

# Descriptive Report

## Instrumentation and Data Acquisition

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The objective of this project was the development of a smart doorbell, seen in figures 1 and 2. It features a camera with facial recognition, a microphone to allow visitors to leave a voice message, a display where the owner can choose a message, and a speaker to play the ringtone.



Figure 1: Doorbell image

On the first page of our doorbell's interface (figure 3), the account username and password are verified, and it only allows proceeding to the next page if they match the owner's credentials. On this first page, it is also necessary to upload a photo of the person the owner wants the doorbell to recognize, with all others being marked as unknown.

After this verification, on the next page the user can access the doorbell settings (4). They can choose the desired ringtone from three available sounds and select the message they want to display (maximum 150 characters). If



Figure 2: Complete assembly image



Figure 3: Interface page 1

the message has up to 16 characters, it appears on the display's first line; if between 16 and 32 characters, it appears on both lines; and if more than 32 characters, it only appears on the top line with autoscroll activated. This data is transmitted between the Raspberry Pi and Arduino via Serial connection. On this second page, an email is also requested where the user wishes to receive doorbell notifications. To proceed to the next page, it verifies that all fields are filled and that the email matches

the desired format.

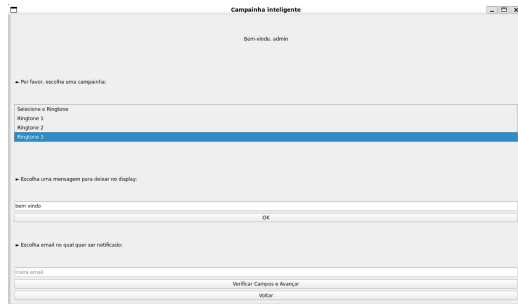


Figure 4: Interface page 2

On the third and final page (figure 5), the functionality to activate/deactivate the doorbell is presented. When deactivated, it works as a common doorbell, only making sound when the button is pressed. When activated, the first time the button is pressed, a photo is taken of the visitor(s) and facial recognition is performed. The owner receives an email with the photo showing the face(s) outlined by a square that has either "unknown" or the person's name (if it is the person from the uploaded photo) at its bottom edge (figures 6 and 7). On the third press, a message appears on the display warning that a voice recording will start if the visitor wants to leave a message for the owner, who will receive a new email with the recording. On the fifth press, the user receives an email warning about SPAM detection due to the high number of presses in a short time. This count resets every 5 minutes. This page also has a button for the owner to view a photo from the doorbell camera whenever desired. Finally, there is a button to send a test email, allowing the owner to verify they entered the correct email address (figure 8).

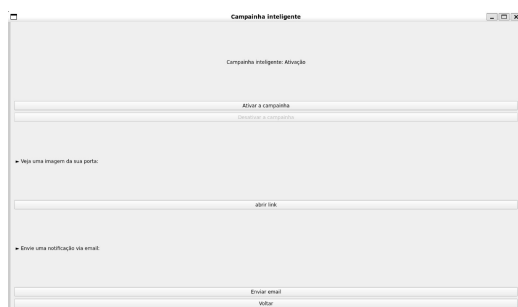


Figure 5: Interface page 3

New functionalities and improving the existing ones should be included in future work.

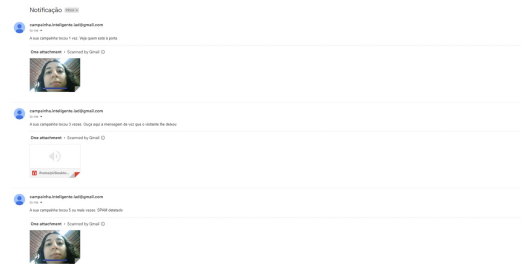


Figure 6: Emails received when the doorbell rings

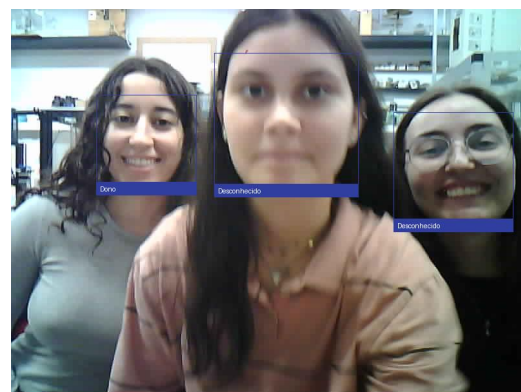


Figure 7: Photo showing facial recognition results. Three people were detected: the owner and two unknowns

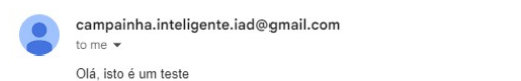


Figure 8: Test email received when clicking the "send email" button