

Obstacle Detection for Blind People

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Abstract—This project is a step towards making the life of blind people more independent and normal. In this project we have created a simple device that will enable them to overcome their limitation of free movement. Our device is simple and user friendly that will communicate with the blind person through audio which will guide them in their day to day life. The device is equipped to detect any change in the environment in terms of moving objects. The blind person using the device will also be notified whether the obstacle is in motion. All this process will be processed through comparing the picture taken by the device and the picture taken earlier. Any changes in the picture will trigger another block which will detect any obstacle and in the same time will measure the distance, direction and size of the object. It will also use sensors for distance measurement. This paper provides a efficient design of obstacle detection for blind people using Verilog HDL and a possible solution where the user can control device by using Field Programmable Gate Array(FPGA) controller to which the devices and sensors are interfaced. We have simulated this design in Verilog HDL using Xilinx and ModelSim. The project is in agreement with our thesis goal and the results are visible through our waveform.

Keywords—Obstacle Detection For Blind People, Simulation, Synthesis and Verilog HDL.

I. INTRODUCTION

VISUAL impairment has troubled a lot in last 25 years or so. According to W.H.O, up to the June 2012; 285 million people are visually impaired in the world: 39 million blind and 246 million have low vision. About 90% of the world visually impaired people lives in developing countries. Also about 65% of all people who are visually impaired are aged above 50 and older; this age group comprise about 20% of world population. 19 million children are

visually impaired out of which 1.4 million are irreversibly blind for the rest of their lives. Moderate visual impairment combined with severe visual impairment is grouped under the term “low vision”. Low vision taken together with blindness represents all visual impairment. Total blindness is the inability to tell the light from darker or the total inability to see. Visual impairment or low vision is a severe reduction in vision that cannot be corrected with standard glasses or contact lenses and reduces a person’s ability to function at certain or the entire tasks. Here we come up with the work which is based on the use of technologies to improve visually impair people mobility.

Our research focuses on obstacle detection in order to reduce navigation difficulties for visually impaired people. Moving through all unknown environment becomes a real challenge when we can’t rely on our own eyes. Since dynamic obstacle usually produce sound while moving, blind people develop their sense of hearing to localize them. But in condition where the obstacles are undetectable by blinds, it could be dangerous for them. The technologies which are in use are SONAR technique, infra-red detection, and stereo camera using earphones etc. which are costly. So we are introducing a system for blinds which is cheap, portable, user friendly, light weighted and of moderate range of about 4 feet through which they will be warned when any obstacle comes in front of the gadget. And also provide the distance of the obstacle .

A. Problem

The target of this project is to facilitate the life of any blind person in an affordable price.

B. Objective

The objective of the project is help a blind person to find out whether there is any object in a given distance and whether the object is moving or not.

The academic goal of this project is to develop specific skills in designing, programming, testing and debugging..

C. Project Scope

Our system uses laser and image comparator for performing its task. Our system can also be used in robotics or any other sensor related devices.

D. Assumption

We constructed an image comparator for detecting moving objects. Due to the limitation of the time constraints and also due to the hardware inaccessibility and expense, we used laser for detecting any object.

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II. APPROACH

We have taken a demo image in the form of binary digits. At first the laser works and finds out whether there is any obstacle within a given range. If there is any obstacle, the other block which is the image comparator is initiated. This gives signals whether the object is moving or not.

A. Block Diagram

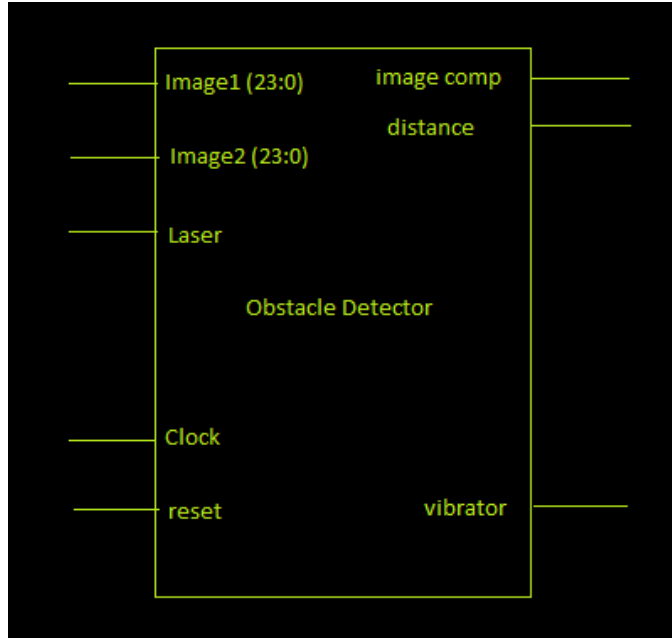


Fig.1 Block diagram of the system

The input signals are-

Image1[23:0]: it is the first image that is to be compared with another image.

Image2[23:0]: it is the second image that is to be compared with another image.

Laser: used for distance measurement.

Clock= Clock

Reset = reset

The output signals are-

Image comp: gives output after comparing the image.

Distance: gives the distance of the object.

Vibrator: gives output to the person using the system.

The next state after the block diagram is to create the hierarchy and state diagram which explains diagram showing the different states and condition. The design is for every module, which includes the states, the devices, the conditions and the required action.

B. Hierarchy

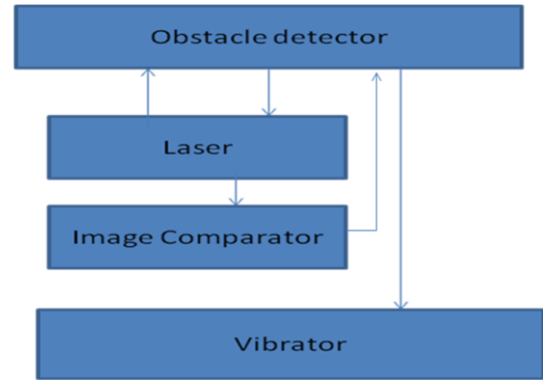


Fig.2 hierarchy of the system

Obstacle detector: This block takes all the input and gives the output as a vibration signal.

Laser: The laser is used to detect any object which is in the close proximity. The distance can be changed by the user for his convenience.

Image comparator: This block compares two consecutive images and checks whether the images are same. If the images are same, it means that the object is still otherwise the object is moving.

Vibrator: This is the output of the system. The vibrator gives signals for objects in close proximity and moving objects. The vibrator can be replaced by speakers for sound output and also by LED displays for visible outputs in other systems for any future use.

C. State Diagram

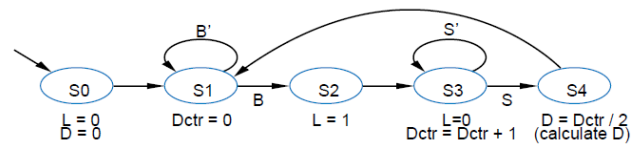


Fig.3 state diagram of laser module

S0: Initialize laser to off ($L=0$) and initialize displayed distance to 0 ($D=0$)

S1: B'- stay in S1, keep waiting and B- go to a new state S2

S2: turn on the laser.

S3: Turn off the laser. Stay in S3 until sense reflection. Start timer, wait to sense reflection. Increment $Dctr$ each cycle in S3. Once reflection detected (S), go to new state S4.

S4: Calculate distance. Assuming clock frequency is 3×10^8 , $Dctr$ holds number of meters, so $D=Dctr/2$.

III. THEORY

A. Verilog HDL

In the semiconductor and electronic device industry, Verilog is a hardware descriptive language used to model electronic systems. Along with VHDL, Verilog HDL is another most commonly used language in the design, verification and implementation of digital logic chips at the

V.CONCLUSION

The wave form is obtained as desired. Therefore we can conclude that the project was successfully done and is ready for implementation.

First of all, we acknowledge the praise to the Almighty Allah, Who gave strength and permitted us to accomplish the work. We would like to thank our respective faculty advisor Mr. Iqbalur Rahman Rokon for his essential guidance, precious advice. Finally, we would like to show our appreciation to our family and beloved parents for their inestimable support during these years of our study.

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