LabVIEW Based Object Tracking and Arduino Based Human Detection

K.Swetha
UG Scholar
Department of Instrumentation & Control Engineering
Saranathan College of Engineering, Trichy, TamilNadu, India

M.Anupriya
UG Scholar
Department of Instrumentation & Control Engineering
Saranathan College of Engineering, Trichy, TamilNadu, India

R.Sowndarya
UG Scholar
Department of Instrumentation & Control Engineering
Saranathan College of Engineering, Trichy, TamilNadu, India

M.Meera Devi
UG Scholar
Department of Instrumentation & Control Engineering
Saranathan College of Engineering, Trichy, TamilNadu, India

S.Sivakumar
Assistant Professor
Department of Instrumentation & Control Engineering
Saranathan College of Engineering, Trichy, TamilNadu, India

Abstract

Tracking object and human detection are most frequently made applications with available new technologies. The platform in which it is performed tells about its work. In this paper, object tracking is done using LabVIEW and human detection is made possible using PIR sensor and Arduino. For investigating about the human detected, a servo motor is used for rotating the camera to capture the face of the human. Vision assistant is the key tool used for getting the real world object and comparing it with the reference predefined object. There is option for implementing both single and multi-object tracking but here single object is being tracked with real time values displayed along with images for getting information about the deviation taking place in the application. A LED is used for indicating whether the predefined condition prevails or any deviation is recorded.

Keywords: LabVIEW, Arduino, PIR sensor

I. INTRODUCTION

The concept of tracking and detection is much wanted in industries now days in order to build a high class security system. Object tracking is a process of comparison done between a real time and a reference object. Sequencing of objects is done on certain frequencies such that human eye can view the pictures clearly. Two applications specified in this paper play a major role in security purpose. Both these applications can be used in various fields. Object tracking is done in order to follow the object in its place and mainly can be used to avoid unknown people to enter any place without prior permission.

There are many possible ways for implementing human detection. One such way is to detect the movement of humans using a single parameter, sense it and make actions according to the output value of the sensor. Human detection forms another part of this paper which uses a sensor and a servo motor for implementing it. A conditional loop is introduced in the coding for combining the motion of servo motor based on the sensor value. Since it uses Arduino, an application can be implemented through coding. Here C language is used for coding the board for human detection.

II. HARDWARE USED

The commonly used hardware for both of the applications is the camera module. For human detection, PIR sensor and a servo motor is used. A detailed explanation is given as follows

A. PIR motion sensor (passiveinfra-red sensor):

PIR is used to detect infrared radiation. When a person changes his or her position, the changes is detected by the sensor in terms of IR radiation based on which the output value changes. Based upon the application it can be used. Passive Infrared sensors are used for applications such as automatically detection within a place covering the range of the sensor.
B. Servo Motor

A Servo motor is a rotary actuator or linear actuator that allows for a control of angle, position, acceleration, velocity and capabilities in a précised manner but ordinary motor cannot do it. It makes use of a regular motor and pair it with a sensor for position feedback. Servo motor is a sophisticated controller, often used for rotational movement with frequency as varying component. It is most suitable for closed loop control system. It is used in applications such as robotics, machinery and automated manufacturing.

C. Arduino Uno

The Arduino Uno is a microcontroller board. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. Each of the 14 digital pins on the Uno can be used as an input or output, using pin Mode (), digital Write (), and digital Read () functions. They operate at 5 volts. Each pin can provide or receive a maximum of 20 mA and has an internal pull-up resistor (disconnected by default) of 20-50 k ohms. A maximum of 40mA is the value that must not be exceeded on any I/O pin to avoid permanent damage to the microcontroller. The Uno has 6 analog inputs, labelled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analogReference () function.

III. SOFTWARE USED

A. LabVIEW

LabVIEW means Laboratory Virtual Instrumentation Engineering Workbench. It is a platform for developing visual programming language from National Instruments. "G" is named as Graphical language. It is commonly used for instrument control and automation on variety of platform including LINUX, Mac OS X, and MICROSOFT Windows. The code files have the extension “.vi” it is an abbreviation of Virtual Instrument. LabVIEW offers lot of Toolkits. It contain two panel, one is front panel and another one is block diagram. Block diagram is used for the purpose of program development enclosing the essential blocks and other functions inbuilt in it, Front panel is used for input and output indications which makes this software user-friendly. It is a graphical user interface and easily understandable since it is in the form of pictorial blocks.

B. Vision Assistant

It is used for Creating, editing, and running vision applications using NI Vision toolkit available in LabVIEW. Image src is used to store the reference image. Image destination is referenced for the destination image. If Image Dst is connected, it must be the same type as the Image Src. Image DSTout shows the output of the image. The default is no error. Error in is connected in the input side and if error occurs it sends it to the output side. Error out is connected in the output side or Simple Error Handler or General Error Handler VIs to display the description of the error code.

IV. IMPLEMENTATION

The above explanation has been implemented by using PIR motion sensor and servo motor with Arduino Uno in real time.
C. Human Detection:
Passive Infrared Sensor (PIR) is pyroelectric sensor which is used to sense the human radiation within 10m. The 3 pins in PIR sensor are ground, supply, data. PIR sensor and Arduino Uno is interfaced to detect the human and also control the alarm on and off. Arduino data pin, supply, ground is connected with PIR data pin, supply and ground. Pin 13 of Arduino Uno is connected with LED and pin 10 is connected with buzzer. The IR radiation from human body is detected by PIR sensor, the sensed value is given to Arduino pin 2. If PIR sensor detects the radiation it will show high (1) (i.e.) LED and buzzer will be in ON condition otherwise low (0) (i.e.) LED and buzzer will be in off condition. Servo motor is used to receive a control signal that represents a desired output position of the servo shaft and apply power to its DC motor until its shaft turns to that position. Servo motor is connected with Arduino for rotation purpose. By using Servo library in Arduino we can build the program for rotation. Program for rotation can control the angle of servo motor.

D. Object Tracking:
It is the new approach towards tracking the object and its location, tracking is usually performed in higher level application that simply require the location and/or shape of the object in each frame. We have identified the effective approaches for robust tracking of the object which provides potential future research towards this field. Here we explore the tracking characteristics to measure in a real-life application, focusing the location of object in scene and identification of object. This real time tracking consists of 2 methods; In first method we designed to acquire the images and detect the interested object, estimate the position of the object, then by delivering the estimated position value to the second module, then it is designed as a position controller to maintain the object to be in camera view. Here image capturing algorithm is faster because of LabVIEW. In vision assistant, we have stored the image and by comparing with it, the led will on and off.

In this paper, vision assistant is used to get images with wireless module which was made as a part of the project to make a user-friendly display system. In this paper, single object is tracked along with the location and angle of place. Multiple objects can be loaded using arrays and this same concept can be implemented. It is not mandatory that only LED has to be used for indication. May this also form a condition upon which another application may takes place.

V. RESULT AND CONCLUSION

The two applications stated in this paper can be used along with any monitoring systems and even in security systems for implementing cheap and handle able application. Even there are many applications regarding security can be built through the above described hardware and software tools. This can be installed in any places since the module is very small and monitoring can be made from certain distances. The development of kit using such low-end components is to promote the basic knowledge for future studies and experiments which leads to high-end device developments.
REFERENCE

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