Power Automation In A Classroom

SOFTWARE TEST DOCUMENT

Contents

1 Introduction

1.1 System Overview

In today's world, electricity plays a vital role and hence there's a necessity to find a way to save electricity in various places where its being used in abundance. People do not take this seriously and do not put in efforts in order to save electricity.Usage of electricity has been continually increasing and in most of the places its being wasted and hence we look forward to propose a way in which electricity can be saved at places where its being wasted. We here are considering an example of a classroom where electricity is essential. Due to the busy schedule in todays life, its often observed that people forget to switch off the lights and fans in a room which leads to an increment in the electricity bill. Over a number of years, many advancements have been made in order to automate the working of electrical appliances in a building. We propose a system in order to automate the electric appliances of a classroom in order to save electricity as much as possible. We look forward to make use of a combination of motion detection algorithms and face detection algorithms in order to automate the supply of electricity, i.e switch it off, in case no one is present in the room and switch it on in case of the presence of even one person in the room.
Module 1: Image Comparer: The reference image is compared with the image taken from the live feed.Similarity percentage is calculated using image processing.
Module 2: Face and Motion Detection: The Image processing algorithms are used to detect motion or Face in the Video.
Module 3: Hardware Component: Once the motion is detected the system connects with raspberry Pi and Relay circuit which controls the electrcity connection.

1.2 Test Approach

The system will require manual testing methods as it is an integration of both software and hardware. Each feature shall require manual testing one by one.

2   Test Plan

2.1   Features to be tested

Features to be tested are
The common features to be tested are

- Motion Detection

- Face Detection

- Accuracy of the Image comparing algorithm

- Proper switching of electricity by Rpi and Rc

Module 1:

- Image Comparing algorithm

- Tests for checking the efficiency of the image comparing algorithm.

Module 2:

- Tests for motion or face detection.

Module 3:

- Testing of hardware connection

- The systems connection with Raspberry Pi and Relay circuit is checked.

Module 4:

- presenting the Prototype.

3   Test Cases

3.1   Image Comparison

3.1.1   Purpose

To check how efficiently and accurately the algorithm works.

3.1.2   Inputs

1. Image 1

2. Image 2

3.1.3 Expected Outputs and Pass/Fail criteria

As inputs we will feed in various combination of similar and dissimilar images. 2 images whose similarity is already known will be entered in the system.If the similarity calculated will be approximately equal to the known similarity,the system will clear the test.

3.2   Motion And Face Detection

3.2.1   Purpose

To check if the system is able to detect any motion of face in the Video frames.

3.2.2   Inputs

1. A previously recorded video footage of the classroom.

3.2.3   Expected Outputs and Pass/Fail criteria

If the system is not able to detect a human face or any changes in the environment ,then it will be considered as a failure of the test.

3.3   Hardware Interface

3.3.1   Purpose

To check if the hardware functions as expected.

3.3.2   Inputs

1. A script will be executed which activates the Raspberry Pi

3.3.3   Expected Outputs and Pass/Fail criteria

On receiving the signal from the system,if the Raspberry Pi and Relay circuit switch on the electricity source then this test will be considered passed.

3.4   Test Cases

Table 1: Test Cases

Test ID	Test case	Input	Expected Output	Actual Output	Criteria
1.	Face Detection	Web camera feed	Detection of human faces in the room	Detection of human faces in the room	Pass
2.	Face Detection	Web camera feed	Detection of human faces in the range of 0-0.6 metre	Detection of human face	Pass
3.	Face Detection	Web camera feed	Detection of human faces above the range of 0.6 metre	Detection of human face	Fail
4.	Face Detection	Web camera feed	Detection of face in low light	Detection of human face	Pass
5.	Motion Detection	.png image	Conversion of RGB image to Grayscale Image	Image converted	Pass
6.	Motion Detection	.png image	Conversion of Grayscale image to Black and White image	Image Converted	Pass
7.	Motion Detection	Web camera feed	Capturing of frames every 20 seconds	Frame Captured every 1000ms	Pass
8.	Motion Detection	.png image	Image comparison between two black and white images (Reference image and frames captured later)	Frame Captured and comparision is done between two images	Pass

Table 2: Test Cases

Test ID	Test case	Input	Expected Output	Actual Output	Criteria
9.	Motion Detection	Web Camera feed	Capturing of images every 1000ms and analyzing the images captured every 30 ms later)	Frame captured and analysis is done of 30 images	Pass
10.	Motion Detection	.png image	Images are checked for motion and if over 15 images out of 30 cross the threshold power is supplied	Power is supplied if motion is present above a threshold for 15 images out of 30 images	Pass
11.	LED lights	Amount of motion	If the motion is above threshold the LED should turn ON in any case otherwise, the LED is OFF.	If the motion is above threshold the LED should turn ON in any case otherwise, the LED is OFF.	Pass