

OBJECT SORTER BASED ON COLOR USING RASPBERRY PI

Kiran Chopade¹, Akash D Patil², Vijay Kadam³, Karan Pacharne⁴, Prof. Rashmi Deshpande⁵

^{1,2,3,4}Student, Department of Computer Engineering, Dr. D.Y. Patil Institute of Engineering Management and Research, Akurdi, Pune

⁵Associate Professor, Department of Computer Engineering, Dr. D.Y. Patil Institute of Engineering Management and Research, Akurdi, Pune

ABSTRACT

For industrial applications, objects sorting is a tough task that requires continuous labour. It is advantageous to design a machine that spots the objects and rearrange them when a product matches predefined standards. This paper approach is proposed to sort the objects by using color identification with TCS3200 sensor. Identification of color is based on the frequency analysis from output of sensor. Servo motors are used to place the product for color identification and for moving the slider. Raspberry Pi controls the process of sorting with color identification. This system sorts colored objects and differentiate the objects to separate bins. Cost effective implementation of the system and size scalability makes the proposed system easier to implement in small scale industries minimizing the manual power.

Keywords- Raspberry Pi, Servo Motors, Python, TCS 3200 color sensor, etc.

1. INTRODUCTION

Color Based Object Sorting has a wide usage in fruit sorting as well as candy sorting industries. This system puts forward a mechanism to detect color and sort items through image processing. Once identified a mechanism is used to sort the candies into particular bins baskets. We here demonstrate this mechanism using with electronic circuitry along with sorting mechanism using 3 bins. The system uses raspberry pi connected to a controller circuit to achieve this task. A motor is used to feed an object to the TCS 3200 color sensor chamber. As soon is the color is detected a signal is sent to the sorter mechanism which uses a motor to position the sorting tube towards respective section. Thus, we achieve a completely automated IOT based sorting system.

2. METHODOLOGY AND PROPOSED SYSTEM

This paper aims to study and compare various methods for object sorting based on color. We developed a machine for object sorting based on color using TCS3200 (color sensor) and controlled by Raspberry Pi. Moreover, on the existing system, the existing system was only able to sort three colors i.e Red, Green, Blue by image processing using the live camera. And it was using Arduino as its main processor.

This section explains our proposed approach and system in three steps. First, our machine will be able to sort colors other than Red, Green, Blue. Second, we will be controlling our machine using Raspberry Pi. And third, we'll be having a slider to slide object into the desired bin rather than using a robotic arm to reduce sorting time.

3. PROBLEM STATEMENT

To build object sorter machine using TCS3200 color sensor and Raspberry Pi which will sort the objects based on their color and place the objects in different bins based on their respective colors.

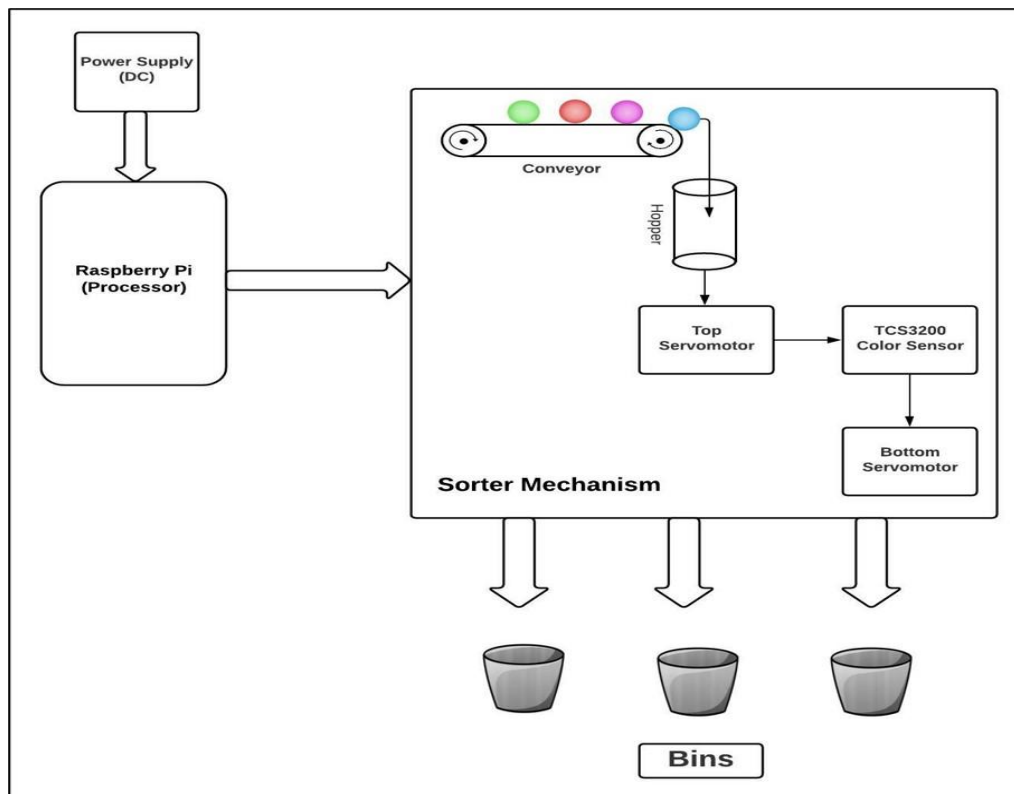
4. LITERATURE SURVEY

K. Murali Chandra Babu, P. A. Harsha Vardhini, "Design and Development of Cost-Effective Arduino based Object Sorting System". As presented, For industrial applications, object sorting is a tough task that requires continuous labor. It is advantageous to design a machine that spots the objects and rearranges them when a product matches predefined standards. This paper approach is proposed to sort the objects by using color identification with the TCS3200 sensor. Identification of color is based on the frequency analysis from the output of the sensor. Chutes are used to place the product for color identification and for moving the container. Arduino nano controls the process of sorting with color identification. This system sorts colored objects and differentiates them objects to a separate case. Cost-effective implementation of the system and size scalability makes the proposed system easier to implement in small-scale industries minimizing the manual power.

S. A. Khan, T. Z. Anika, N. Sultana, M. N. Uddin, "Color Sorting Robotic Arm". As presented, the design and implementation of color sorting robotic arm which can detect the exact position of an object and can pick up the object to place it in designated place. This robotic arm is like human arm which can rotate according to its predefined angles. On the other hand, detecting an object on color basis is done by ultrasonic sensor & color sorting sensor. The heart of this project is microcontroller board ATMEGA328P which controls servo motors used in base, elbow, wrist and grip. The prototype of this project was made and used for picking red, green and blue color objects.

Md. Jamilur Rahman, Deb Prosad Das, Ohidul Islam, Hasan U. Zaman, "A Novel Design of a Robotic Object Sorter Based on Color Differences using Image Processing Techniques". As presented, In the industrial production systems, manufacturers often face difficulties in sorting out colored objects. Human eyes cannot continuously differentiate colors, as they get tired very soon. Using manual sorting, many laborers are needed which can be a huge expense. The aim of this project is to build a robotic sorter, which is capable of detecting and sorting colored objects. It has a robotic arm, which, after detection of color, picks up the object and then place it at a predetermined place as required by the production system. This project is a combination of electrical, mechanical and visual subsystems. A Pixy cam along with the image processing software do the job of color detection. We have used several servomotors for rotating the arms of the robot. The arms can move horizontally from its base and vertically up and down. The gripper is capable of moving quite far for proper gripping of objects. This multi-DOF (Degree of Freedom) robotic sorter can be a very useful tool in fully automating a production process, which uses conveyer belts. The overall improvement in the efficiency of the production process can be significant by using this machine.

5. BLOCK DIAGRAM



6. ALGORITHM

KNN

The k-nearest neighbors (KNN) algorithm is a simple, easy-to-implement supervised machine learning algorithm that can be used to solve both classification and regression problems. We will use this algorithm to classify the color of a new object.

Step-1: Start

Step-2: Initialize the variables for Red, Green, Blue

Step-3: Measure the color values for the selected objects using TCS 3200 color sensor. i.e measure Red component in an object, measure Green component in an object and measure Blue component in an object.

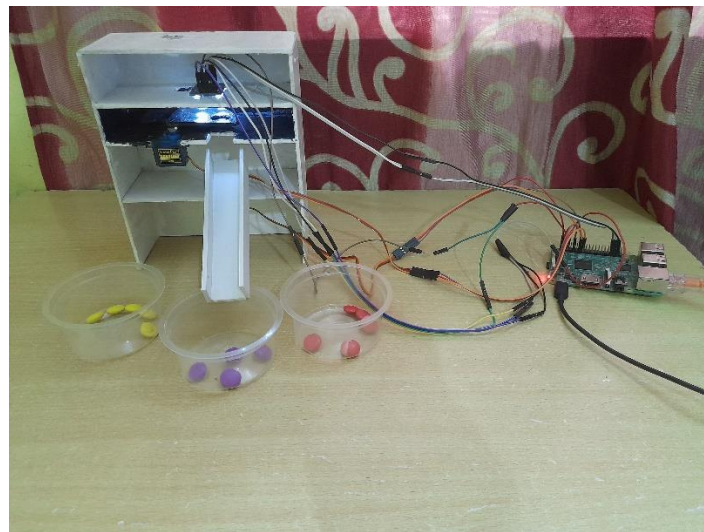
Step-4: By doing step 3, now we get RGB values for an object, store those values in R, G, B variables respectively.

Step-5: Put any object out of selected objects in front of the sensor, now if the detected color value for red==R, detected color value for green==G, detected color value for blue==B then rotate the servo motor by a certain angle to drop and object into the expected bin.

Step-6: If the detected color is out of selected objects, then rotate the servo motor to drop an object in the separate bin kept only for objects out of choice.

Step-7: Stop

7. DESIGN IMPLEMENTATION



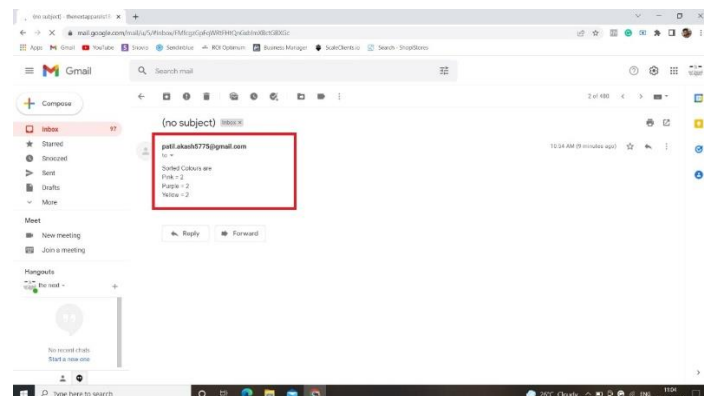
8. RESULTS & DISCUSSION

```

1: #!/usr/bin/env python
2:
3: import time
4: import sys
5:
6: # Define the GPIO pins
7: GPIO.setmode(GPIO.BCM)
8: GPIO.setup(17, GPIO.OUT)
9: GPIO.setup(27, GPIO.OUT)
10: GPIO.setup(22, GPIO.OUT)
11:
12: # Define the motor pins
13: motor = GPIO.PWM(18, 50)
14: motor.start(0)
15:
16: # Define the camera
17: camera = cv2.VideoCapture(0)
18:
19: # Define the color values
20: red = 0.015, 0.015, 0.015
21: green = 0.015, 0.015, 0.015
22: blue = 0.015, 0.015, 0.015
23:
24: # Define the motor speed
25: speed = 50
26:
27: # Define the motor direction
28: direction = 1
29:
30: # Define the motor target
31: target = 0
32:
33: # Define the motor current
34: current = 0
35:
36: # Define the motor error
37: error = 0
38:
39: # Define the motor feedback
40: feedback = 0
41:
42: # Define the motor control
43: control = 0
44:
45: # Define the motor output
46: output = 0
47:
48: # Define the motor status
49: status = 0
50:
51: # Define the motor mode
52: mode = 0
53:
54: # Define the motor state
55: state = 0
56:
57: # Define the motor action
58: action = 0
59:
60: # Define the motor effect
61: effect = 0
62:
63: # Define the motor response
64: response = 0
65:
66: # Define the motor consequence
67: consequence = 0
68:
69: # Define the motor motivation
70: motivation = 0
71:
72: # Define the motor inhibition
73: inhibition = 0
74:
75: # Define the motor excitation
76: excitation = 0
77:
78: # Define the motor deactivation
79: deactivation = 0
80:
81: # Define the motor activation
82: activation = 0
83:
84: # Define the motor deactivation
85: deactivation = 0
86:
87: # Define the motor activation
88: activation = 0
89:
90: # Define the motor deactivation
91: deactivation = 0
92:
93: # Define the motor activation
94: activation = 0
95:
96: # Define the motor deactivation
97: deactivation = 0
98:
99: # Define the motor activation
100: activation = 0
101:
102: # Define the motor deactivation
103: deactivation = 0
104:
105: # Define the motor activation
106: activation = 0
107:
108: # Define the motor deactivation
109: deactivation = 0
110:
111: # Define the motor activation
112: activation = 0
113:
114: # Define the motor deactivation
115: deactivation = 0
116:
117: # Define the motor activation
118: activation = 0
119:
120: # Define the motor deactivation
121: deactivation = 0
122:
123: # Define the motor activation
124: activation = 0
125:
126: # Define the motor deactivation
127: deactivation = 0
128:
129: # Define the motor activation
130: activation = 0
131:
132: # Define the motor deactivation
133: deactivation = 0
134:
135: # Define the motor activation
136: activation = 0
137:
138: # Define the motor deactivation
139: deactivation = 0
140:
141: # Define the motor activation
142: activation = 0
143:
144: # Define the motor deactivation
145: deactivation = 0
146:
147: # Define the motor activation
148: activation = 0
149:
150: # Define the motor deactivation
151: deactivation = 0
152:
153: # Define the motor activation
154: activation = 0
155:
156: # Define the motor deactivation
157: deactivation = 0
158:
159: # Define the motor activation
160: activation = 0
161:
162: # Define the motor deactivation
163: deactivation = 0
164:
165: # Define the motor activation
166: activation = 0
167:
168: # Define the motor deactivation
169: deactivation = 0
170:
171: # Define the motor activation
172: activation = 0
173:
174: # Define the motor deactivation
175: deactivation = 0
176:
177: # Define the motor activation
178: activation = 0
179:
180: # Define the motor deactivation
181: deactivation = 0
182:
183: # Define the motor activation
184: activation = 0
185:
186: # Define the motor deactivation
187: deactivation = 0
188:
189: # Define the motor activation
190: activation = 0
191:
192: # Define the motor deactivation
193: deactivation = 0
194:
195: # Define the motor activation
196: activation = 0
197:
198: # Define the motor deactivation
199: deactivation = 0
200:
201: # Define the motor activation
202: activation = 0
203:
204: # Define the motor deactivation
205: deactivation = 0
206:
207: # Define the motor activation
208: activation = 0
209:
210: # Define the motor deactivation
211: deactivation = 0
212:
213: # Define the motor activation
214: activation = 0
215:
216: # Define the motor deactivation
217: deactivation = 0
218:
219: # Define the motor activation
220: activation = 0
221:
222: # Define the motor deactivation
223: deactivation = 0
224:
225: # Define the motor activation
226: activation = 0
227:
228: # Define the motor deactivation
229: deactivation = 0
230:
231: # Define the motor activation
232: activation = 0
233:
234: # Define the motor deactivation
235: deactivation = 0
236:
237: # Define the motor activation
238: activation = 0
239:
240: # Define the motor deactivation
241: deactivation = 0
242:
243: # Define the motor activation
244: activation = 0
245:
246: # Define the motor deactivation
247: deactivation = 0
248:
249: # Define the motor activation
250: activation = 0
251:
252: # Define the motor deactivation
253: deactivation = 0
254:
255: # Define the motor activation
256: activation = 0
257:
258: # Define the motor deactivation
259: deactivation = 0
260:
261: # Define the motor activation
262: activation = 0
263:
264: # Define the motor deactivation
265: deactivation = 0
266:
267: # Define the motor activation
268: activation = 0
269:
270: # Define the motor deactivation
271: deactivation = 0
272:
273: # Define the motor activation
274: activation = 0
275:
276: # Define the motor deactivation
277: deactivation = 0
278:
279: # Define the motor activation
280: activation = 0
281:
282: # Define the motor deactivation
283: deactivation = 0
284:
285: # Define the motor activation
286: activation = 0
287:
288: # Define the motor deactivation
289: deactivation = 0
290:
291: # Define the motor activation
292: activation = 0
293:
294: # Define the motor deactivation
295: deactivation = 0
296:
297: # Define the motor activation
298: activation = 0
299:
300: # Define the motor deactivation
301: deactivation = 0
302:
303: # Define the motor activation
304: activation = 0
305:
306: # Define the motor deactivation
307: deactivation = 0
308:
309: # Define the motor activation
310: activation = 0
311:
312: # Define the motor deactivation
313: deactivation = 0
314:
315: # Define the motor activation
316: activation = 0
317:
318: # Define the motor deactivation
319: deactivation = 0
320:
321: # Define the motor activation
322: activation = 0
323:
324: # Define the motor deactivation
325: deactivation = 0
326:
327: # Define the motor activation
328: activation = 0
329:
330: # Define the motor deactivation
331: deactivation = 0
332:
333: # Define the motor activation
334: activation = 0
335:
336: # Define the motor deactivation
337: deactivation = 0
338:
339: # Define the motor activation
340: activation = 0
341:
342: # Define the motor deactivation
343: deactivation = 0
344:
345: # Define the motor activation
346: activation = 0
347:
348: # Define the motor deactivation
349: deactivation = 0
350:
351: # Define the motor activation
352: activation = 0
353:
354: # Define the motor deactivation
355: deactivation = 0
356:
357: # Define the motor activation
358: activation = 0
359:
360: # Define the motor deactivation
361: deactivation = 0
362:
363: # Define the motor activation
364: activation = 0
365:
366: # Define the motor deactivation
367: deactivation = 0
368:
369: # Define the motor activation
370: activation = 0
371:
372: # Define the motor deactivation
373: deactivation = 0
374:
375: # Define the motor activation
376: activation = 0
377:
378: # Define the motor deactivation
379: deactivation = 0
380:
381: # Define the motor activation
382: activation = 0
383:
384: # Define the motor deactivation
385: deactivation = 0
386:
387: # Define the motor activation
388: activation = 0
389:
390: # Define the motor deactivation
391: deactivation = 0
392:
393: # Define the motor activation
394: activation = 0
395:
396: # Define the motor deactivation
397: deactivation = 0
398:
399: # Define the motor activation
400: activation = 0
401:
402: # Define the motor deactivation
403: deactivation = 0
404:
405: # Define the motor activation
406: activation = 0
407:
408: # Define the motor deactivation
409: deactivation = 0
410:
411: # Define the motor activation
412: activation = 0
413:
414: # Define the motor deactivation
415: deactivation = 0
416:
417: # Define the motor activation
418: activation = 0
419:
420: # Define the motor deactivation
421: deactivation = 0
422:
423: # Define the motor activation
424: activation = 0
425:
426: # Define the motor deactivation
427: deactivation = 0
428:
429: # Define the motor activation
430: activation = 0
431:
432: # Define the motor deactivation
433: deactivation = 0
434:
435: # Define the motor activation
436: activation = 0
437:
438: # Define the motor deactivation
439: deactivation = 0
440:
441: # Define the motor activation
442: activation = 0
443:
444: # Define the motor deactivation
445: deactivation = 0
446:
447: # Define the motor activation
448: activation = 0
449:
450: # Define the motor deactivation
451: deactivation = 0
452:
453: # Define the motor activation
454: activation = 0
455:
456: # Define the motor deactivation
457: deactivation = 0
458:
459: # Define the motor activation
460: activation = 0
461:
462: # Define the motor deactivation
463: deactivation = 0
464:
465: # Define the motor activation
466: activation = 0
467:
468: # Define the motor deactivation
469: deactivation = 0
470:
471: # Define the motor activation
472: activation = 0
473:
474: # Define the motor deactivation
475: deactivation = 0
476:
477: # Define the motor activation
478: activation = 0
479:
480: # Define the motor deactivation
481: deactivation = 0
482:
483: # Define the motor activation
484: activation = 0
485:
486: # Define the motor deactivation
487: deactivation = 0
488:
489: # Define the motor activation
490: activation = 0
491:
492: # Define the motor deactivation
493: deactivation = 0
494:
495: # Define the motor activation
496: activation = 0
497:
498: # Define the motor deactivation
499: deactivation = 0
500:
501: # Define the motor activation
502: activation = 0
503:
504: # Define the motor deactivation
505: deactivation = 0
506:
507: # Define the motor activation
508: activation = 0
509:
510: # Define the motor deactivation
511: deactivation = 0
512:
513: # Define the motor activation
514: activation = 0
515:
516: # Define the motor deactivation
517: deactivation = 0
518:
519: # Define the motor activation
520: activation = 0
521:
522: # Define the motor deactivation
523: deactivation = 0
524:
525: # Define the motor activation
526: activation = 0
527:
528: # Define the motor deactivation
529: deactivation = 0
530:
531: # Define the motor activation
532: activation = 0
533:
534: # Define the motor deactivation
535: deactivation = 0
536:
537: # Define the motor activation
538: activation = 0
539:
540: # Define the motor deactivation
541: deactivation = 0
542:
543: # Define the motor activation
544: activation = 0
545:
546: # Define the motor deactivation
547: deactivation = 0
548:
549: # Define the motor activation
550: activation = 0
551:
552: # Define the motor deactivation
553: deactivation = 0
554:
555: # Define the motor activation
556: activation = 0
557:
558: # Define the motor deactivation
559: deactivation = 0
560:
561: # Define the motor activation
562: activation = 0
563:
564: # Define the motor deactivation
565: deactivation = 0
566:
567: # Define the motor activation
568: activation = 0
569:
570: # Define the motor deactivation
571: deactivation = 0
572:
573: # Define the motor activation
574: activation = 0
575:
576: # Define the motor deactivation
577: deactivation = 0
578:
579: # Define the motor activation
580: activation = 0
581:
582: # Define the motor deactivation
583: deactivation = 0
584:
585: # Define the motor activation
586: activation = 0
587:
588: # Define the motor deactivation
589: deactivation = 0
590:
591: # Define the motor activation
592: activation = 0
593:
594: # Define the motor deactivation
595: deactivation = 0
596:
597: # Define the motor activation
598: activation = 0
599:
600: # Define the motor deactivation
601: deactivation = 0
602:
603: # Define the motor activation
604: activation = 0
605:
606: # Define the motor deactivation
607: deactivation = 0
608:
609: # Define the motor activation
610: activation = 0
611:
612: # Define the motor deactivation
613: deactivation = 0
614:
615: # Define the motor activation
616: activation = 0
617:
618: # Define the motor deactivation
619: deactivation = 0
620:
621: # Define the motor activation
622: activation = 0
623:
624: # Define the motor deactivation
625: deactivation = 0
626:
627: # Define the motor activation
628: activation = 0
629:
630: # Define the motor deactivation
631: deactivation = 0
632:
633: # Define the motor activation
634: activation = 0
635:
636: # Define the motor deactivation
637: deactivation = 0
638:
639: # Define the motor activation
640: activation = 0
641:
642: # Define the motor deactivation
643: deactivation = 0
644:
645: # Define the motor activation
646: activation = 0
647:
648: # Define the motor deactivation
649: deactivation = 0
650:
651: # Define the motor activation
652: activation = 0
653:
654: # Define the motor deactivation
655: deactivation = 0
656:
657: # Define the motor activation
658: activation = 0
659:
660: # Define the motor deactivation
661: deactivation = 0
662:
663: # Define the motor activation
664: activation = 0
665:
666: # Define the motor deactivation
667: deactivation = 0
668:
669: # Define the motor activation
670: activation = 0
671:
672: # Define the motor deactivation
673: deactivation = 0
674:
675: # Define the motor activation
676: activation = 0
677:
678: # Define the motor deactivation
679: deactivation = 0
680:
681: # Define the motor activation
682: activation = 0
683:
684: # Define the motor deactivation
685: deactivation = 0
686:
687: # Define the motor activation
688: activation = 0
689:
690: # Define the motor deactivation
691: deactivation = 0
692:
693: # Define the motor activation
694: activation = 0
695:
696: # Define the motor deactivation
697: deactivation = 0
698:
699: # Define the motor activation
700: activation = 0
701:
702: # Define the motor deactivation
703: deactivation = 0
704:
705: # Define the motor activation
706: activation = 0
707:
708: # Define the motor deactivation
709: deactivation = 0
710:
711: # Define the motor activation
712: activation = 0
713:
714: # Define the motor deactivation
715: deactivation = 0
716:
717: # Define the motor activation
718: activation = 0
719:
720: # Define the motor deactivation
721: deactivation = 0
722:
723: # Define the motor activation
724: activation = 0
725:
726: # Define the motor deactivation
727: deactivation = 0
728:
729: # Define the motor activation
730: activation = 0
731:
732: # Define the motor deactivation
733: deactivation = 0
734:
735: # Define the motor activation
736: activation = 0
737:
738: # Define the motor deactivation
739: deactivation = 0
740:
741: # Define the motor activation
742: activation = 0
743:
744: # Define the motor deactivation
745: deactivation = 0
746:
747: # Define the motor activation
748: activation = 0
749:
750: # Define the motor deactivation
751: deactivation = 0
752:
753: # Define the motor activation
754: activation = 0
755:
756: # Define the motor deactivation
757: deactivation = 0
758:
759: # Define the motor activation
760: activation = 0
761:
762: # Define the motor deactivation
763: deactivation = 0
764:
765: # Define the motor activation
766: activation = 0
767:
768: # Define the motor deactivation
769: deactivation = 0
770:
771: # Define the motor activation
772: activation = 0
773:
774: # Define the motor deactivation
775: deactivation = 0
776:
777: # Define the motor activation
778: activation = 0
779:
780: # Define the motor deactivation
781: deactivation = 0
782:
783: # Define the motor activation
784: activation = 0
785:
786: # Define the motor deactivation
787: deactivation = 0
788:
789: # Define the motor activation
790: activation = 0
791:
792: # Define the motor deactivation
793: deactivation = 0
794:
795: # Define the motor activation
796: activation = 0
797:
798: # Define the motor deactivation
799: deactivation = 0
800:
801: # Define the motor activation
802: activation = 0
803:
804: # Define the motor deactivation
805: deactivation = 0
806:
807: # Define the motor activation
808: activation = 0
809:
810: # Define the motor deactivation
811: deactivation = 0
812:
813: # Define the motor activation
814: activation = 0
815:
816: # Define the motor deactivation
817: deactivation = 0
818:
819: # Define the motor activation
820: activation = 0
821:
822: # Define the motor deactivation
823: deactivation = 0
824:
825: # Define the motor activation
826: activation = 0
827:
828: # Define the motor deactivation
829: deactivation = 0
830:
831: # Define the motor activation
832: activation = 0
833:
834: # Define the motor deactivation
835: deactivation = 0
836:
837: # Define the motor activation
838: activation = 0
839:
840: # Define the motor deactivation
841: deactivation = 0
842:
843: # Define the motor activation
844: activation = 0
845:
846: # Define the motor deactivation
847: deactivation = 0
848:
849: # Define the motor activation
850: activation = 0
851:
852: # Define the motor deactivation
853: deactivation = 0
854:
855: # Define the motor activation
856: activation = 0
857:
858: # Define the motor deactivation
859: deactivation = 0
860:
861: # Define the motor activation
862: activation = 0
863:
864: # Define the motor deactivation
865: deactivation = 0
866:
867: # Define the motor activation
868: activation = 0
869:
870: # Define the motor deactivation
871: deactivation = 0
872:
873: # Define the motor activation
874: activation = 0
875:
876: # Define the motor deactivation
877: deactivation = 0
878:
879: # Define the motor activation
880: activation = 0
881:
882: # Define the motor deactivation
883: deactivation = 0
884:
885: # Define the motor activation
886: activation = 0
887:
888: # Define the motor deactivation
889: deactivation = 0
890:
891: # Define the motor activation
892: activation = 0
893:
894: # Define the motor deactivation
895: deactivation = 0
896:
897: # Define the motor activation
898: activation = 0
899:
900: # Define the motor deactivation
901: deactivation = 0
902:
903: # Define the motor activation
904: activation = 0
905:
906: # Define the motor deactivation
907: deactivation = 0
908:
909: # Define the motor activation
910: activation = 0
911:
912: # Define the motor deactivation
913: deactivation = 0
914:
915: # Define the motor activation
916: activation = 0
917:
918: # Define the motor deactivation
919: deactivation = 0
920:
921: # Define the motor activation
922: activation = 0
923:
924: # Define the motor deactivation
925: deactivation = 0
926:
927: # Define the motor activation
928: activation = 0
929:
930: # Define the motor deactivation
931: deactivation = 0
932:
933: # Define the motor activation
934: activation = 0
935:
936: # Define the motor deactivation
937: deactivation = 0
938:
939: # Define the motor activation
940: activation = 0
941:
942: # Define the motor deactivation
943: deactivation = 0
944:
945: # Define the motor activation
946: activation = 0
947:
948: # Define the motor deactivation
949: deactivation = 0
950:
951: # Define the motor activation
952: activation = 0
953:
954: # Define the motor deactivation
955: deactivation = 0
956:
957: # Define the motor activation
958: activation = 0
959:
960: # Define the motor deactivation
961: deactivation = 0
962:
963: # Define the motor activation
964: activation = 0
965:
966: # Define the motor deactivation
967: deactivation = 0
968:
969: # Define the motor activation
970: activation = 0
971:
972: # Define the motor deactivation
973: deactivation = 0
974:
975: # Define the motor activation
976: activation = 0
977:
978: # Define the motor deactivation
979: deactivation = 0
980:
981: # Define the motor activation
982: activation = 0
983:
984: # Define the motor deactivation
985: deactivation = 0
986:
987: # Define the motor activation
988: activation = 0
989:
990: # Define the motor deactivation
991: deactivation = 0
992:
993: # Define the motor activation
994: activation = 0
995:
996: # Define the motor deactivation
997: deactivation = 0
998:
999: # Define the motor activation
1000: activation = 0

```

We have implemented an email feature in this project. Which will send an email to the machine operator automatically, with a detailed report of the operation. This means there is no need for an operator to be present at the location.



9. CONCLUSION

A raspberry pi based object sorting system for industrial applications is implemented that is well suited for industries where sorting of objects is required based on its colors. This system sorts colored objects and differentiates the objects into separate cases. Identification of color is based on the frequency analysis from the output of the sensor. Cost-effective implementation of the system and size scalability makes the proposed system easier to implement in small-scale industries minimizing the manual power.

10. FUTURE SCOPE

- The load cell can be added for measurement and control of the weight of the product.
- Speed of the system can be increased by accounting for the speed of production.
- The system can be used as a quality controller by adding more sensors.
- The sensor can be changed according to the type of product.
- The DC motor can be replaced with a stepper motor.

11. REFERENCES

- [1] Khojastehnazhand, M.; Omid, M.; and Tabatabaeefar, A. Development of a lemon sorting system based on colour and size. *Journal of Plant Science*, 4(4), 122-127. (Year - 2010)
- [2] Avishay, D.; Pavlov, V; and Avramov, I. Designing and testing a calibrating procedure for combining the coordination systems of a handling robot and a stationed video camera. *Robotics and Computer-Integrated Manufacturing*, 27(3), 514-520. (Year - 2011)
- [3] Yu, Y-H.; Kwok, N.M.; and Ha, Q.P. Color tracking for multiple robot control using a system-on-programmable-chip. *Automation in Construction*, 20(6), 669-676. (Year - 2011)
- [4] Do, Y. Intelligent worm sorting using robot vision. *Procedia Engineering*, 41(2), 917-922. (Year - 2012)
- [5] Dharmannagari Vijay Kumar Reddy, Sorting of Objects Based On Colour By Pick And Place Robotic Arm And With Conveyor Belt Arrangement, *International Journal Of Mechanical And Robotics Research*, ISSN 2278 – 0149. (Year - 2014)