ABSTRACT

Mankind has always strived to give life like qualities to its artifacts in an attempt to find substitutes for himself to carry out his orders and also to work in a hostile environment. The popular concept of a robot is of a machine that looks and works like a human being. The industry is moving from current state of automation to Robotization, to increase productivity and to deliver uniform quality. The industrial robots of today may not look the least bit like a human being although all the research is directed to provide more and more anthropomorphic and humanlike features and super-human capabilities in these.

Here how a pick and place robot can be designed for a workstation where loading and packing of lead batteries is been presented. All the various problems and obstruc-tions for the loading process has been deeply analyzed and been taken into consideration while designing the pick and place robot.

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CHAPTER 1

INTRODUCTION

Pick and Place robot is the one which is used to pick up an object and place it in the desired location. The pick and place mechanical arm is a human controlled based sys-tem that detects the object, picks that object from source location and places at desired location. For detection of object, human detect presence of object and move machine accordingly.

The Robotic arm kit is made of two section. The bottom driving unit takes the robot to left, right, forward and backward motion. The top gripper unit is to pick and place any object. The driving unit has two motors and also the gripper unit has two motors. The Robot is strong enough to handle a task like bomb diffusing, transporting, rescue operation etc.

1.0.1 PROJECT AIM AND OBJECTIVE

The aim of this project is design an autonomous robot with complete system allow the robot wander about its environment and to interact with certain object that its encounter. In order to achieve the aim of this project, several objectives are needed to be complete.

1.0.2 IMPORTANCE OF WORK

In this scenario, the industry having a problem by human life in some hazardous duty service. Robot can work in environments so hazardous that an unprotected human would quickly die.

CHAPTER 2

LITERATURE SURVEY

Rocholl, Johann C. "Rostock Delta Robot." Reprap.org. N.p., 14 July 2012. Web. 13 Nov. 2014.

Bonev, Lian. "Parallelmic - The Parallel Mechanism Information Center."Parallemic.org. N.p., 24 Aug. 2014. Web. 13 Nov. 2014.

2.1 Introduction

For our project, we decided to create a pick and place robot. Through our literature search, we found that the basic principles of pick and place robots have been thor-oughly explored, and many of the associated fundamental equations have effectively been solved. However, the optimization of this robots is still a very active field. The main specifications of a pick and place robot are (i) speed of operation, (ii) precision, (iii) maximum load, (iv) range of motion or workspace, and (v) cost.

2.2 Internet Search

Our internet search revealed the wide range of applications for pick and place robots. There are YouTube videos about the robot build, links to GitHub code, and full instruc-tions for how to build a simple pick and place robot. It features a comprehensive parts lists including the types of motors used, battery, modules, specs and more. Basically if you followed the instructions and bought all of the parts, you would have a full working

pick and place robot printer for weekend or twoâAZs worth of work. The useful parts of this internet search include the motor, power supply, and controller details. By looking at how this build is made, we can modify and expand on the work they have already done. The links to the github code leads to the program that many people use to control

the robots for 3-D printing applications. We plan on dissecting this code and seeing if we can use or modify some of the functions.

CHAPTER 3

HARDWARE DESCRIPTION

3.1 Chasis

A chassis consists of an internal vehicle frame that supports an artificial object in its construction and use, can also provide protection for some internal parts.

3.2 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.

S1	S2	S3	S4	Motor
1	0	0	1	Clockwise
0	1	1	0	Anti-Clockwise
1	1	1	1	Stop
0	0	0	0	Stop

H bridge Combination

3.3 Actuation

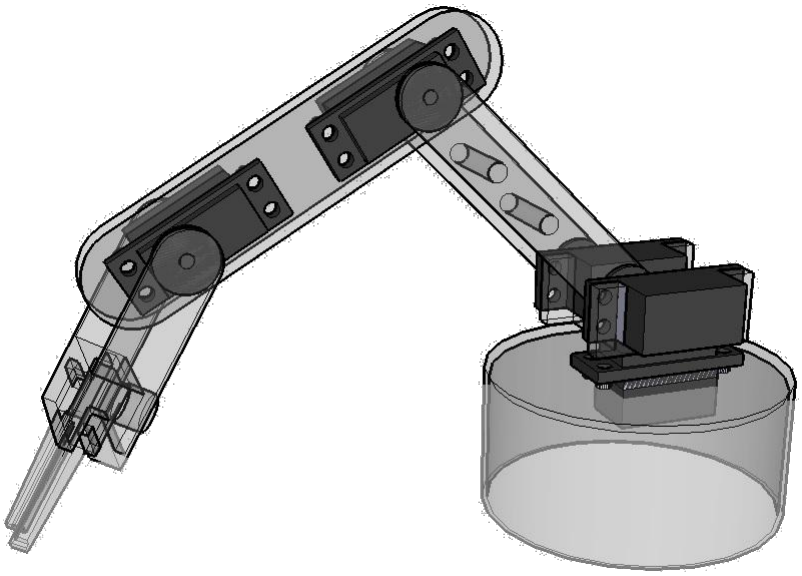
Actuators are like the "muscles" of a mechanical arm, the parts which convert stored energy into movement. By far the most popular actuators are electric motors that spin a wheel or gear, and linear actuators that control industrial mechanical arm in factors. But there are some recent advances in alternative types of actuators, powered by electricity, chemicals, or compressed air.

3.4 Power Source

At present mostly (lead-acid) batteries are used

3.5 Robotic Arm

A robotic arm is a type of mechanical arm, usually programmable, with similar func-tions to a human arm. It includes 4 geared motors, 4 wheels with track belts and arm gripper.



3.6 Bluetooth Module

Bluetooth Module- HC-05 module is an easy to use Bluetooth) module, designed for transparent wireless serial connection setup.

3.7 Arduno Board

Arduino is an open source, computer hardware and software company, project, and user community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world.

CHAPTER 4

SYSTEM ANALYSIS

The various tasks which a pick and place mechanical arm can perform are as follows:

4.1 Pick-And-Place

The use of mechanical arm for placing products in cartons and transfer of cartons and products between different stations in the packaging lines is very common in all indus-tries. High speed pick-and-place mechanical arm for placing small items like candy and cookies in packages are often combined with a visual observation system for identifying products.

4.2 Handling Of Flexible Packages

Flexible packaging material is the generic term for soft packages made of film, foil or paper sheeting. Popular forms are stand-up pouches, bags, sachets and envelopes. These packages are often formed, filled and sealed in a vertical or horizontal form-fill-seal machine. The package is then finally put into a case by top loading.

4.3 Cartooning Machines

Cartooning machines erect boxes from flat sheets of corrugated material. The erected boxes are then filled with products or individual cartons and are then prepared for the palletizing process. As with most packaging machines, vacuum cups, vacuum pumps and other pneumatic components are an essential part of the cartooning.

CHAPTER 5

SYSTEM DESIGN

5.0.1 Controls

The mechanical structure of a mechanical arm must be controlled to perform tasks. The control of a mechanical arm involves three distinct phases - perception, processing, and action.

5.1 FACTORS TO BE CONSIDERED

The various factors to be considered while designing of pick and place mechanical arm are been discussed as follows. The factors are all important while designing procedure of the mechanical arm.

5.1.1 Controls

The mechanical structure of a mechanical arm must be controlled to perform tasks. The control of a mechanical arm involves three distinct phases - perception, processing, and action.

5.1.2 Autonomy Levels Control systems

The classification that takes into account about the interaction between human control and the machine motions

- Teleportation: - A human controls each movement; each machine actuator change is specified by the operator.
- Supervisory: - A human specifies general moves or position changes and the machine decides specific movements of its actuators.

- Task-level autonomy: - The operator specifies only the task and the mechanical arm manages itself to complete it.
- Full autonomy: - The machine will create and complete all its tasks without hu-man interaction.

5.1.3 Safety Requirements

The various safety requirements which were considered while designing the mechanical arm are decided as follows:

- The mechanical arm should not be programmed such that it should damage the Battery while holding it in its gripper.
- Correct holding position should be set as if it not set then while movement of the mechanical arm it may drop the Lead Batteries which can arise a Hazardous situation in the industry.
- The mechanical arm should be interfaced properly with the sensors been placed near the Belt conveyor so as to know when the belt conveyor is to be stopped or to be started to move the batteries ahead.
- Load carrying capacity should be maintained as it should be always more than the default load which is to be shifted.

CHAPTER 6

CODING AND TESTING

```
int motor1Pin1 = 8; int motor1Pin2 = 7; int enable1Pin = 9; int motor2Pin1 = 5;
int motor2Pin2 = 4; int enable2Pin = 6; int motor3Pin1 = 14; int motor3Pin2 =
13; int enable3Pin = 15; int motor4Pin1 = 11; int motor4Pin2 = 10; int
enable4Pin = 12; int state; int flag=0;

    void setup()
pinMode(motor1Pin1, OUTPUT),pinMode(motor1Pin2,
OUTPUT),pinMode(enable1Pin, OUTPUT);
pinMode(motor2Pin1, OUTPUT),pinMode(motor2Pin2,
OUTPUT),pinMode(enable2Pin, OUTPUT);
pinMode(motor3Pin1, OUTPUT),pinMode(motor3Pin2,
OUTPUT),pinMode(enable3Pin, OUTPUT);
pinMode(motor4Pin1, OUTPUT),pinMode(motor4Pin2,
OUTPUT),pinMode(enable4Pin, OUTPUT);
Stop(); Serial.begin(9600);

    void loop() if(Serial.available() > 0) state = Serial.read(); flag=0;

    if (state == 'F') Forward(); if(flag == 0)Serial.println("Go Forward"),flag=1;

    else if (state == 'B') Reverse(); if(flag == 0)Serial.println("Go Reverse"),flag=1;

    else if (state == 'L') Left(); if(flag == 0)Serial.println("Go Left"),flag=1;

    else if (state == 'R') Right(); if(flag == 0)Serial.println("Go Right"),flag=1;

    else if (state == 'S') Stop(); if(flag == 0)Serial.println("STOP!"),flag=1;

    else if (state == 'P') Pick(); if(flag == 0)Serial.println("Pick"),flag=1;

    else if (state == 'Q') Place(); if(flag == 0)Serial.println("Place"),flag=1;

    else if (state == 'H') Hold(); if(flag == 0)Serial.println("Hold"),flag=1;
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else if (state == ’l’) Free(); if(flag == 0)Serial.println("Unhold"),flag=1;

void Forward() digitalWrite(motor1Pin1, LOW); digitalWrite(motor1Pin2, HIGH); digitalWrite(motor2Pin1, HIGH); digitalWrite(motor2Pin2, LOW); digitalWrite(enable1Pin, HIGH); digitalWrite(enable2Pin, HIGH);

void Reverse() digitalWrite(motor1Pin1, HIGH); digitalWrite(motor1Pin2, LOW); digitalWrite(motor2Pin1, LOW); digitalWrite(motor2Pin2, HIGH); digitalWrite(enable1Pin, HIGH); digitalWrite(enable2Pin, HIGH);

void Left() digitalWrite(motor1Pin1, HIGH); digitalWrite(motor1Pin2, LOW); dig-italWrite(motor2Pin1, HIGH); digitalWrite(motor2Pin2, LOW); digitalWrite(enable1Pin, HIGH); digitalWrite(enable2Pin, HIGH);

void Right() digitalWrite(motor1Pin1, LOW); digitalWrite(motor1Pin2, HIGH); dig-italWrite(motor2Pin1, LOW); digitalWrite(motor2Pin2, HIGH); digitalWrite(enable1Pin, HIGH); digitalWrite(enable2Pin, HIGH);

void Pick() digitalWrite(motor3Pin1, LOW); digitalWrite(motor3Pin2, HIGH); dig-italWrite(enable3Pin, HIGH);

void Place() digitalWrite(motor3Pin1, HIGH); digitalWrite(motor3Pin2, LOW); dig-italWrite(enable3Pin, HIGH);

void Hold() digitalWrite(motor4Pin1, LOW); digitalWrite(motor4Pin2, HIGH); dig-italWrite(enable4Pin, HIGH);

void Free() digitalWrite(motor4Pin1, HIGH); digitalWrite(motor4Pin2, LOW); dig-italWrite(enable4Pin, HIGH);

void Stop() // Stop the motors digitalWrite(enable1Pin, LOW); digitalWrite(enable2Pin, LOW); digitalWrite(enable3Pin, LOW); digitalWrite(enable4Pin, LOW); digitalWrite(motor1Pin1, LOW); digitalWrite(motor1Pin2, LOW); digitalWrite(motor2Pin1, LOW); digitalWrite(motor2Pin2, LOW); digitalWrite(motor3Pin1, LOW); digitalWrite(motor3Pin2, LOW); digitalWrite(motor4Pin1, LOW); digitalWrite(motor4Pin2, LOW);

CHAPTER 7

CONCLUSION

This system would make it easier for man to unrivalled the risk of handling suspicious objects which could be hazardous in its present environment and workplace. Complex and complicated duties would be achieved faster and more accurately with this design.

CHAPTER 8

FUTURE ENHANCEMENT

There are many unsolved problems and fundamental challenges for robotics. At a very high level. Manipulation and physical interaction with the real world: We need con-certed modeling and control efforts together with the development of good hardware to make arms and hands that can perform anything but the simplest of pick-and-place op-erations that are prevalent in industry. The pick and place robot is having the very vast area of applications. As we are using android based control the applications broadens to both the domestic and industrial use. The future scope applications of this project are,

- Bomb Diffusion After few modifications of the pick and place mechanism we can improve the robot for the bomb diffusion purpose. Using the web cam we can train the robot to diffuse the bomb hence without putting human life in danger we can fight against the terrorism
- Lab:Our robot can handle dangerous chemicals in chemical lab our in nuclear reactor labs which are hazardous to human body. Having a android control facility and webcam this robot can perform many tasks that human cannot or dangerous for human to handle. With some modifications this robot can be used for helping the physically challenged people.