

Smart Sensors in Automatic Power On Off for Projector Based on User Monitoring Signals

Tuyen Nguyen Tai

Lab Center, Posts and Telecommunications Institute of Technology, VIETNAM

Abstract: This is a paper, the author presents the problem of sensors in intelligent supervising to enable automatic power on or off projector based on the MCU [1][2][6] users' signal monitoring device from individuals to make decisions on the Power On or Off instead of using a remote control and push the buttons on the current Projector. Research results are tested at the Lab Center of Posts and Telecommunications Institute of Technology, Vietnam [7].

Keywords: Intelligent Sensor, Sensor VGA, Sensor HDMI, Sensor Power, Smart Projector, PTIT.

I. INTRODUCTION

Currently, a projector is a device which is commonly used and familiar in schools, institutes, offices, conferences, seminars, etc., and used fixed or not fixed, depending on the purpose of the user. In school, most projectors hang up the ceiling of the class and a remote control must be used to turn on or off the projector. The use of remote control effectively have many shortcomings, to solve this problem the authors, who are lecturers of Posts and Telecommunications Institute of Technology bring forward the problem of sensors in intelligent supervising [6] to enable automatic power on or off projector based on the users' signal monitoring device from individuals to make decisions on the Power on or off instead of using a remote control and push the buttons on the current Projector and function keys on the projector in order to create the convenience for users, improve the lifespan of bulbs and power savings when not in use.

II. INTELLIGENT SENSOR FOR PROJECTOR

2.1 The idea of the problem

2.1.1 Automatic turn on/off projector when using and not using

When using: Users connect VGA / HDMI / LAN from personal devices to transmit signals to the projector as shown in Figure 1

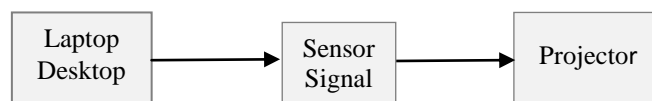


Figure 1. Coupling Laptop / Desktop with projector

When the signal sent to the projector (signal) is determined corresponding logic level 1 and no signal sent to the projector is determined to be a logic 0.

When determining the state of the logic level switching from 0 to 1, the decision is made to send the first signal with a width of 5ms to turn on the projector.

When determining the state of logic levels switching from 1 to 0, a decision is made to monitor the existence of logic level 0 in the range of τ with suitable width from 2000ms to 3000ms. If during this time there appears a logic 1 again, remove the existing monitoring logic level 0 and vice versa without appearing logic level 1, the decision is made to send the first signal with the width of 5ms to turn off the projector.

The maintenance of period of time determined at the level 1 at the entrance $\tau = R.C \cdot Un$ (With $Un =$ undefined threshold between logic state 0 and logic state 1).

2.2 Solving the problem

2.2.1 Connection of Laptop / Desktop with the projector in the problem of sensors in intelligent supervising to enable automatic power on or off the projector which is calculated for both transplant and built-in projectors as shown in Figure 2.

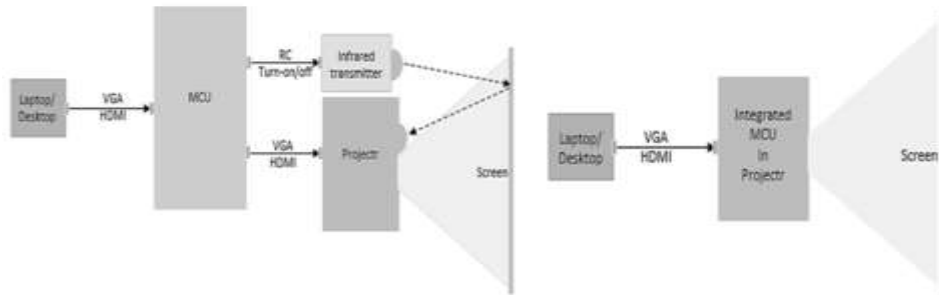


Figure 2: a. MCU is mounted outside b. MCU is integrated into projector

Figure 2a, the signal from the Laptop / Desktop will be coupled with sensors in intelligent supervising to enable automatic power on or off projector (MCU) prior to transplanted with a projector, MCU has two pairs of VGA / HDMI / LAN and a port LED emitting controlling infrared signals.

Figure 2b, the signal from the Laptop / Desktop will be coupled directly to the projector, the signal coupling port to VGA / HDMI / LAN projector will pair signals for the sensors in intelligent supervising to enable automatic power on or off the projector. This integration will use a 3.3v source of the projector and the control exit via OPTO will send controlling signals through the gate coupling on / off button on the projector without using LED controlling infrared signal.

2.2.2 Flowchart for sensors in intelligent supervising to enable automatic power on / off projector

- Step 1.** Start (Start the program)
- Step 2.** Identify Port used (Declaration of Port in use)
- Step 3.** Identify the user Mode (Declaration of Mode in use)
- Step 4.** Determine the status of the entrance (Assign status)
 - If the state 0, the signal 0 to 1 Signaling 1st time (1 pulse 5ms)
 - If the status 1 to 0, next step 5
- Step 5.** Determine the time delay of 2000ms to 3000ms (maintain level 1, 2000ms-3000ms)
 - If false, back step 4
 - If true, next step 6
- Step 6.** Signaling 2nd times (1-2 pulse 5ms)
- Step 7.** Finish

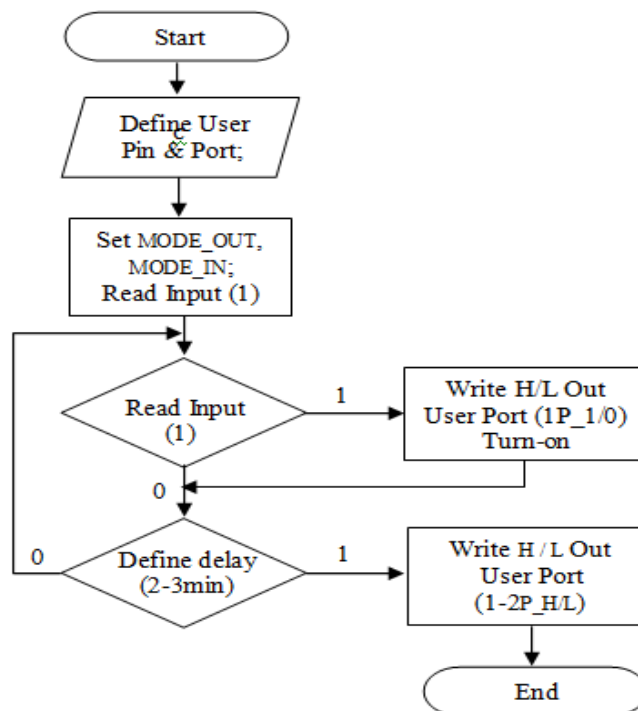


Figure 3. Program Block Diagram

As shown in Figure 6: U2in will move from a logic level 0 to logic level 1 when the user connects VGA/HDMI/LAN to the laptop/desktop and this level will always be at a high level until the signal cable is disconnected. The status U2in will switch to a logic level 0; U1in and U2out are at the same logic level and yet at the same time move from a logic level 0 to a logic level 1. But scheme shows U2out and U1in are at high levels after τ , then it changes from logic level 1 to 0; U1out appears at logic level 1 for a period of 10ms then returns to a logic level 0 and maintain a logic level 0 until U1in transferred from logic level 1 to 0, U1out appears at logic level 1 and in interruption of 15ms, then move to logic level 0.

2.2.5 Experimental programs for MCU

```
...
Int main ()
{
CLK_DeInit();
CLK_HSECmd(ENABLE)
CLK_SYSClkConfig(CLK_PRESCALER_HSIDIV1);
TIM1_Cmd(ENABLE);
DeInit(PORTx); //x = C, B
DeInit(PORTy); //y = D, A
Init(PORTx,PIN_ALL,MODE_OUT_PP_LOW_FAST);
Init(PORTy,PIN_1,MODE_IN_FL_NO_IT);
while(1)
{
if(!ReadInputPin(PORT,PIN_1))
{
WriteLow(USER_PORT,USER_PIN7);
while(first)
{
delay_ms(t); // t=1 →10
WriteHigh(USER_PORT,USER_PIN7);
delay_ms(t); // t=1 →10
WriteLow(USER_PORT,USER_PIN7);
delay_ms(t); // t=1 →10
.....;
}
}
else
{
while(!first)
{
WriteHigh(USER_PORT,USER_PIN7);
delay_ms(t); // t=1 →10
WriteLow(USER_PORT,USER_PIN7);
delay_ms(t); // t=1 →10
first=TRUE;
}
}
}
return ;
...
}
```

III. EXPERIMENTAL RESULTS

3.1. Built- in projector

The direct integration onto the circuit board inside the projector is quite compact for the fact that the smart board of sensors in intelligent supervising to enable automatic power on/off projector based on the users' signal monitoring will be compactly designed with MCU [3] [5] using nanometer technology and compact components so a very circuit and component with size of 1.5 cm * 2cm * 1cm can easily be blended into the empty space inside and using raising resources 3V3 of the projector. Input entrance shown in Figure 5 will be

connected to the VGA/HDMI/LAN and exit output in Figure 5 is connected to the entrance of the source on/off buttons on the circuit board of the projector as shown in Figure 2b.

3.2. External coupling projector

The indirectly external coupling will be paired with the memory of on/off orders and emit infrared signal [6] for the projector. The entire circuit will be packed in plastic box 65mm * 53mm * 3mm with signal coupling ports VGA/HDMI/LAN with Laptop/Desktop and output signal VGA/HDMI/LAN paired with the projector as shown in Figure 2a. The power will be taken use adapter 5V0 or from the coupling ports of the projector.

IV. CONCLUSION

The problem of sensors in intelligent supervising to enable automatic power on or off projector based on the users' signal monitoring device from individuals to make decisions on the Power on or off instead of using a remote control and push the buttons on the current Projector and function keys on the projector is all in order to improve cost efficiency and convenience for users, extend the life of the bulb and save useless power consumption of the projector when not in use. The result of the application has been tested in Lab Center of Posts and Telecommunications Institute of Technology, Vietnam.

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