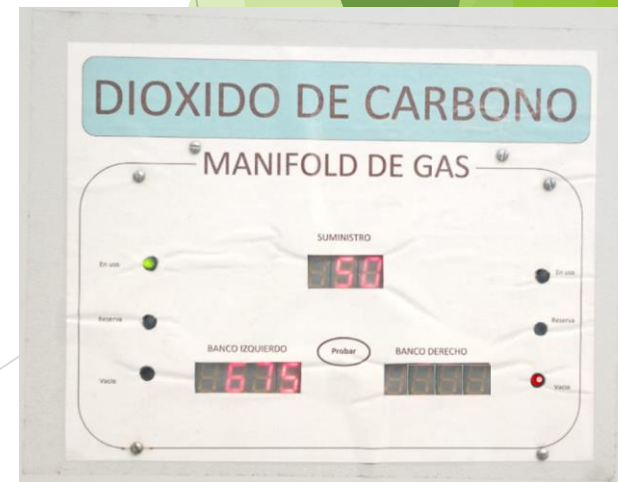
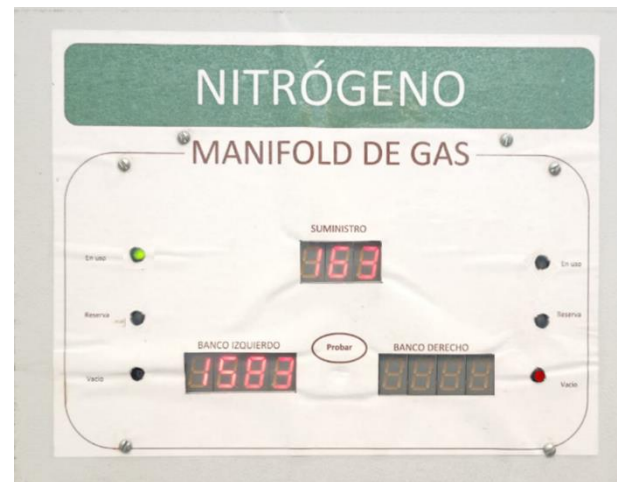
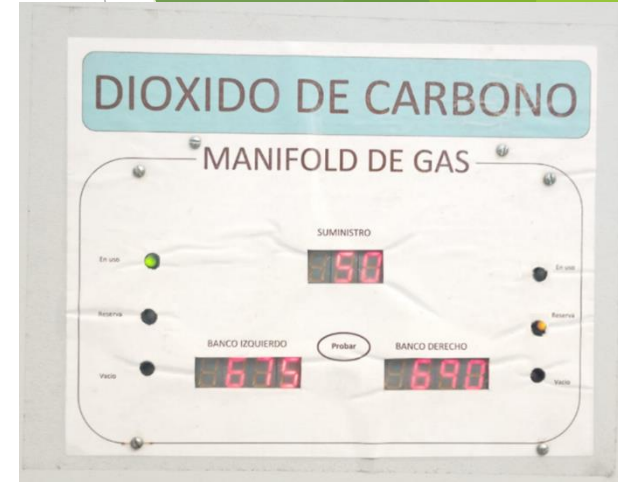
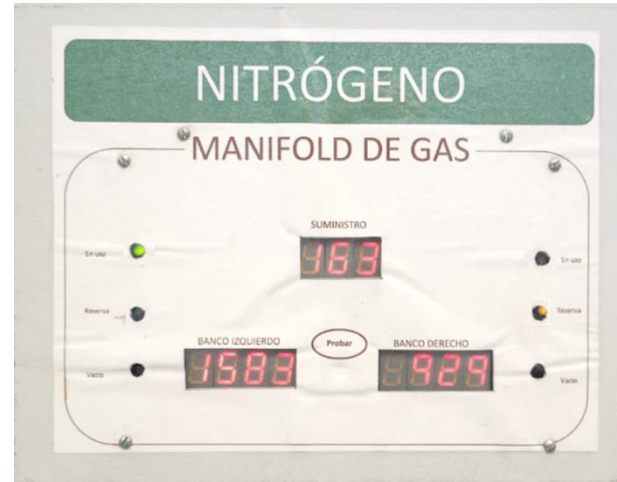
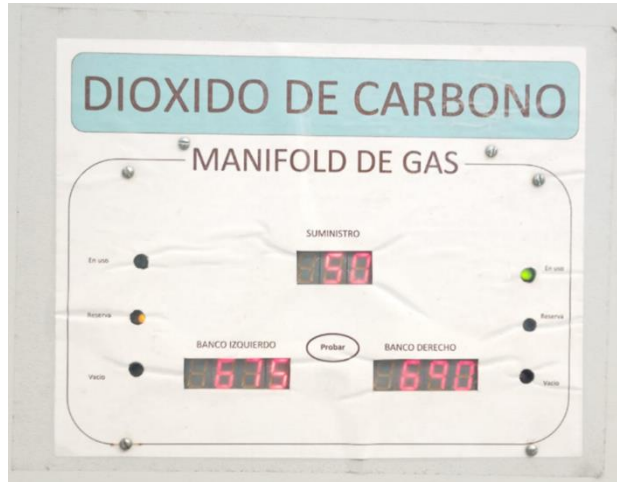
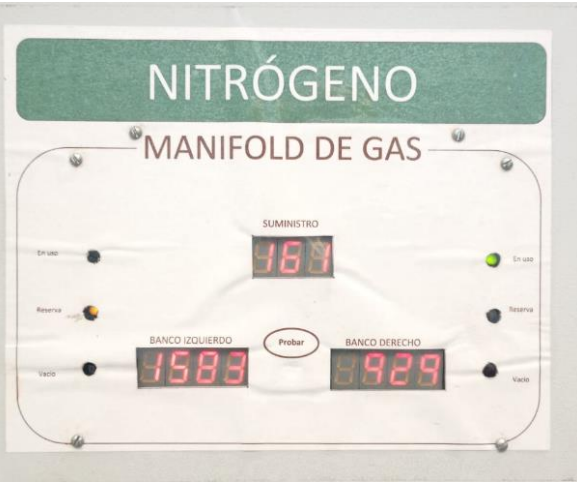
Phase 1.- Database of photographs of the indicator panel of the automatic manifold.

Phase 2.- Image processing for detection of leds indicators.

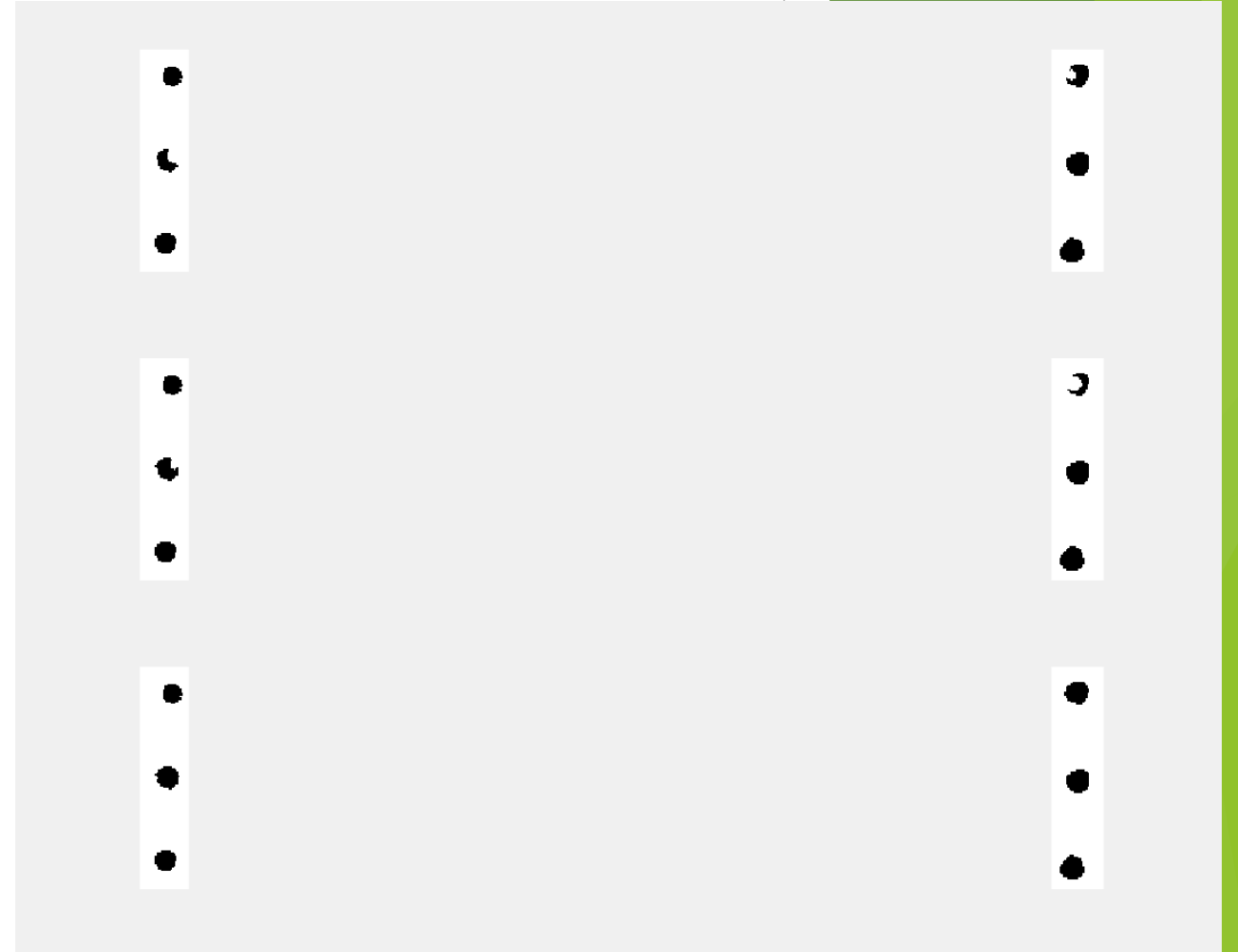
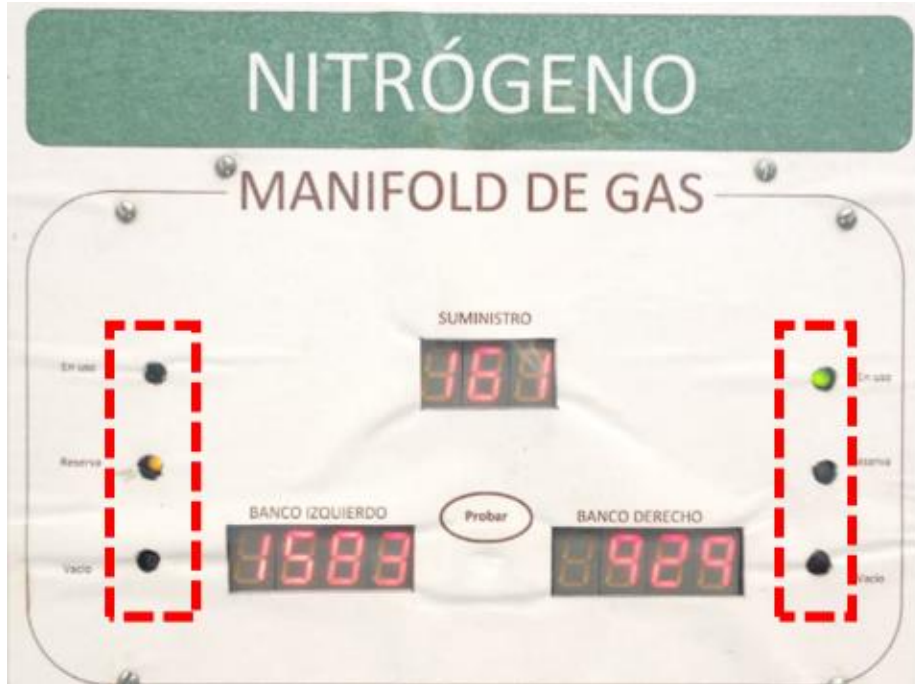
Phase 3.- Image processing to detect the color of leds indicators.

Phase 4.- Notification.

Phase 1.- Database of photographs of the indicator panel of the automatic manifold.

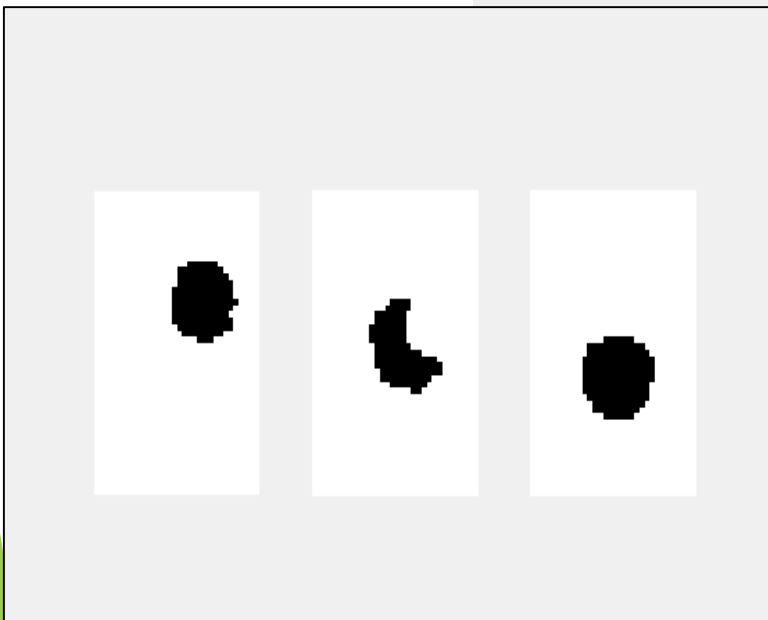
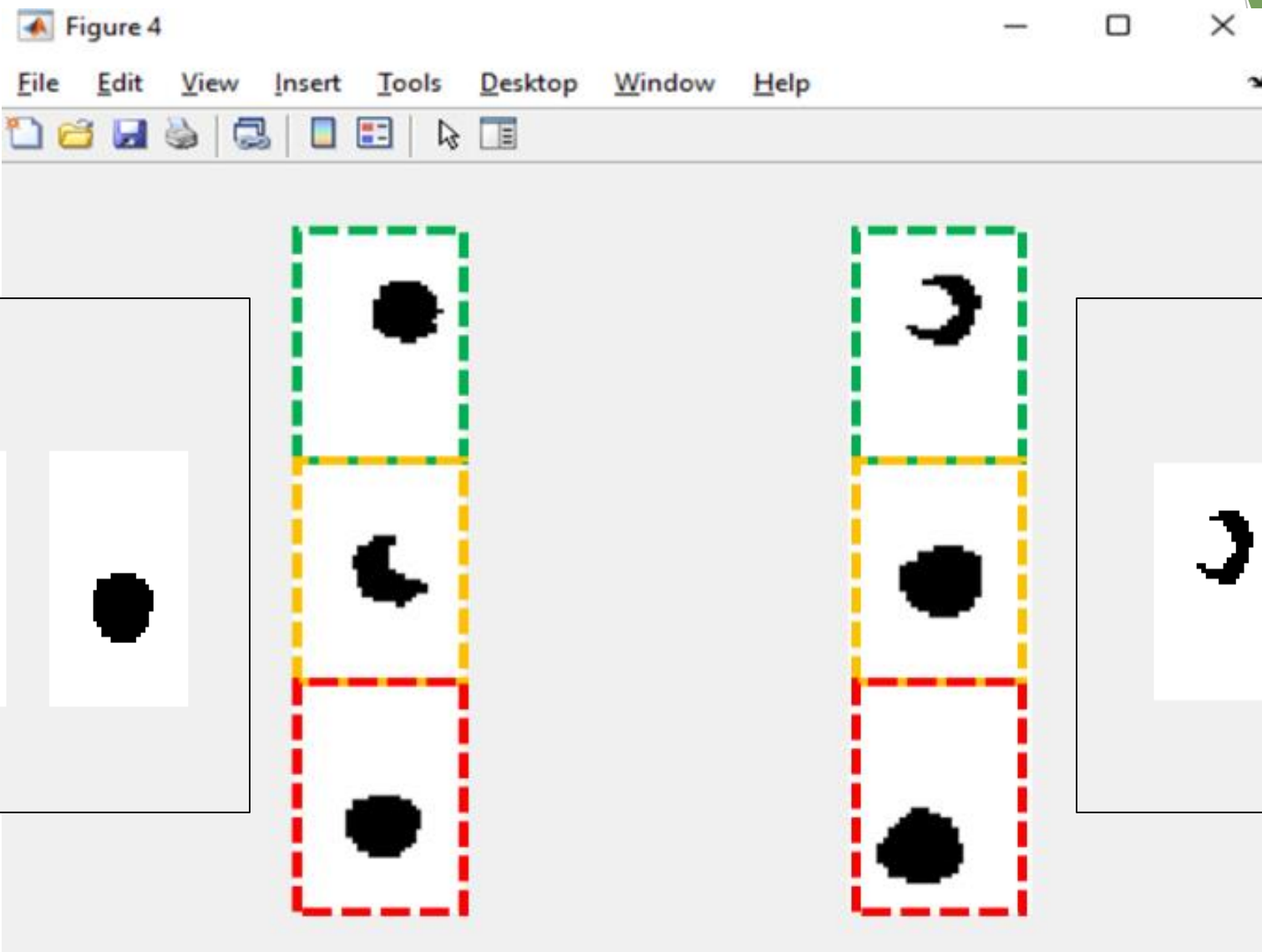


Phase 2.- Image processing for detection of leds indicators.



Phase 3.- Image processing to detect the color of leds indicators.





Results

Table 1. Results of the processing of the images of the automatic nitrogen manifold.

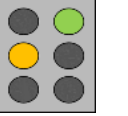
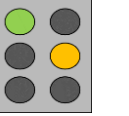
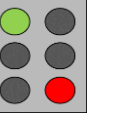
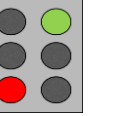
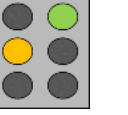
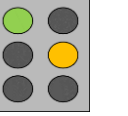
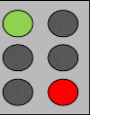
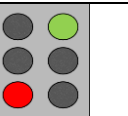
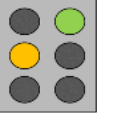
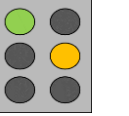
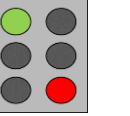
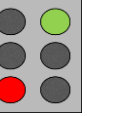
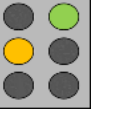
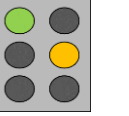
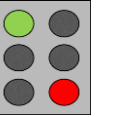
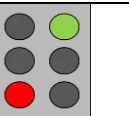
Real \ Obtained	 R.: Use L.: Reserve	 R.: Reserve L.: Use	 R.: Empty L.: Use	 R.: Use L.: Empty
 R.: Use L.: Reserve	10	0	0	0
 R.: Reserve L.: Use	0	10	0	0
 R.: Empty L.: Use	0	0	10	0
 R.: Use L.: Empty	0	0	0	10

Table 2. Results of the processing of the images of the automatic carbon dioxide manifold.

Real \ Obtained	 R.: Use L.: Reserve	 R.: Reserve L.: Use	 R.: Empty L.: Use	 R.: Use L.: Empty
 R.: Use L.: Reserve	10	0	0	0
 R.: Reserve L.: Use	0	10	0	0
 R.: Empty L.: Use	0	0	10	0
 R.: Use L.: Empty	0	0	0	10

Conclusions

As future work, the lighting of the environment should be considered, since at the time of binarizing, it is possible that the background is not white and may turn black if the images are captured at night.

An improvement that could be implemented consists of segmenting the LEDs to check their color and ignore external factors such as lighting depending on whether it is day or night.

It is possible to add another kind of alarm apart from playing audio on the PC. One of the most practical and feasible possibilities is to send an email to the department in charge of supplying medical gases (usually Maintenance) notifying them that one of the manifold intake tanks is empty.

The implementation of this proposal solves the cumbersome task of constantly going to check the status of the tanks, saving time, personnel and resources in hospitals.

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