An Efficient Approach for Image generation using NI LABVIEW

CH.A V.Manikanta Kumar
Electronic and Communication Engineering
K.L.University
Guntur,Andhra Pradesh
Contact number:8121191930
avmanikanta23@gmail.com

S.Avinash
Electronic and Communication Engineering
K.L.University
Guntur,Andhra Pradesh
Contact number:9985798895
avinash120196@gamil.com

Abstract— Designing of a prototype that overcomes the 2D LED conventional display methods. Past technologies have been using LEDs in large number for advertising boards resulted in high power consumption and production cost .These problems can be addressed by a portable prototype using the concept of persistence over vision which uses a very few number of LEDs and produces eye-catching 2D and 3D user defined programmable images**.**

***Index Terms*—persistence over vision, prototype, LED**

I. INTRODUCTION

The basic concept used in the propeller display is **persistence over vision**

Persistence of vision is the phenomenon of the eye by which an after image is thought to persist for approximately one twenty-fifth of a second on the retina, and believed to be explanation for motion perception, however it only explains why the black spaces that come between each "real" movie frame are not perceived. The true reason for motion perception is the phi phenomenon.

The theory of persistence of vision is the belief that human perception of motion (brain centered) is the result of persistence of vision (eye centered). A more plausible theory to explain motion perception (at least on a descriptive level) are two distinct perceptual illusions: phi phenomenon and beta movement.

The concept of pov in this project is applied through leds which are mounted over the propeller. This can be observed through help of a brush less motor when it rotates at particular fixed rpm and with application of sensor synchronizing techniques**.**

II. MATHEMATICAL APPROACH

Generally we can see a moving object if it changes at the rate of 24 frames/second

So we can see the image moving if it changing at the rate of 1440 frames/minute

Therefore we take the motor of rpm around 1440 or above.

Let us display the image "**1"** in the sector of 450

So for 1500 rotations ---------- 60 sec

1 rotation----------0.04 sec

3600 ---------- 0.04 sec

8x450----------0.04 sec

450----------0.005 sec

As seen above we are displaying "**1"** in 5 steps with a delay of 1ms in each step

According to these above calculations the programme will be written in case structure using delays such that required algorithm is obtained

The main is proto type is the rpm rate .The rpm rate of any brushless dc motor is constant over particular period of time Using that way we can calculate the rpm rate and adjust it through pwm t-on and t-off of square signal this type of techniques are know to be synchronizing techniques .

III. SOFTWARE-LAB-VIEW

LabVIEW (short for Laboratory Virtual Instrumentation Engineering Workbench) is a platform and development environment for a visual programming language from National Instruments. LabVIEW programming is perfect for any estimation or control framework, and the heart of the NI outline stage.Coordinating all the apparatuses that specialists and researchers need to assemble an extensive variety of uses in drastically less time, LabVIEW is an advanced environment for critical thinking, quickened gains, and constant development

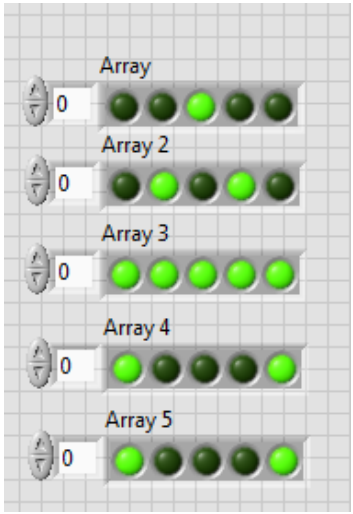
In the virtual instrumentation setting we discover the programming LabVIEW , a realistic programming environment which permits the PC to direct both, control and supervision of courses of action by method for an instinctive and practical coding. The LabVIEW programming environment is partitioned as two sections: the front panel, where interface with the utilized can be created, and the functional block Diagram, which is the programming territory is established. Applications are created from the connection between the front panel components and the Functional blocks, and, additionally, relationship between functional blocks.

LabVIEW programs are termed as Virtual Instruments, on the other hand VI, since their appearance what's more operation imitate physical instruments, such as oscilloscopes what's more multimeters. LabVIEW holds an

exhaustive set of instruments for procuring dissecting, showing, what's more putting away information, as well as instruments to help you troubleshoot your code.

When LabVIEW open it shows two windows if you want write any program in Lab VIEW, first in that program which operation is Find out, that operation we draw as Graphical Diagram in Functional block diagram window then we can give inputs (control) and output (indicator) in front panel, after assigning we have to connect through wire from inputs (control) to function and Functions to output (Indicator).

LabVIEW is a programming environment appropriate for undergraduate engineering training . It offers help for data acquisition hardware, inherent libraries, multitasking, and basic meaning of client interfaces and is generally utilized within expert building. Thus, this product apparatus is found in college courses on mechatronics , power and gadgets computerized indicator handling , control , and remote labs . Moreover, it is utilized in real mechatronics/mechanical autonomy (Robotics) applications Basic mobile robot lab examples with LabVIEW solutions , Object Oriented Programming for LabVIEW Real-Time Targets, Numerical Simulation of the FDTD Method in LabVIEW with examples , EDFA Applications, A mathematical test for emulation , Analog Modulation device for essential and Real Experimentation , Digital Communication, Flexible Arrayed pH Sensor Measurement System , Object Orientation , Power System Harmonic Measurement ,



Breaking the string to characters
The steps followed are
i) Taking input String

ii) Converting String to Unsigned Byte array

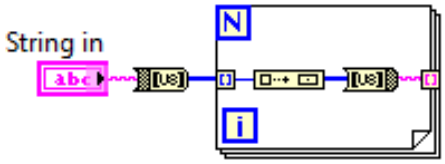
iii) Auto Indexing the Unsigned Byte array to For Loop

iv) Appending the elements to an n-dimensional array

v) Converting this unsigned byte array to string

vi) Auto Indexing this string

Finally in this step we result with the following code



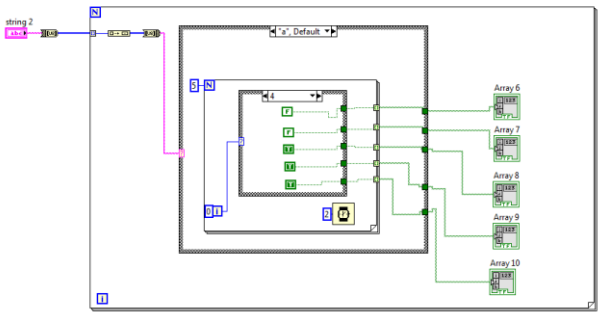
Developing an looping structure for displaying letters
i)Taking an for loop and case structure

ii)Arranging the Boolean LED's and taking output in the following way

A suitable code is developed by taking several cases for displaying required symbol.

For letting the user know about the format of display of LED's an array is taken

Now Task 1 and Task2 can be combined to get the following code



Sending the code of display to each LED on the breakage of String
i) Converting Boolean to an integer of 0 or1

ii) Converting this number to a decimal string format

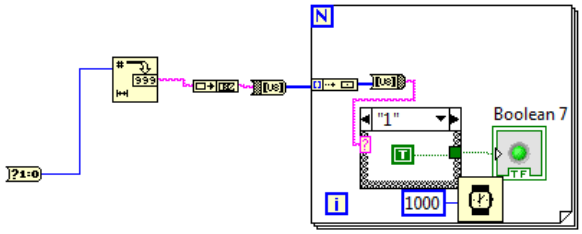
iii) In order to concatenate these various strings

iv) Now converting this String to an unsigned Byte array so that it can be auto indexed to a loop

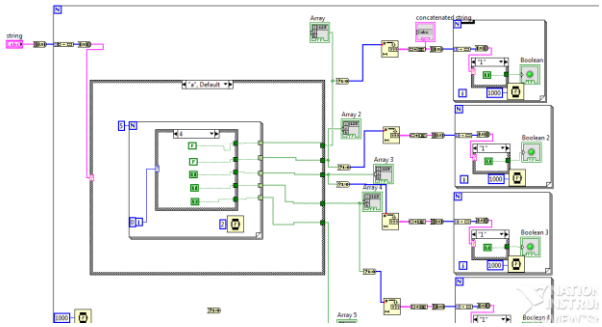
v) Now when sent in a loop this need to be again formed into an array. This can be achieved by

vi) Now doing the reverse process done outside the loop

vii) Now this should be again auto indexed to a case structure where LED needs to be programmed



The entire tasks mentioned above can be combined in the following way



The developed algorithm is implemented on particular hard ware which will be discussed on hardware section

IV. HARDWARE

After the development algorithm ,there the need of selection of hardware is critical part for the implementation

The hardware mainly contains of three main sector's

- The control unit – NI My RIO 1900
- The motor unit
- The propeller unit

A.CONTROL UNIT – NI My RIO 1900

NI my RIO places dual-core ARM Cortex-A9 real-time processing and Xilinx FPGA customizable I/O . With its onboard devices, seamless software experience, and library of courseware and tutorials, NI my RIO provides an affordable tool that makes students to do real engineering . NI myRIO harnesses the power of FPGA programming with LabVIEW software and provides the option to program the processor in either LabVIEW or C/C++. anyone can program at their current experience level and graduate to more complexity as they grow comfortable.

The FPGA role

Field-programmable gate arrays (FPGAs) are reprogrammable silicon chips. In contrast to processors that you find in your PC, programming an FPGA rewires the chip itself to implement your functionality rather than run a software application. Ross Freeman, the cofounder of Xilinx, invented the first FPGA in 1985. NI has partnered with Xilinx to offer their cutting-edge FPGA technology in a variety of hardware platforms. FPGA chip adoption across all industries is driven by the fact that FPGAs combine the best parts of application-specific integrated circuits (ASICs) and processor-based systems. These benefits include the following:

- Faster I/O response times and specialized functionality
- Exceeding the computing power of digital signal processors
- Rapid prototyping and verification without the fabrication process of custom ASIC design
- Implementing custom functionality with the reliability of dedicated deterministic hardware
- Field-upgradable eliminating the expense of custom ASIC re-design and maintenance

1) The specifications of NI My RIO -processor

Processor type .....Xilinx Z-7010

Processor speed.....667 MHz

Processor cores 2

2) FPGA

FPGA type .....Xilinx Z-7010

B.THE MOTOR UNIT

The motor unit mainly consist of electronic speed control and a brushless dc motor

ESC is an electronic circuit with the purpose to vary an electric motor's speed, its direction and possibly also to act as a dynamic brake. ESCs are often used on electrically powered radio controlled models, with the variety most often used for brushless motors essentially providing an electronically-generated three phase electric power low voltage source of energy for the motor.

An ESC can be a stand-alone unit which plugs into the receiver's throttle control channel or incorporated into the receiver itself, as is the case in most toy-grade R/C vehicles. Some R/C manufacturers that install proprietary hobby-grade electronics in their entry-level vehicles, vessels or aircraft use

on board electronics that combine the two on a single circuit board.

The brushless dc motor's are also know as electrical commutated motors or synchronous motors that are powered by dc electric source via an integrated inverter/switching power supply ,which produces an AC electric signal to drive the motor .AC alternating current ,does not imply a sinusoidal wave form,but rather a bidirectional current with no restriction waveform .additional sensors and electronics control the inverter output amplitude , waveform and frequency .The rotor part of a brushless motor is often a permanent magnet synchronous motor ,but can also be a switched reluctance motor,or induction motor

the tow key parameters of brushless DC motors are the motor constants Kv and Km

C.PROPELLER UNIT

The propeller unit consists of a pcb beam of leds which help's in display of characters and images .

CHARACTERISTIC'S

- 2D advertisements are history,3D looks as natural as real objects-the only difference is, that objects emit their own light
- the hardware has been specially designed to operate even at bright light conditions the usage of high power and high efficient leds make images and characters visible easily at daylight/sunlight
- pre-calculated animations and characters can be played back off with algorithms developed with 40 frames per/sec ,this is fast enough to trick the human eye
- The algorithms are developed are on LABVIEW 2013 platform , which is cluster of vi's and sub vi's
- The animations and characters can directed via mobile apps by using NI Dashboard on mobile platform

APPLICATION'S

- Effective display tool with compact ability at its ease
- New approach in class room interaction
- A unique device which can be used in simple 3d images
- The small games like Mario ,animations can displayed

FUTURE SCOPE

- The propeller display is a two dimensional led display device. Its purpose is to project small images on to eyes of a human spectator. It can mainly be used for advertisement and entertainment purpose. As a technology in this form as not been developed so far, it is quit an eye catcher and especially companies can gain peoples curiosity by advertising there products with prototype .
- This prototype can be further extended by the mounting series of propellers over one above the other to achieve a three dimensional display such that a presided image generation is possible
- The utilization of prototype in remote accessing areas via wifi facility.
- By using tri colour smd leds and some sophisticated technologies there is possibility to achieve display of led screens on propeller clock for which RIO platform is a great advantages.

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