WVOM (WIDE-VIEW OBJECT MOVEMENT) SENSOR

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Tajuk Projek : WVOM (Wide View Object Movement) Sensor

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DEDICATION

Dedicated in thankful for appreciation for support, encouragement, understandings to my beloved mother and father.

ACKNOWLEDGEMENT

Alhamdulillah, my blessing to existence God because with the permission can I complete my final year project with successfully and excellent apart from being able to add knowledge latest technology that gain ground. Final year project is credit that is very valuable in giving opportunity to me to get a degree for this year.

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I also want wish the most gratitude to mom, father and family in helps me financially, advice, guidance and in spirit so that I successfully completed this final year project. Without support and inducement from them, I do not can finish my final year project successfully. Thank you I say also to my friends that also directly involved or indirect in giving advice, inducement and skills that they shared with me.

Hoped with knowledge that I own from complete my final year project, can I used in nature job later. May Allah repay their good merit that directly involved and indirect in helps me to complete this final year project. Thank you for everything.

ABSTRACT

WVOM (WIDE-VIEW OBJECT MOVEMENT) SENSOR is will be the new sensor which using the mini camera to capture image in each second. This sensor as a detector in a moving object regardless of human, animal or static objects but be moved by someone. The function of this sensor is if this sensor is defining any movement in it view range, so it will emitting light from LED as the output. The mini camera has be used for this sensor is OV9665FSL camera. This sensor has three important parts that is input device, processor and output device and if one part is not working, this sensor will not be perfect. The input of this sensor is mini camera OV9665FSL camera. This mini camera functions as the image capture and send the image frame format to the processor. The image format actually will be converts to the binary format or in hexadecimal format and save in the Random Access Memory (RAM) or known as buffer. For the processor part is by using the Arduino circuit board. This circuit board should have the own language and need to be programmed by using the Arduino002 Compiler to ensure that the processor work in accordance with the instructions given. Among the instructions at the processor is communication between the input device and also output device. The very important instruction for the processor to ensure this sensor working well is comparing two images which has been capture by input device. That is how the WVOM sensor is working actually. The last part is output device. This last device working as the output and it connected to the processor. This output only to show the ON or OFF the LED. The LED will be ON if the WVOM sensor defines any movement and if the WVOM sensor is not define any movement, so the LED still is OFF.

ABSTRAK

WVOM (Wide View Object Movement) Sensor merupakan pengesan baru yang menggunakan kamera kecil untuk mengambil imej pada setiap saat sebanyak dua imej untuk dibandingkan perbezaan antara imej tersebut. Sensor ini merupakan satu pengesan objek yang bergerak tanpa mengira manusia, haiwan atau objek yang statik tetapi diubah kedudukan asal kepada kedudukan lain. Fungsi pengesan ini adalah untuk mengesan sesuatu objek yang bergerak dalam julat penglihatannya dan LED hijau digunakan sebagai pengeluar. Kamera kecil yang digunakan untuk pengesan ini ialah kamera OV9665FSL. Pengesan ini mempunyai tiga bahagian penting iaitu kemasukan, pemprosesan dan pengeluran. Kemasukkan pengesan ini ialah kamera mini OV9665FSL. Kamera ini berfungsi untuk menangkap imej dan menghantar imej dalam format kerangka untuk diproses. Format imej sebenarnya telah ditukarkan kepada format imej *binary* atau format imej *hexadecimal* dan disimpan ke dalam *Random Access Memory* (RAM) atau dikenali sebagai penimbal. Untuk bahagian pemprosessan pula merujuk kepada papan litar Arduino. Papan litar ini sepatutnya mempunyai *programming* sendiri dan perlu untuk diprogramkan dengan menggunakan penimbal Arduino002 untuk memastikan bahawa kerja pemprosessan sejajar dengan arahan yang diberi. Antara arahan di bahagian pemproses ialah komunikasi antara peranti kemasukkan dan juga peranti keluaran. Arahan amat penting untuk pemprosessan bagi memastikan pengesan ini dapat membandingkan dua imej yang diambil oleh kamera. Bahagian terakhir ialah peranti keluaran. Pengeluar ini hanya menunjukkan LED ON atau OFF. LED akan ON jika pengesan WVOM dapat menentukan sebarang gerakan dan sekiranya pengesan WVOM tidak mengenalpasti sebarang pergerakan, LED akan kekal OFF. Perbezaaan imej ditentukan melalui perbezaan warna yang terdapat pada imej yang diambil.

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LIST OF ABBREVIATIONS

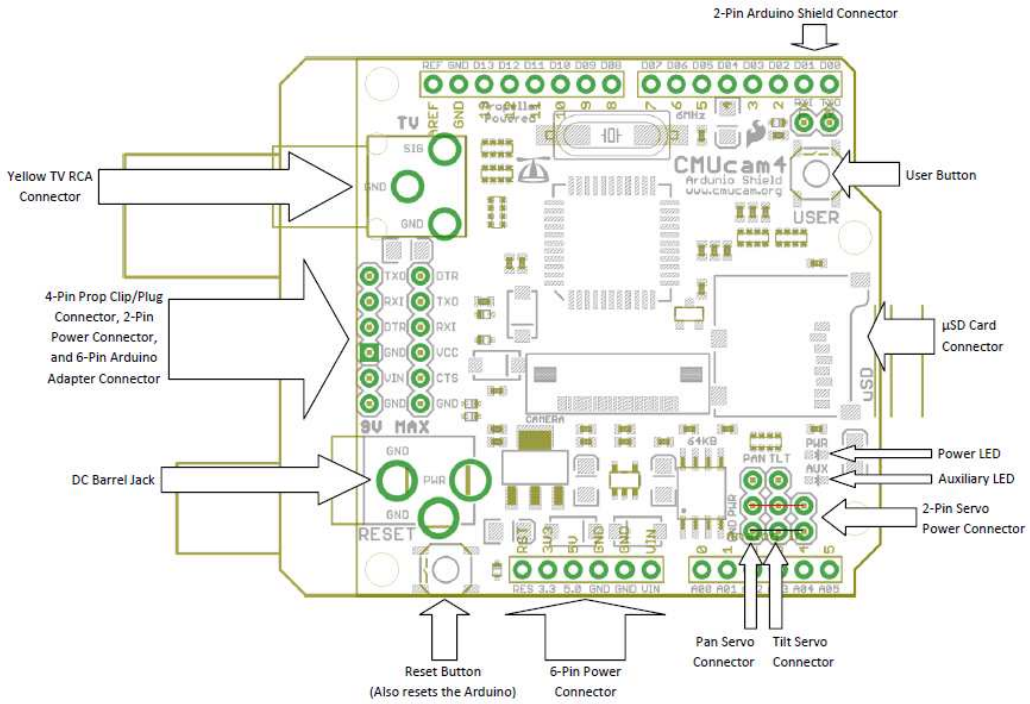
WVOM	-	Wide View Object Movement
LED	-	Light Emitting Diode
RAM	-	Random Access Memory
PIR	-	Passive Infra-Red
HVAC	-	Heating, Ventilation, and Air Conditioning
C-MOS	-	Complementary metal–oxide–semiconductor
JPEG	-	Joint Photographic Experts Group
JFIF	-	JPEG File Interchange Format
TTL	-	Transistor-transistor Logic
UART	-	Universal Asynchronous Receiver/Transmitter
PWM	-	Pulse Width Modulation
USB	-	Universal Serial Bus
AC	-	Alternating current
DC	-	Direct current
PCB	-	Printed circuit board
IDE	-	Integrated development environment
ALU	-	Arithmetic Logic Unit

APPENDIX

CMUcam4 Board Layout and Ports For the SparkFun CMUcam4 v10

Board Layout

The CMUcam4 has a two-port servo controller (capable of 1 µs resolution at a 50 Hz refresh rate), power LED, auxiliary LED, TTL UART (capable of up to 250,000 bits per second – by default 19,200 bits per second), and analog video generator (capable of NTSC or PAL output). The board layout for SparkFun CMUcam4 v10 is shown below.



Port Information

Power Connectors

The camera board can be powered in five different ways. Either from the VCC pin on the 6-pin serial connector, the 2-pin power connector near the DC barrel jack, the DC barrel jack, the 5.0 volt pins on the 6-pin power connector, and/or the VIN pin on the 6-pin power connector. The 3.3 volt pin on the 6-pin power connector does not power the camera board. The power supply for the camera board should be able to deliver at least 250 mA at between 4V to 9V DC.

Warning: Do not connect a power supply to the 2-pin power connector near the DC barrel jack and a different power supply to the DC barrel jack at the same time. This will cause a short.

Serial Connectors

The camera board can be communicated with in three different ways. Either from the 2-pin Arduino Shield serial port connection, the 6-pin Arduino Adapter serial port connection, or the 4-pin Prop Clip/Plug serial port connection. The serial data from the 2-pin Arduino Shield port and the 6-pin Arduino Adapter port (the 4-pin Prop Clip/Plug port) are logically ANDed together.

Cut the wire in the copper solder jumper labeled “TXO” on the bottom of the board to disable the TXO pin on the 2-pin Arduino Shield Connector. If you want, you can then use the provided “TXO” hole to wire up a connection to some Arduino pin other than the default “Serial” RXI pin to be used as a RXI pin if you are using the “SoftwareSerial” library and not the “HardwareSerial” library to communicate to the CMUcam4.

Cut the wire in the copper solder jumper labeled “RXI” on the bottom of the board to disable the RXI pin on the 2-pin Arduino Shield Connector. If you want, you can then use the provided “RXI” hole to wire up a connection to some Arduino pin other than the default “Serial” TXO pin to be used as a TXO pin if you are using the “SoftwareSerial” library and not the “HardwareSerial” library to communicate to the CMUcam4.

Warning: Do not connect a serial adapter to the 6-pin Arduino Adapter port and a different serial adapter to the 4-pin Prop Clip/Plug port at the same time. This will cause a short.

Camera Connector

The camera board has a camera connector designed for the OmniVision OV9665FSL camera module. Removing the camera module from the camera board may damage the camera module.

Servo Connectors

The camera board has a pan and a tilt servo connector. The pan and tilt servo connectors can be used to drive a pan and a tilt servo or be used as general-purpose inputs/outputs (GPIOs). The 2-pin servo power connector right next to the pan and tilt servo connectors provides power to the pan and tilt servo connectors only, and does not power the camera board. Be careful, not to reverse the power to the 2-pin servo power connector. Doing so may damage any servo connected to the pan and tilt servo connectors.

Short the “SERVO PWR” copper solder jumper on the bottom of the camera board to connect the 2-pin servo power connector and 5.0 pin on the 6-pin power connector. **Warning:** The pan servo and/or tilt servo may draw more current than an Arduino’s 5V power supply is capable of delivering. This will cause spurious resets.

Warning: Do not connect a power supply to the 2-pin servo power connector and a different supply to the 5.0 pin and a GND pin on the 6-pin power connector at the same time when the “SERVO PWR” copper solder jumper on the bottom of the camera board is shorted. This will cause a short.

TV Connector

The camera board has a yellow RCA TV connector for analog video output in either NTSC or PAL B/D/G/H/K/I. PAL N and PAL M are not supported.

µSD Connector

The camera board has a µSD card connector and a FAT16/FAT32 full file system driver library for accessing µSD and µSDHC cards (µSDXC cards are not FAT16/FAT32 compatible).

CHAPTER 1

INTRODUCTION

In this chapter is discuss about the introduction of the project which have explain the function of the movement sensor, the problem statement which state that the improvement of the original candidates for the movement sensor purpose, the objective, the scope of the project and lastly will be discuss is the flow of the project.

1.1 Introduction of Project

A movement detector is a device that detects moving objects, particularly people. A movement detector is often integrated as a component of a system that automatically performs a task or alerts a user of movement in an area. Movement detectors form a vital component of security, automated lighting, home control, energy efficiency, and other useful systems.

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1.2 Problem statement

Right now, Passive Infra-Red (PIR) and Ultrasonic sensors were the original candidates for the movement sensor purpose. However, PIR sensor can only detect motion from its surrounding while an Ultrasonic motion sensor is only for calculating distance between an object and itself.

Infrared is a classification of electromagnetic radiation with a wavelength between roughly 700nm to 300µm. It is outside of the visible light spectrum but is emitted by all living beings and surrounding objects. It is often helpful to think of infrared in terms of radiated heat. In a PIR sensor, the sensing element is a pyro-electric device which generates a temporary electric potential when there is an increase or decrease in infrared radiation.

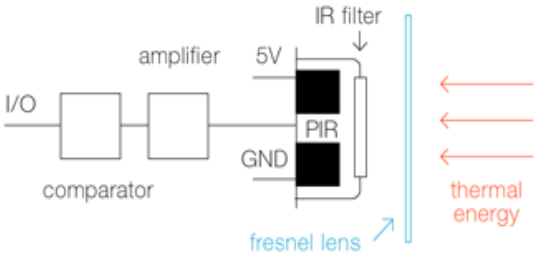

Figure 1.0: PIR sensor operation

While there are many advantages to a PIR sensor that make them an ideal choice for user detection applications, there are a few disadvantages to consider. PIR sensors require an unobstructed view of the occurrence of motion and cannot easily discern between humans and small animals. They are susceptible to "dead spots," which are areas where motion cannot be detected within the field of view. The farther one gets from the sensor the less sensitive it becomes.

Ultrasonic sensors work in ways that are similar to radar and sonar utilizing the Doppler principle. A piezoelectric transducer converts electrical energy into an ultrasonic wave typically between 40-50 kHz. This high frequency sound wave, which is beyond the capability of human hearing, hits an object and is reflected back toward another transducer which converts the sound wave back into electrical energy.

Ultrasonic sensors do not have gaps in the coverage zone like a PIR sensor and can be sensitive to slight motions at nearly twice the distance. The overall detection range is comparable to that of a PIR sensor. The ultrasonic sensor also can detect motion behind partial obstructions. One of the key advantages of the ultrasonic sensor is the ability to calculate distance to the object in motion.

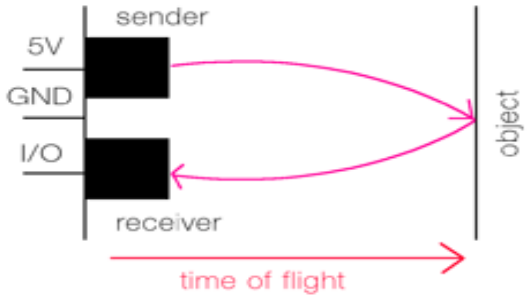

Figure 1.1: Ultrasonic sensor operation

One of the main advantages of the ultrasonic sensor is often one of the main disadvantages as well. Oftentimes the high sensitivity to ultrasonic sensors leads to false triggers. For example, excessive air motion from a fan or an HVAC system can cause the sensor to trigger.

This shows that this movement sensor is still have the disadvantage that is detect any movement in wide range area. A possible solution is using the OV9665FSL camera which controlled via an Arduino board has been built before for identifying objects by processing signals of different image captured by OV9665FSL camera. This OV9665FSL camera will be functions same as our eyes which can view in wide area.

1.3 Objectives of Project

The objectives of this project are:

a. To produce the camera sensor which this can view in wide area.
b. To using the OV9665FSL camera as the motion sensor.
c. To get the emitting light from LEDs as the output when the sensor detects any motion.

All three of these objectives need to ensure smooth running of the project to be able to function in accordance with a predetermined idea and be able to function properly.

1.4 Scope of the Project

The scope of work for this project is start with the study the theoretical what to do for this project. For this part, I have learned how the sensor functions, mini camera and also on the Arduino circuit board. For the selection of the suitable mini camera which can connected with the Arduino circuit board should be based on data sheet mini camera and how mini camera function.

There are two differences between the OV9665FSL camera and CM-26N / P C-MOS color camera that OV9665FSL camera is a mini programmer camera where there are four essential cables which is Vcc, Ground, Transmitter and Receiver compared with CM-26N/P C-MOS color camera that only has three essential cables which is Vcc, Ground and videos and cannot be programmed.

For the Arduino, it is an open-source electronics prototyping platform based on flexible, easy to use hardware and software. It’s intended for artists, designers, hobbyists, and anymore interested in creating interactive objects or environments. Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators.