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# The Material Recognizing Robot

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*Abstract: A Material recognizing Robot is the one which is used to pick up an object and place it in the desired location. It can be a cylindrical robot providing movement in horizontal, vertical and rotational axes. The Robot detects the type of material through its specific weight using the Load cell. The Robot place the dimensionally identical and differ with weight Materials in a Load cell and find the weight of the materials from the weight of materials it identify the required material.*
*Keywords: Density, Specific weight, Sorting, Recognizing, A Rover, End Effectors, Controller, Sensors, Load cell, Actuators.*

## I. INTRODUCTION

The Matrec is a material recognizing, i.e. it has the ability identify the materials. Materials can be differentiated based on their following properties: Density, Specific weight and Conductivity. The above mentioned properties help us in differentiating the materials in their own distinct ways. We have selected specific weight of materials in our project for recognizing materials. A load cell has been used as sensor to sense the weight of the work piece. The signal from the load cell is passed on to the comparator. The comparator produces two different signals (0 or 1), one for correct load and one for high or low load. The signal from the comparator is sent to the 89C51 microcontroller. The pre-loaded program decides the direction of motion of the robot.

## II. LITERATURE REVIEW

Bankole I. Oladapo -The automatic sorting system has been reported to be complex and a global problem. This is because of the inability of sorting machines to incorporate flexibility in their design concept. This research therefore designed and developed an automated sorting object of a conveyor belt. The developed automated sorting machine is able to incorporate flexibility and separate species of non-ferrous material objects and at the same time move objects automatically to the basket as defined by the regulation of the Programmable Logic Controllers (PLC) with a capacitive proximity sensor to detect a value range of objects. The result obtained shows that plastic, wood, and steel were sorted into their respective and correct position with an average, sorting, time of 9.903 s, 14.072 s and 18.648 s respectively. The proposed developed model of this research could be adopted at any institution or industries, whose practices are based on mechatronics engineering systems. This is to guide the industrial sector in sorting of object and teaching aid to institutions and hence produce the list of classified materials according to the enabled sorting program commands.

## III. COMPONENTS USED

### A. Rover
It is the main body of the robot consisting of several rigid bodies like a cylinder or a sphere, joints and links. It is also known as a manipulator.

### B. End Effectors
It is the body connected to the last joint of the rover which is used for the purpose of gripping or handling objects. It can be an analogy to the arm of a human being.

### C. Actuators
They are the drivers of the robot. It actually actuates the robot. It can be any motor like servo motor, stepper motor or pneumatic or hydraulic cylinders.

### D. Sensors
They are used to sense the internal as well as the external state to make sure the robot functions smoothly as a whole. Sensors involve touch sensors, IR sensor etc

### E. Load Cell
They are used to identify the type of material with its specific weight. The load cell is connected to Micro controller through analogue to Digital converter part. The Robot places the material on the load cell and identifies the type of material through its weight.

### F. Controller
It is used to control the actuators based on the sensor feedback and thus control the motion of each and every joint and eventually the movement of the end effectors.

## IV. SPECIFICATIONS OF THE ROBOT

With Robotic Arm Edge,
Command the gripper to open and close,
Wrist motion of 120degrees
An extensive elbow range of 300degrees,
Base rotation of 270degrees,
Base motion of 180degrees,
Vertical reach of 15 inches,
Horizontal reach of 6inches,
And lifting capacity of 100g.
 Some of the added features include a searchlight
Design on the gripper and a safety gear audible indicator s included on all five gear boxes to prevent any potential injury or    gear breakage during operation.
Maximum lift: 100g.
Dimensions: 9"Lx 6 . 3"W x 15" H
Weight -558g

## V. HARDWARE AND SOFTWARE REQUIREMENTS FOR THE PROJECTS

*A. Hardware*
1) The Pick and Place Robot
2) Load cell
3) 8051 Microcontroller Development Board
4) LCD Display Module
5) 4x4 Matrix Keypad
6) Analogue to digital converter

*B. Software*
1) Keil Embedded Software
2) Flash Magic
3) Hyper terminal

## VI. PROBLEM STATEMENTS

*A. Capital cost*
Whilst industrial robots can prove highly effective and bring you a positive ROI, implementing them might require a fairly high capital cost. That's why, before making a decision we recommend considering both the investment needed and also the ROI you expect to achieve. Often the easiest way to get round this issue is to take out asset finance and the ROI of the robot more than pays for the interest on the asset finance.

*B. Expertise*
Whilst industrial robots are excellent for performing many tasks, as with any other type of technology, they require more training and expertise to initially set up. The expertise of a good automation company with a support package will be very important. To minimize your reliance on automation companies you can train some of your engineers on how to program robots, but you will still need the assistance of experienced automation companies for the original integration of the robot.

*C. Limitations*
In recent years the number of industrial robots and the applications they can be used for has increased significantly. However, there still are some limitations in terms of the type of tasks they can perform, which is why we suggest that an automation company looks at your requirement to assess the options first. Sometimes a bespoke automated system may give a better or faster result than a robot. Also, a robot does not have everything built into it, often the success or failure of an industrial robotic system depends on how well the surrounding systems are integrated e.g. grippers, vision systems, conveyor systems etc. Only use good trusted robot integrators to be sure of the optimum results if you do choose to use industrial robots.

## VII. WORKING

We have provided 4x4 matrix Keypad and 2x16 LCD Display for human interface with Robot

Every material has got unique characteristic depending upon their density; the weight of the every material is varying with respect to the constant volume (size) of the materials. We use this principle to identify the type of material.

We use 5 Axis Pick and Place Robot and Load cell based weighing machine to identify the material

We have pre-stored the Data of the materials into the Robot memory. We will instruct the Robot through Keypad and LCD Display to identify the Particular material from available different sources of **same sized** (volume) materials.

The Robot Pick and place the materials on the weighing machine one by one and calculate weight and compare the weights with required material data from its memory. It will display the Result in LCD Display

The Robots are faster and can get the work done in seconds compared to their human counterparts.

They are flexible and have the appropriate design.

They are accurate.

They increase the safety of the working environment and actually never get tired.

The Industry which handling different material can use this Robot for quicker and best results.
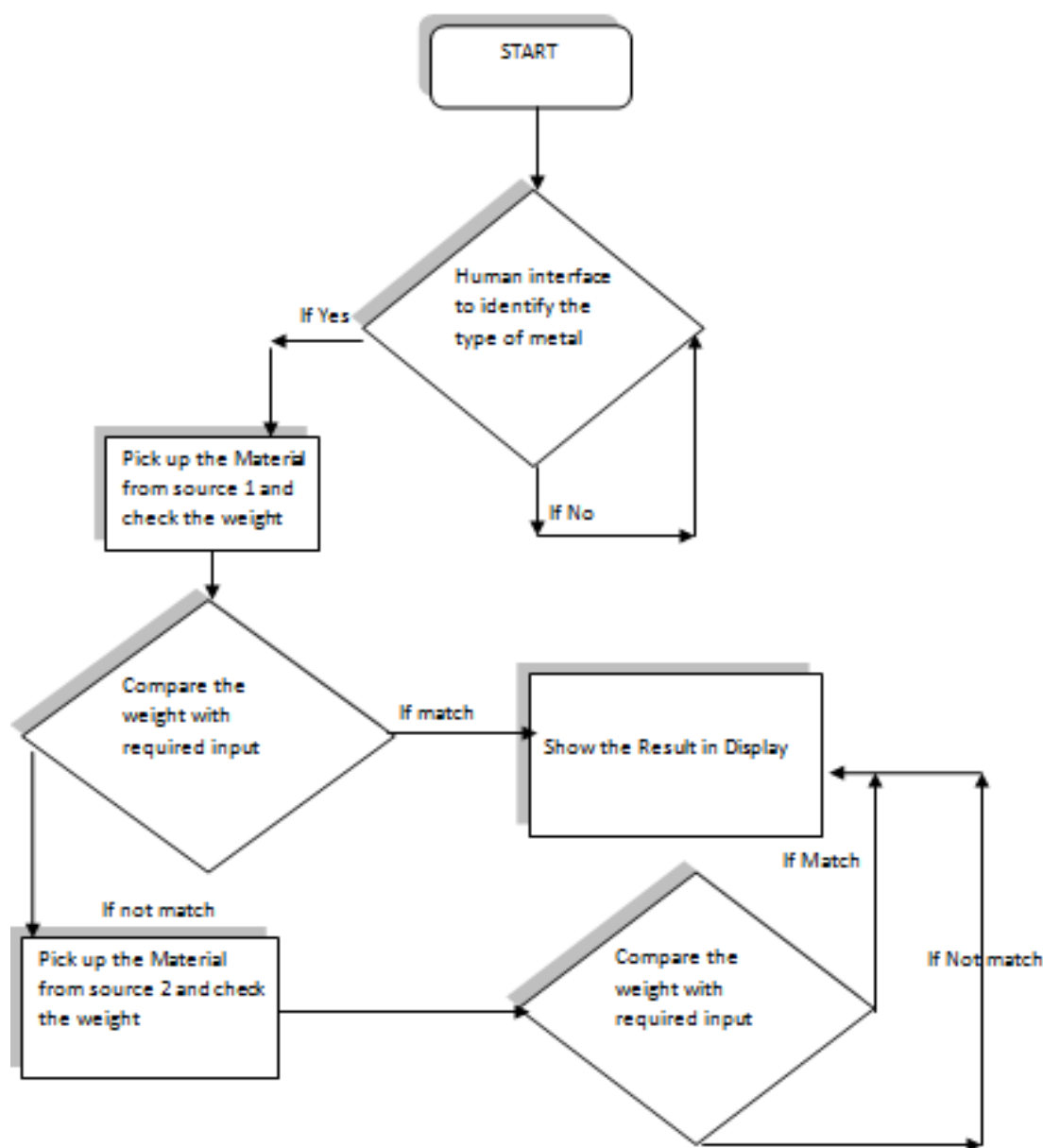


Fig 3. Block Diagram of the Material detecting Robot

Fig 4. Fabricated Material Recognizing Robot

## VIII. ADVANTAGES

A. Before moving further, let us see few reasons why pick and place robots are preferred:

B. They are faster and can get the work done in seconds compared to their human counterparts.

C. They are flexible and have the appropriate design.

D. They are accurate.

E. They increase the safety of the working environment and actually never get tired.

## VII. CONCLUSION

A robot with the capability of recognizing the materials based on their specific weight was fabricated according to the design aspects. The robot has the capability to separate aluminium from other materials based on their specific weights. This robot can be inter faced with the CNC lathe and can be used to bring out a Flexible Manufacturing System in industries. This automation will be the future scope of the project. On interfacing it we can use this robot as an automatic work loading and unloading device.

## REFERENCES

[1]     www.elsevier.com/locate/jestch

[2]     www.universal-robots.com/applications/pick-and-place/

[3]     www.robotics.org/blog-article.cfm/Pick-and-Place-Robots-What-Are-They-Used-For-and-How-Do-They-Benefit-Manufacturers/88

[4]     https://en.wikipedia.org/wiki/Load_cell

[5]     https://pdfs.semanticscholar.org/be85/d89cac6ae3ec5d8ed18431c67c18b9c7ea0b.pdf

[6]     www.ATMEL.com

[7]     www.keil.com

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