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Development of Control Circuit for Detecting CCTV Operation and Failure

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Abstract. This paper has developed the circuit of equipment for CCTV operation and detecting failure, which enables to identify in naked eye failure of CCTV which is used to protect public facility and prevent safety accident. It is designed with shunt which has 0.5ohm, maximum current of 1A and over 0.5W class($P = 1A^2 * 0.5$ and 10bit ADC in which built in MCU. Also current has been designated using VR(Voltage Regulator) as reference current. Status light of voltage and current is 2 color LED while green color means normal status and red color does abnormal status.

Keywords: CCTV, MCU, ADC, VR

1 Introduction

As media release recently, accidents happens frequently in public facilities and common place. At this time CCTV(Closed Circuit TV) recording screen provides critical clue to find the cause of safety accidents. However we can't sometimes identify whether CCTV works properly or not if we don't make regular inspection or check. Additionally it is inconvenient to check main CCTV in order to find screen movement. Therefore this paper has developed a power distributor for CCTV operation and detecting failure[1], which enables you to check in naked eye the correct operation of CCTV right away on the spot without using monitor or DVR(Digital Video Recorder) program after installation.

2 CCTV configuration

In conventional configuration of CCTV, we can check operation of camera just on the monitor screen in case of multiple cameras installed. So when we have multiple

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cameras, we have to separate plugs to identify which power cable belongs to which. As we can't identify the failure immediately in naked eye, we can see when camera got breakdown just when video recorded in DVR is restored later. Above all it is very difficult to identify whether current camera is working well. Diagram for camera connection in power supply section with new control circuit box is shown in Figure 1.

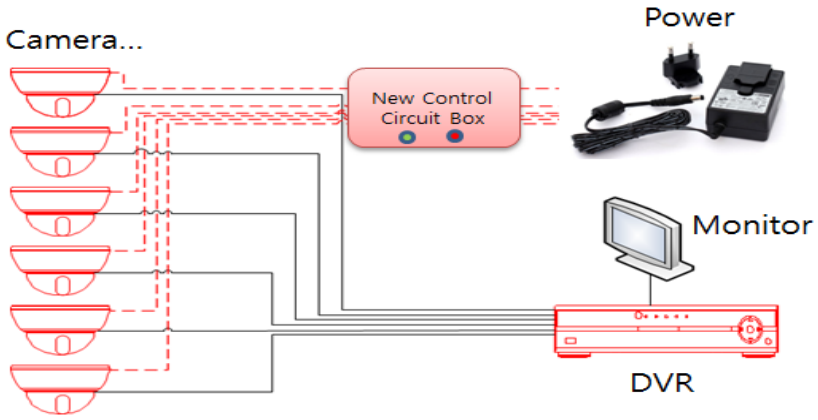

Fig. 1. Diagram for camera connection in power supply section.

3 Circuit to detect failure of CCTV

In case the failure of CCTV is due to short of camera wiring, fault of power supply adapter or failure of camera, it is not easy to find cause of the failure. So we tried to check whether electricity is in normal condition, which is basic indicator for identifying cause of CCTV failure.

However most of power supply and camera is installed on cell or surface of wall, which makes the check of failure more difficult. Also the way of finding failure of camera even when power supply device is in normal condition is to connect monitor directly to DVR or CCTV. That's why it takes long time on the site because camera is tore down for checking. Accordingly we has developed a circuit which shows power supply, operation and cabling for camera at a glance by making separate medium equipment which control breakdown. Figure 2 shows a circuit diagram to detect failure of CCTV. Shunt is designed to be more than 0.5W class($P = 1A^2 * 0.5$) with 1A of maximum current on 0.5ohm and ADC(Analog to Digital Converter) is designed to be 10bit ADC[2,3] built in MCU[4]. Also current setting is designed to have reference current by using BR. LED of voltage and current status has 2 colors. Green indicates normal status whereas Red does abnormal status. It is designed that buzzer alarm flickers in abnormal status every 0.5 second and buzzer sound rings. The method of detecting quantity of current by identifying voltage difference between

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both ends of shunt in current consumed for CCTV. As for voltage difference for both ends of Shunt, approximately 50mV is detected per 0.1A(V=IR). In order to raise resolution of detected voltage, ADC is detected after being amplified through DC Bias circuit.

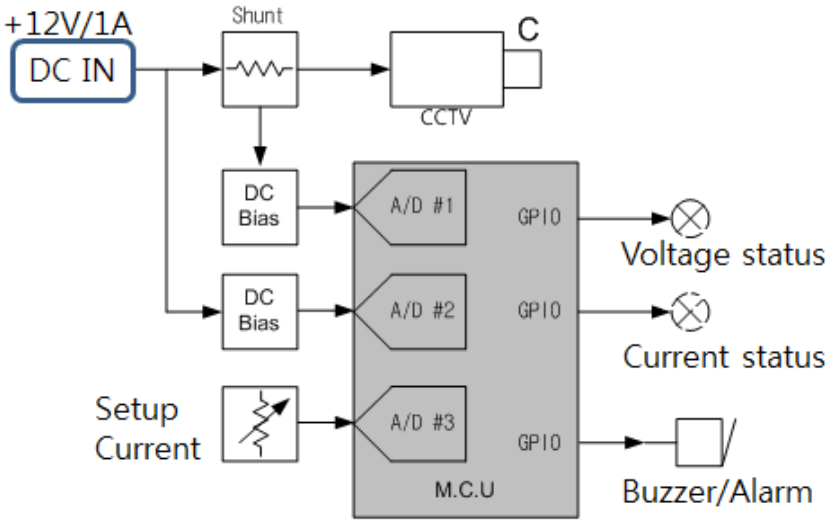

Fig.2. Circuit diagram to detect failure of CCTV

By designing consumption current to be maximum 1A and shunt resistance[5] as to be more than 0.5W class, conversion data is between 0 and 1023 as ADC conversion data. Voltage input for checking voltage is ADC detected as partial voltage through DC Bias circuit. Maximum 16V can be detected while conversion data is converted in unit of 0.1V. As for designation of reference current, reference current level is designated using VR[6,7] in order to designate reference current which flows in CCTV. Conversion data is between 0 and 1023 as ADC conversion data. As for output of voltage condition, it is printed out in red color in case it is beyond range of ±10[%] on basis of +12V after detecting input voltage. In case input voltage is less than 10[%] of +12V, red color flickers every 0.5 second and red color is printed out in case it exceeds 10[%] of +12V. As for output of current status, detected current and reference current is compared each other and output is printed out in green color in normal status where difference between detected current and reference current is within ±20 whereas red color in excessive situation . In case difference detected current is smaller as much as 20 than reference current, red color flickers every 0.5 second while red color is printed out when exceeding 20. As for buzzer output, either of current and voltage condition is abnormal, buzzer alarm flickers every 0.5 second whereas no buzzer output is produced in case of normal condition. Figure 3 shows the manufactured control circuit box for Detecting CCTV Operation and Failure. And Figure 4 shows the DC On/Off state test result.

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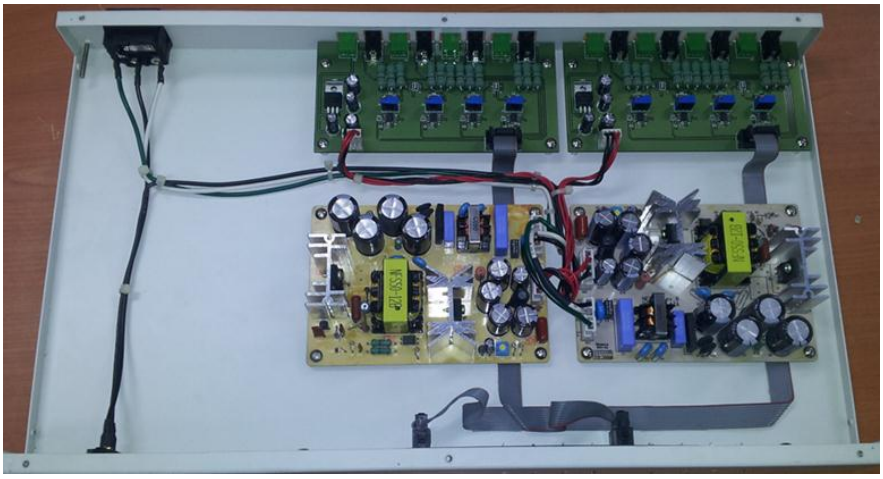

Fig. 3. Control circuit box for Detecting CCTV Operation and Failure

Fig. 4. DC On/Off state

4 Conclusion

Currently we can find cause of breakdown by checking connection part after disassembling equipment installed in order to detect operation and failure of CCTV. It costs too much time and money. So we developed a control circuit system which can

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identify breakdown of CCTV in naked eye. Based on status of current detected, green and red color indicates normal and faulty condition respectively and buzzer sound warns user of breakdown. We expect that this system will make much contribute to control of CCTV.

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