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Object Sorting by using IR Sensor and Raspberry Pi

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ABSTRACT

In 21st century the automation boost the production growth by adding technology. This system has an approach to implement sorting of objects on the basis of size. It is simple concept to implement sorting effectively saving manual time and work. Sorting of objects are usually done by humans which takes a lot of time and effort. The design of object sorting using Raspberry-pi reduces human effort, speed, and also improves the manufacturing process to reach the market need. Here, we sort the object based on size. For the size detection we use the IR sensors which detect the size of the object by comparing the output state of the IR sensors.

KEYWORDS: *Raspberry Pi, IR sensor, sorting*

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I. INTRODUCTION

In manufacturing industries, there is a need to sort objects. The objects may be of similar or different types. The system should be able to detect the objects and then differentiate the objects from each other on the basis of their properties. Objects may have different shapes or different colours. The objects may be of same shape and same colour but different texture[6]. Thus, different objects and different conditions require different type of processing. Our aim is to classify objects using IR sensor and Raspberry Pi on the parameters like size.

This automated system does not requires any special human surveillance and thus reduces the probability of errors usually done by workers. The outputs of the system are completely reliable which can be further use with huge working systems.

II. LITERATURE REVIEW

Table-1: Literature Review

Author's Name	Method	Benefits	Limitations
1. Arun M O 2. Aneesh G Nath 3. Shyna A	classification of cashews by using computer vision system.	Computer vision and image processing can be used as a fine alternative for existing manual Grading system.	Not able to efficiently sort the grade splits of cashews. Has a limited accuracy and complex circuitry.
1. Himanshu Patel 2. Riya Joy 3. SelinMcwan 4. Hardik Modi	By Using TCS3200 color sensor and Arduino, frequency scaling for color detection.	Fast, reduce lab our cost and good repeatability with less human interference.	Complex circuitary and sensing color by using a faulty sensor is not reliable.

1. DameshwariSahu 2. ChiteshDewangan	By Using image processing and using Matlab as a programming tool.	Detects visible defects, stems, size and shape with high speed and precision.	Complex programming.
1. ChandraSekharNandi 2. BipanTudu 3. Chiranjib Koley	Uses Machine Vision based system and CCD camera to collect video signal, Recurisive feature elimination technique with support vector based classifier.	Fast sorting using conveyor, user friendly system, bypass the calibration requirement of the sensor output with respect to maturity	Long training time, misclassification due to scratches or black spots.
1. RahulVijaySoans 2. Pradyu	By using webcam and RaspberryPi3 along with Linux operating System.	Control in speed and direction of conveyor belt is	Accuracy depends on the lighting condition.

III. OBJECT'S HEIGHT DETECTION

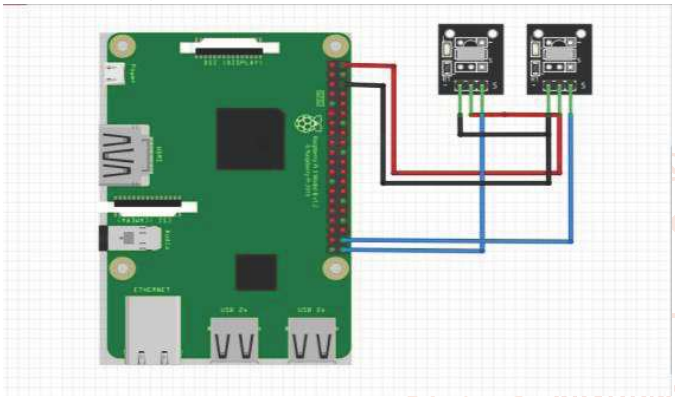

Fig-1: Circuit Diagram for object's height detection

In above circuit diagram, two IR sensor is connected to the Raspberry Pi through different GPIO pins. The IR sensor has three pins namely vcc, gnd, output pin. Ground pins of both the IR sensor connected together and then connected to the one of the GPIO pin of Raspberry Pi. Similarly the vcc pins of both IR sensor also connected together and then connected to one of the GPIO pin of Raspberry Pi. The output pin of both the IR sensor is connected to two different GPIO pin of Raspberry Pi.

IV. BLOCK DIAGRAM AND ITS EXPLANATION

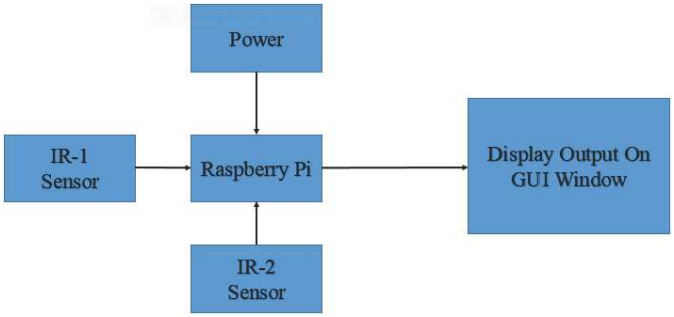

Fig-2: Block Diagram of sorting system

The working principle of this system is that it has raspberry pi which requires power supply for the operation which is provided through the connected laptop or computer or through raspberry pi adapter. After giving power to raspberry pi it get turn on and its screen is visible to the connected laptop or computer. Now connect both the IR sensor as per given in the circuit diagram. These IR sensors gets power from the raspberry pi and its start operating. IR sensor is basically detects the presence of an object, so in the system we had arranged both the IR sensor in such a way that if only one IR sensor is activated at a time then it means that small(height) object is detected. Similarly if both the IR sensors is activated at a time then it means that big object (height) is detected.

IR sensors is send output to raspberry pi and it process the input from IR sensor according to programming which is done in raspberry pi. It shows the output in the GUI screen which we have design in the programming.

This sorting system consist of following main components:

A. Raspberry Pi 3

Fig-3: Raspberry Pi 3

Raspberry Pi is understood as a single-board pc, which suggests specifically what it sounds like: it's a pc, a bit like a desktop, laptop, or smartphone, however designed on one computer circuit board. Like most single-board computers, Raspberry Pi is little – roughly an equivalent footprint as a master card – however that doesn't mean it's not powerful: a

Raspberry Pi will do something an even bigger and additional power-hungry pc will do, tho' not essentially as quickly.

Various models of Raspberry Pi are discharged since the initial Model B, every conveyance either improved specifications or options specific to a selected use-case. The Raspberry Pi Zero family, as an example, may be a small version of the life-sized Raspberry Pi that drops many options – especially the multiple USB ports and wired network port – in favour of a considerably smaller layout and reduced power necessities.

Unlike a conventional pc, that hides its inner workings in an exceedingly case, a regular Raspberry Pi has all its parts, ports, and options out on show – though you'll be able to obtain a case to supply additional protection, if you'd like. This makes it an excellent tool for learning regarding what the varied components of a pc do, and conjointly makes it straightforward to be told what goes wherever once it comes time to infix the varied extras – referred to as peripherals.

B. IR Sensor

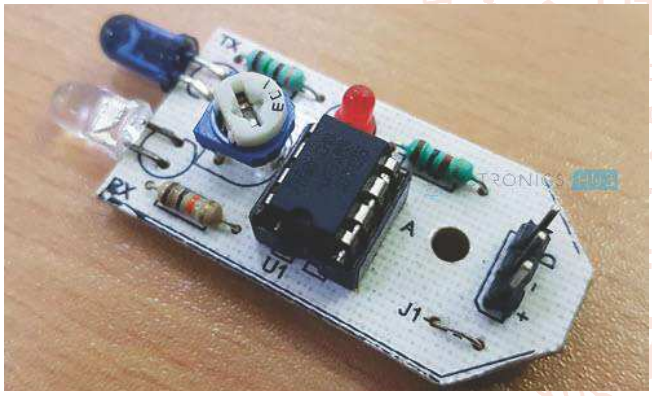

Fig-4: IR Sensor

IR sensing element is associate device, that emits the sunshine so as to sense some object of the environment. associate IR sensing element will live the warmth of associate object furthermore as detects the motion. Usually, within the spectrum, all the objects radiate some sort of thermal radiation. These forms of radiations square measure invisible to our eyes, however infrared sensing element will sight these radiations.

The electrode is just associate IR junction rectifier (Light Emitting Diode) and also the detector is just associate IR photodiode. Photodiode is sensitive to IR light-weight of an equivalent wavelength that is emitted by the IR junction rectifier. once IR light-weight falls on the photodiode, the resistances and also the output voltages can modification in proportion to the magnitude of the IR light-weight received.

There square measure 5 basic components utilized in a typical infrared detection system: associate infrared supply, a transmission medium, optical element, infrared detectors or receivers and signal process. Infrared lasers and Infrared LED's of specific wavelength used as infrared sources.

C. LED(Light Emitting Diode)

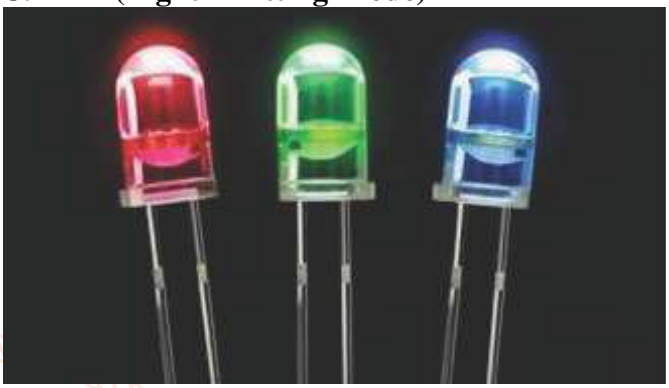

Fig-5: LED

In this project LED are used as indicators when the system turns on. LED's are just tiny light bulbs that fit easily into an electrical circuit. But unlike ordinary incandescent bulbs, they don't have a filament that will burn out and they don't get especially hot.

D. USB to VGA Adapter

Fig-6: USB to VGA Adapter

In this project this USB to VGA convertor is required to connect the Raspberry pi with the monitor. With this we can connect to monitor for programming the Raspberry pi.

V. RESULT AND CONCLUSION

The objects are sorted out based upon the size. We have used a Linux based board called raspberry pi, interfaced with IR sensor to sense the presence of objects and give output according to input. The input from the IR sensor will be send to the raspberry pi and it will process the input as per the program we fed in the raspberry pi. The results will be shown in the designed gui screen.

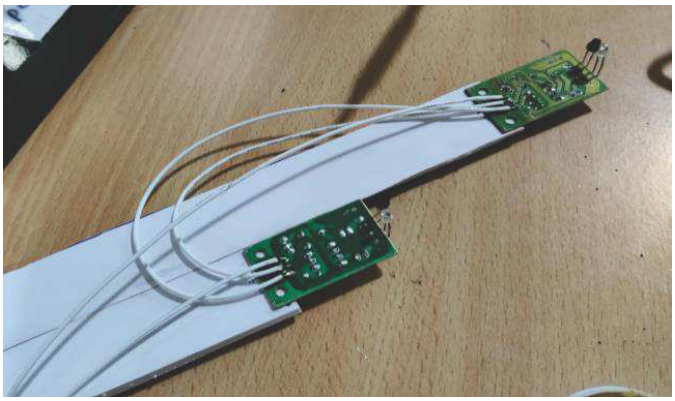

Fig-7: Connection

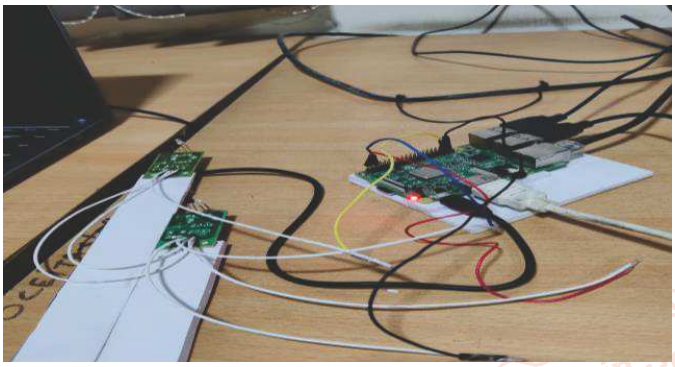

Fig-8: Interfacing IR sensor with Raspberry Pi

Fig-9: Testing of sorting system

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