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PROTOTYPE DESIGN OF INTELLIGENT PACKAGE SORTING SYSTEM

SUBHANKAR BERA, MALAY KUMAR PANDIT and ASIM KUMAR JANA

Haldia Institute of Technology
Haldia, East Medinipur-721657, India

Department of ECE
E-mail: subhankarbera489@gmail.com
asimkjana@gmail.com
mkpandit.seci@gmail.com

Abstract

Despite years of activity, truly open and intelligent control systems seem still to be a promise of the future. Agreement on common architectures and application objects is needed to raise open control systems from exchanging raw data to the level of real interoperability of off-the-shelf components. Future control platforms and programming languages should have new built-in mechanisms that support implementation of intelligent functions, such as flexible resource management and exception handling. In factory automation field there is a problem of sorting defective package. Approach: To built a prototype intelligent package sorting system using arduino on the bases of IR sensor, Geard DC motor, Servo motor. Results: Using Arduino programming and IR sensor the odd/defective one will be sort out by the servo motor. By another way this project can be treated as automated material handling system.

1. Introduction

Determining real time highly accurate characteristics of small objects in a fast flowing stream would open new directions for industrial sorting processes. The present paper relates to an apparatus and method for classify in and sorting small size objects, using electronic systems and advanced sensors operating on the basis of a physical and geometric characterization of each element. Recent advances in electronics and printed circuit board

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technology open new perspectives for industrial application in the field. The proposed selection process is based on a multi sensorial characterization, and more specifically on crossed optical and analysis of the objects to be sorted. Parallel guides, also, also called channels, are created on a slanted plant support. The objects to be sorted are immersed in a continuous, free-falling flow along said guides. By another way this project can be treated an automated material handling system & can be designed by following way.

2. Overview of Embedded System

Embedded means something that is attached to another thing. An embedded system can be thought of as a computer hardware system having software embedded in it. An embedded system can be an independent system or it can be a part of a large system. An embedded system is a microcontroller or microprocessor based system which is designed to perform a specific task. For example, a fire alarm is an embedded system; it will sense only smoke.

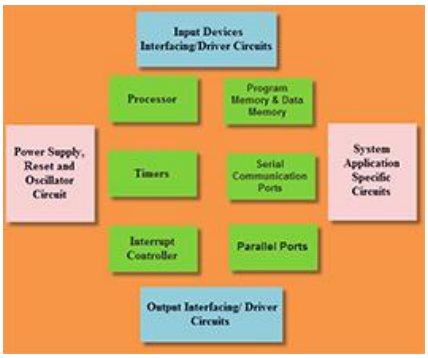

Figure 6.1. Block Diagram of Embedded System.

3. Each of Use

1. Arduino microcontroller. It is an open-source platform, means the boards and software are readily available and anyone can modify and optimize the boards for better functionality. The software used for Arduino devices is called IDE (Integrated Development Environment) which is free to use and required some basic skills to learn it. It can be programmed using C and C++ language. Some people get confused between Microcontroller and Arduino. While former is just an on system 40 pin chip that comes with a

built-in microprocessor and later is a board that comes with the microcontroller in the base of the board, boot loader and allows easy access to input-output pins and makes uploading or burning of the program very easy.

1.1: Arduino UNO

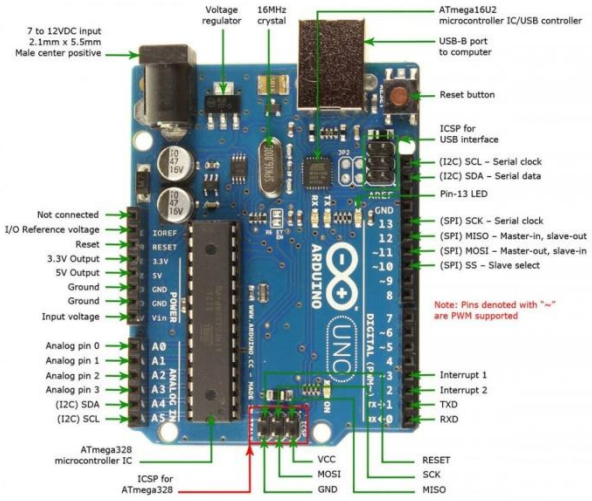

Figure 6.2. Pin Diagram of Arduino Uno.

Motor Driver Shield & Driver IC(L293D)

L293D is a dual *H*-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

L293D contains two inbuilt *H*-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled,

and their outputs are off and in the high-impedance state.

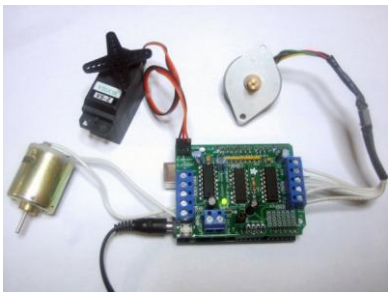

Figure 6.4. Motor Driver Shield is Connected to Stepper Motor, Servo Motor, DC Motor.

Servo Motor (sg90)

Servo motors have been around for a long time and are utilized in many applications. They are small in size but pack a big punch and are very energy-efficient. These features allow them to be used to operate remote-controlled or radio-controlled toy cars, robots and airplanes. Servo motors are also used in industrial applications, robotics, in-line manufacturing, pharmaceutics.

The servo circuitry is built right inside the motor unit and has a positionable shaft, which usually is fitted with a gear . The motor is controlled with an electric signal which determines the amount of movement of the shaft. To fully understand how the servo works, you need to take a look under the hood. Inside there is a pretty simple set-up: a small DC motor, potentiometer, and a control circuit. The motor is attached by gears to the control wheel. As the motor rotates, the potentiometer's resistance changes, so the control circuit can precisely regulate how much movement there is and in which direction.

When the shaft of the motor is at the desired position, power supplied to the motor is stopped. If not, the motor is turned in the appropriate direction. The desired position is sent via electrical pulses through the signal wire. The motor's speed is proportional to the difference between its actual position and desired position. So if the motor is near the desired position, it will turn slowly, otherwise it will turn fast. This is called proportional control**.** This means the motor will only run as hard as necessary to accomplish the task at

hand, a very efficient little guy.

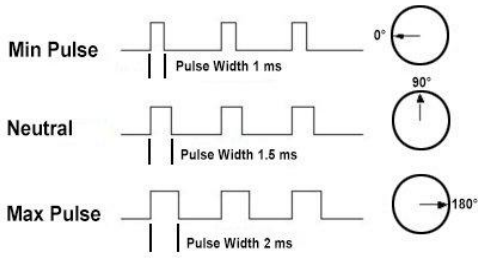

Figure 6.8. Servo Motor Pulses vs Their Angles.

Ir Sensor Module

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes, that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode. The resistances and these output voltages, change in proportion to the magnitude of the IR light received.

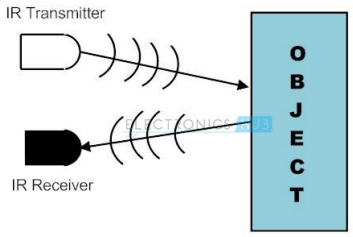

Figure 6.9. Working Principle of Ir Led.

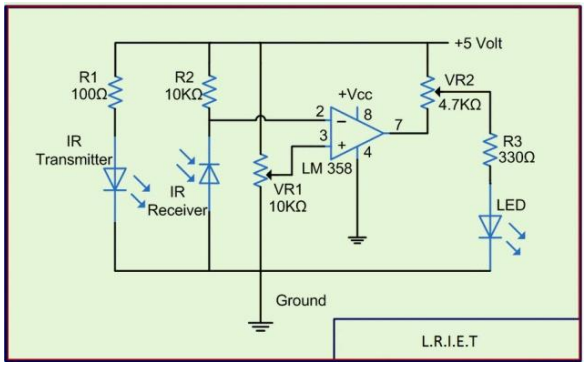

Figure 7. Ir Sensor Circuit Diagram.

In this project, the transmitter section includes an IR sensor, which transmits continuous IR rays to be received by an IR receiver module. An IR output terminal of the receiver varies depending upon its receiving of IR rays. Since this variation cannot be analyzed as such, therefore this output can be fed to a comparator circuit. Here an operational amplifier (op-amp) of LM 339 is used as comparator circuit.

When the IR receiver does not receive a signal, the potential at the inverting input goes higher than that non-inverting input of the comparator IC (LM339). Thus the output of the comparator goes low, but the LED does not glow. When the IR receiver module receives signal to the potential at the inverting input goes low. Thus the output of the comparator (LM 339) goes high and the LED starts glowing. Resistor R1 (100), R2 (10k) and R3 (330) are used to ensure that minimum 10 mA current passes through the IR LED Devices like Photodiode and normal LEDs respectively. Resistor VR2 (preset=5k) is used to adjust the output terminals. Resistor VR1 (preset=10k) is used to set the sensitivity of the circuit Diagram. Read more about IR sensors.

Ir Sensor as Color Detector. Lets see above mentioned concept from a different angle. The amount of reflection light will also depend upon the color of surface from which it is being reflected. Black is said to be perfect absorber and white is to be said perfect reflector. The reflection will be different for different colors. Thus make it a color detector. Application of this sensor can be a line follower, a micro mouse or a grid solver. Following diagram will help you to understand the concept of IR sensor as a color detector.

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