

Automatic Error Detection System in Wire Printing Using Raspberry PI

R.Sathish Kumar¹ S.Kavya² S.Manoj³ M.Magendran⁴ P.Naveen⁵

¹Assistant Professor, ^{2,3,4,5} UG Scholar, Department of ECE
SNS College of Technology
Coimbatore, India

Abstract : In every wire/core cable, the specification of than wire is printed on the surface of the wire with regular interval. The issue of mistake free electrical wire construction is very paramount in any electrical equipment. Every code printed on the wire matters is important. Therefore we intend to aid a system that involves proper printing of codes on the wire. Wires are made by standard wire ropes of desired wire gauge in different diameter or no of wires depending upon its end use. The main aim of this project is meeting local and international standards for traceability such as batch number, part number, date, specification, details ,logos etc., This makes recalls of product possible and protects the consumers. Coding in wire helps to reassure the customer that the product is genuine. It helps to track the product, so in the event of problem with a product, the cause can be identified and required change can be made. The concept of project is if the printing gets interrupted at any cause, the motor running the printer gets stopped automatically with the help of pattern matching technique. By the digital image processing pattern matching technique, the details to be copied in the wire should already dumped into the predefined patterns. While printing, the pattern is checked for matching continuously using camera and sensors fixed to the machine. If the mismatch is detected then the motor is intimated to stop the machine. So this prevents the non-printed wire. It can be done at most speed and the printing can be done downwards, side on or from underneath / and in any orientation. It gives good printing tolerance even when the surfaces are not flat or still. It works relatively low capital costs and also ranges of inks are available.

IndexTerms - Camera, Raspberry pi, Wire.

I. INTRODUCTION

The main purpose of the automated error detecting machine is to detect the missing print in the wire. This can be very useful for customers as well as manufacturer and dealers to check out the specification of the wire easily. There may be chances for print missing in the wire due to ink drain and dislocation of wire. There comes the requirement to identify whether the text or code is printed or not in the wire. In wire manufacturing industries, machine will be more in numbers. Manual monitoring is the traditional approach which is being performed by humans that involves visual inspection. So manual checking is not possible in all cases. This approach is monotonous, time-consuming, slow and no consistent. It also becomes difficult to hire workers who will perform such task. Therefore, alternative approach is needed. The system is designed and implemented for identifying the missing print in the wire automatically. In this technique raspberry pi is used. The text is extraction and comparison is processed by raspberry pi. It's also important to work out how much interval the print is printed on the wire. This can be done by capturing and scanning the image through camera and the text is extracted from the wire. The extracted text is compared with already stored reference text. Over all process is controlled by raspberry pi.

II. DISADVANTAGES OF CURRENT VOTING SYSTEM

In the current system, printing involves multiple checking process that is done manually which is time consuming. The workers need to check and monitor the wire continuously, so that they could stop the machine once they detect the absence of print. This makes the workers to stand near the manufacturing machine for whole day. It is time consuming and unnecessary use of labours.

III. ADVANTAGES OF PROPOSED SYSTEM

In the proposed system the absence of print on the cable/wire can be easily monitored. It automatically indicates the worker through alarm and stops the printing machine. This system does not involve manual process which makes the process less time consuming.

IV. OVERVIEW

In this project we are using Raspberry Pi as a controller. The HD camera is interfaced with the controller. The camera will continuously monitor the printed words on the cable. If any words are not printed on the cable means, it is sensed by the camera and then the microcontroller triggers the driver circuit. The driver output is connected to the contactor and the contactor is connected to the motor. After the driver circuit triggers, the contactor will open then the supply going to the motor will be cut off automatically.

V. BACKGROUND

Raspberry pi

The Raspberry Pi is a basic embedded system having a credit card-sized single board computers developed in the UK by the Raspberry Pi Foundation. The Raspberry Pi is based on the Broadcom BCM2835 system on a chip (SOC) which includes an ARM1176JZF-S Core (ARM V6K)700 MHz CPU processor, Broadcom Video Core IV GPU having 17 pins, 3.5W of power, and 512 MB of RAM memory. The Raspberry Pi system has Secure SD card reader (models A and B) or Micro SD card reader (models A+ and B+) sockets for boot media and persistent storage. The system provides Debian Linux operating system Raspbian image for download. Python is used as main programming language for raspberry pi. This paper presents the implementation of image processing operations on Raspberry Pi

Camera scanner

A webcam is a video camera that feeds or streams its image in real time to or through a computer to a computer network. When captured by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the internet, and emailed as an attachment. When sent to a remote location, the video stream may be saved, viewed or on sent there. Unlike an IP camera, a webcam is generally connected by a USB cable, or similar cable, or built into computer hardware, such as laptops. Raspberry pi consist of Camera slot Interface (CSI) to interface the raspberry pi camera. Here, the wording printed on the cables is captured by using the Raspberry Pi camera or web camera module are enhanced in order to identify the words missing on the cable.

Buzzer

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke.

DC gear motor

The DC Gear motor, consisting of a DC electric motor and a gearbox, is at the heart of several electrical and electronic applications. Precision Micro drives have been designing and developing such high quality mini DC gear motors in an easy-to-mount package for a range of products and equipment. Our miniature gear motor work smoothly and efficiently, supporting these electrical and electronic applications. These geared motors have reduction gear trains capable of providing high torque at relatively low shaft speed or revolutions per minute (RPM).

Relay

A relay is an electrically operated switch. Relays are used where a single signal is used to control various components or circuits. The relays use electromagnet or solid state relays to mechanically operate a switch.

VI. FEATURES IN THE PRINT DETECTION SYSTEM

RASPBERRY PI in print Detection system

The major controls in this system are performed using Raspberry pi. The text of the print is captured by the camera and stored as the reference image. The text of print is extracted by raspberry pi. This process is known as text extraction. The reference image will act as template. The wire comes out from the printing machine at some specific speed. The comparison of the text and the reference image is done in raspberry pi.

Camera scanner in print Detection system

The image of text must be captured and analysed regularly at certain interval of time. For this purpose high definition camera is used. Any kind of camera module can be used. . By the digital image processing pattern matching technique, the details to be copied

in the wire should already dumped into the predefined patterns. While printing, the pattern is checked for matching continuously using camera and sensors fixed to the machine.

Buzzer in print Detection system

In our system buzzer is used to indicate the worker that the text in the wire/cable is missing. So it is useful to stop the machine immediately.

Motor in print Detection system

The motor is used to run the wire in the mechanical setup. High efficiency, high quality low cost DC motor with gearbox for robotics applications. It is very easy to use and available in standard size. Their nut and threads on shaft is to easily connect and internal threaded shaft for easily connect to wheel.

Relay in print detection system

The relay is used to communicate between the motor and the raspberry pi respectively. If the print is missing then automatically relay send the information to the motor to stop printing. For this switching purpose, relays are used.

VI. WORKING

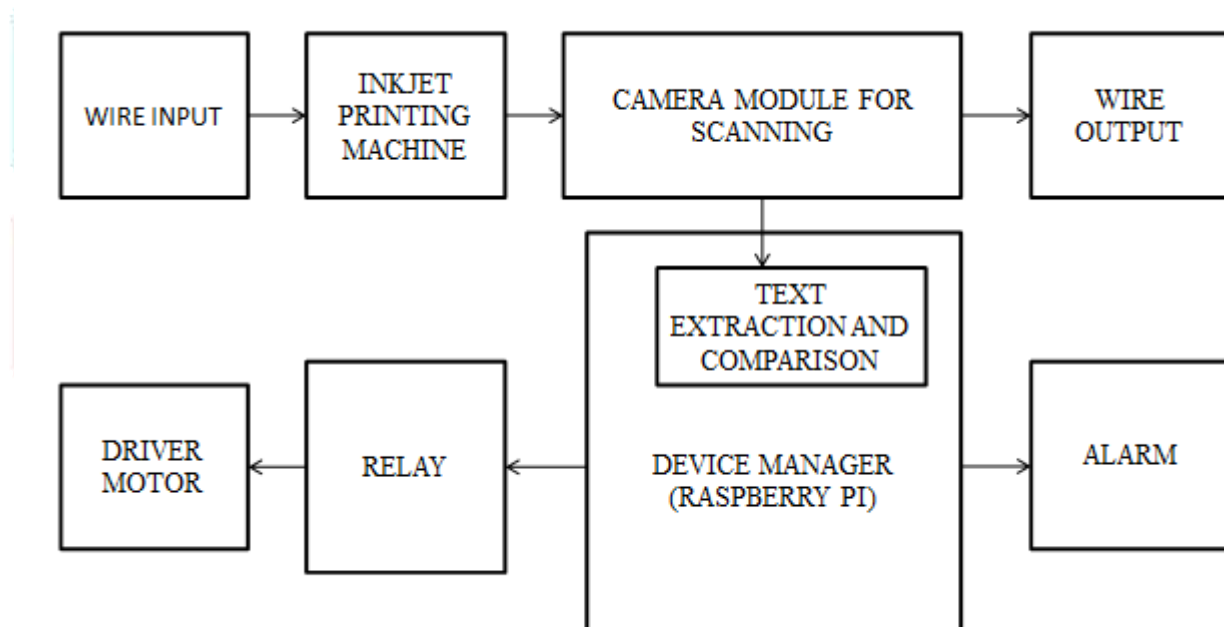


Fig.1 Block diagram

Today image processing are used in various techniques, this paper presents the implementation of image processing operations on Raspberry Pi. The Raspberry Pi is a basic embedded system and being a low cost a single board computer used to reduce the complexity of systems in real time applications. This platform is mainly based on python. Raspberry pi consist of Camera slot Interface (CSI) to interface the raspberry pi camera. Here, the wording printed on the cables is captured by using the Raspberry Pi camera module are enhanced in order to identify the words missing on the cable. This concept is used in the real time application of cable manufacturing industries.

The image processing is a form of signal processing where the input is an image, like a photograph or video frame, the output of an image processing may be either an image or a video frame or a set of characteristics or parameters related to the image. The acquisition of digital image usually suffers from undesirable camera shakes and due to unstable random camera motions. Hence image enhancement algorithms are required to remove these unwanted camera shakes. This image processing concepts are implemented in Raspberry pi in the application of industries. By the digital image processing pattern matching technique, the details to be copied in

the wire should already dumped into the predefined patterns. While printing, the pattern is checked for matching continuously using camera and sensors fixed to the machine. If the mismatch is detected then the motor is intimated to stop the machine.

VII. ALGORITHM

- Step 1: Wire comes out after manufacturing.
- Step 2: The specification of the wire is printed over the top of the wire/cable.
- Step 3: The printing in the wire is monitored regularly using camera.
- Step 4: The text is extracted from the wire and compared to the reference image by using raspberry pi.
- Step 5: If the text is missing , the buzzer will turn On.
- Step 6: The relay send the information to the motor and stop the motor.
- Step 7: The motor gets stopped.
- Step 8: The wire is removed and reprinted.
- Step 9: If the print is not missing then the printing process continues.

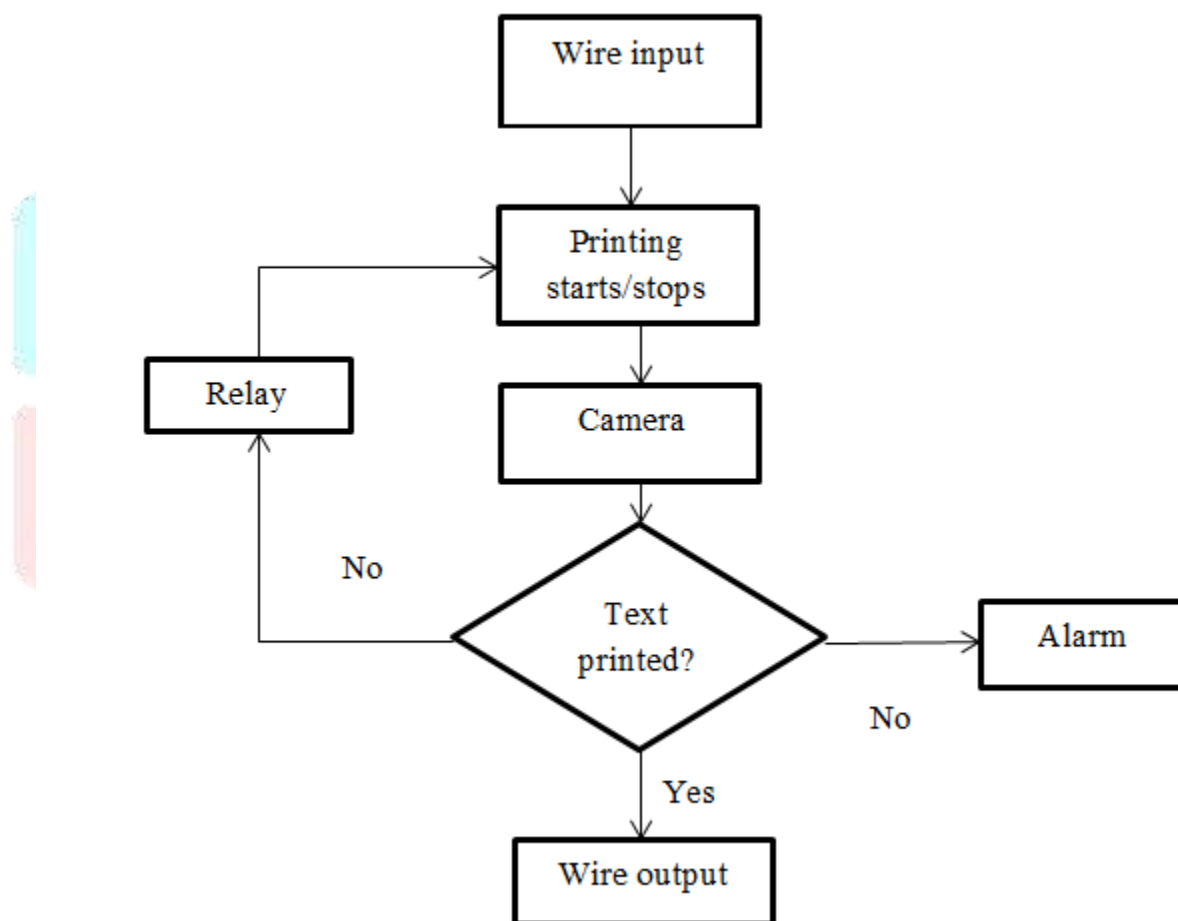


Fig.2 Flow chart

VIII. CONCLUSION

The objective is to build a model that can detect the printed words on the cable basis of visual data captured from a typical webcam which has a fair clarity. This technique intimates the manufacturer to stop the machine. No business can exist without customers. The project aims at complain free wires and to produce satisfactory customers. It also provides ease to the dealers to note down the specification and measurement of the wire. Manual work has been reduced by introducing this project. By implementing this project, a good manufactured wire from the industry arises. This reduces the risks and human effort. The camera in the proposed system inspects the print in the wire. It is imperative that business get to know their customers and their expectations. Establishing a

professional relationship with customers empowers a company with the knowledge of what the customer needs. This proposed methodology saves time and also benchmarks the company in quality.

IX. FUTURE WORK

In future, the system also inspects holes in the wire insulator by using high resolution camera. Defects in the wire can be monitored. The text information can be stored in the cloud and can be used for future purpose.

REFERENCES

- [1] Anoop Jose Chittilappilly, Kamalraj Subramaiaam, "SVM based defect detection for industrial applications", 4th International Conference on Advanced Computing and Communication Systems (ICACCS), Jan. 2017
- [2] Aswin C. Sankaranarayanan, Ashok Veeraraghavan, "Object Detection, Tracking and Recognition for Multiple Smart Cameras", Proceedings of the IEEE, Vol. 96, No. 10, October 2008
- [3] Atul N. Shire, M. M. Khanapurkar and Rajashri S. Mundewadikar, "Plain Ceramic tiles surface defect detection using Image Processing", Fourth International Conference on Emerging Trends in Engineering & Technology, IEEE, pp. 215-220, 2011.
- [4] Eli Shechtman, Michal Irani, "Matching Local Self-Similarities across Images and Videos", IEEE Conference on Computer Vision and Pattern Recognition, 2007.
- [5] F. Fekri, R.M. Mersereau, R.W. Schafer, "A Generalized Interpolative VQ Method for Jointly Optimal Quantization and Interpolation of Images", IEEE International Conference on Acoustics Speech and Signal Processing, vol. 5, pp. 2657-2660, 1998.
- [6] Feng, Z., Gao, C., Shen, T. and Lv, J., 2015, October. Fast action detection with web camera. In Image and Signal Processing (CISP), 2015 8th International Congress on (pp. 64-68). IEEE.
- [7] Daniel J Fonseca, Gopal Uppal, Timothy J Greene, "A knowledge-based system for conveyor equipment selection", Expert Systems with Applications, Volume 26, Issue 4, Pages 615-623, May 2004.
- [8] A. Karthikeyan, S. Sai Gokul, P. Shalini, R. Sowmeya, R. Vinu Varsha, "An Awarding Point Technique in Wi-Fi Sharing System" in International Journal of Creative Research Thoughts (IJCRT) Volume 6, Issue 1, January 2018, pp 1267- 1273 ISSN: 2320-2882.