

# Robotic Arm With Electrical Vehicle

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**Abstract-** The main focus of this work was to design, develop and implementation of competitively robot arm with enhanced control and stumpy cost so that the small scale industry can also use them. The robot arm was designed with three degrees of freedom with electrical linear actuator like structure talented to accomplish accurately simple tasks, such as Fault detection and light material handling, which will be integrated into a mobile platform that serves as an assistant for industrial workforce.

A robot manipulator consists of links connected by joints. The links of the manipulator can be considered to form a kinematic chain. The business end of the kinematic chain of the manipulator is called the end effectors and it is analogous to the human hand. For the end effectors can be a various sensor or can be designed to perform any desired task such as finding various fault heat liege, smock, current liege, etc. The robot arm is equipped with several servo motors which do links between arms and perform arm movements .The servo motors include that a controller (PIC16F631) was implemented. Testing and validation of the robot arm was carried out and results shows that it work properly.

**Keywords-** Sensor (Heat, Smock, Current), Servo motor, Kinematic chain.

## I. INTRODUCTION

A Robot is a virtually intelligent agent capable of carrying out tasks robotically with the help of some supervision. Practically, a robot is basically an electro-mechanical machine that is guided by means of computer and electronic programming. Robots can be classified as autonomous, semiautonomous and remotely controlled. Robots are widely used for variety of tasks such as service stations, cleaning drains, and in tasks that are considered too dangerous to be performed by humans. A robotic arm is a robotic manipulator, usually programmable, with similar functions to a human arm. They have many different functions such as material handling, assembly, arc welding, resistance welding, and machine tool load and unload functions, painting, spraying, etc.

This Robotic arm is programmable in nature and it can be manipulated. The robotic arm is also sometimes referred to as anthropomorphic as it is very similar to that of a human hand. Humans today do all the tasks involved in the manufacturing industry by themselves. However, a Robotic arm can be used for various tasks such as welding, drilling, spraying and many more. A self-sufficient robotic arm is fabricated by using components like micro-controllers and motors.

Due to increase using of industrial robot arms, an evolution to that topic began trying to imitate human movements in a detail mode. The present work is part of a two-phase project, which requires a mobile robot to be able to transport the tools from the storage room to the industrial cell. In this phase in the project, which carried out at MET, BKC, IOE, Nashik the main focus was to design, development and implementation of an industrial robotic arm with stumpy cost, accurate and superior control. This robot arm was designed with Three degrees of freedom and electrical linear actuator talented to accomplish simple tasks, such as Fault detection and light material handling, which will be integrated into a mobile platform that serves as an assistant for industrial workforce.

## II. FINDINGS

Robotic system exist today in industry have an single purpose for an mechanical job but it lack in the adding sensor and fault detection techniques. This robotic arm mainly provide an combination of sensor and hardware for robotic arm.

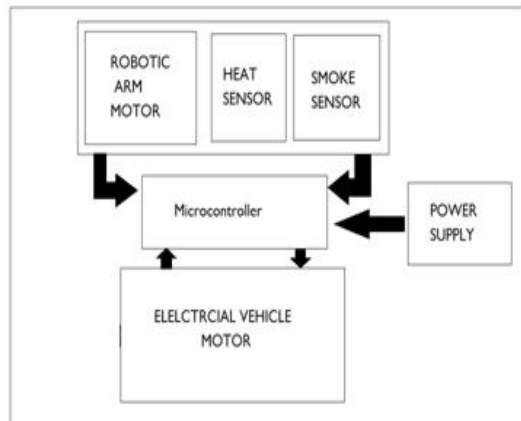
Also an robotic arm have an fixed position for its application which reduces its application limits of machine and hence we have provide an locomotive system so that it can not only provide an mechanical function but also can use in the maintances .

## DESCRIPTION-

This robotic system mainly can divided in two part. Upper part of system mainly consists of an Robotic arm and Sensor box system .where as an lower part of system mainly

consists of an electrical vehicle part . For operation of machine both part of system should work properly.

### III. BLOCK DIAGRAM



### ROBOTIC ARM ASSEMBLY

It's an main part of an system. Robotic arm mainly consists of an sensor system with an robotic arm assembly. Now following are they some of the element used in the system.

- Mechanical Frame
- Servo motor.
- Sensor components

**Mechanical frame-** Mechanical frame mainly provide an support to the system .In this project we have use an steel frame for the Robotic arm. It provide an low weight and good strength for system.

**Servo motor** –In this robotic arm we have mainly use and single servo motor. These servo motors provide an upward and downward direction movement for system. Also by using a single motor for an system we have reduce an complexity of system and it provide an same amount of torque for system to move in all direction. Where as and for left and right movement we can use an electrical vehicle motors.

### Sensor Components-

**Temperature sensor-** LM 35 This temperature sensor is use in this system. Its provide an range of -55 °C to 150 °C. By using this vast amount of temperature rang we can detect any type of heat fault occurred in system. Its required an 4 V to 30 V for operation.

**Fire sensor** - Flame sensor is the most sensitive to ordinary light that is why its reaction is generally used as flame alarm purposes. This module can detect flame or wavelength in 760 nm to 1100 nm range of light source. Its operate on Support 5V/3.3V voltage input.



**Smoke sensor-** smoke sensor is used in this system. When an industry machine has an fault in system its produces an smoke and other gases. Its operate on an 4-5 v power.

### IV. ELECTRICAL VEHICLE ASSEMBLY

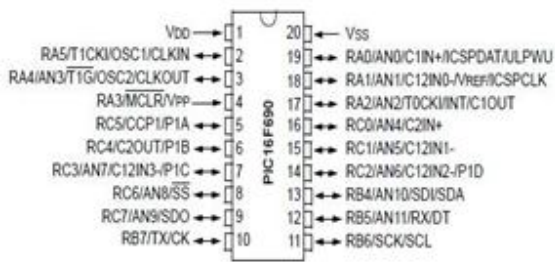
Locomotivness is one of the important properties of this system. Hence we have provide an electrical car for this system. Now following are they components used in this system.

- Electrical vehicle Frame
- Servo motor
- Controlling unit (PIC16F631)

**Electrical vehicle frame** –Electrical vehicle frame mainly provide support for a electrical vehicle motor . it also provide support to microcontroller and GSM communication system. Power supply for system is also place on the vehicle frame . it's a plane steel frame .

**Servo motor-** Electrical vehicle mainly consists of two servo motors. This motor required an 3-4v of supply for operation .This both set of motor is used for moving operation. This motor are controlled by an relay system provided to it. Where as an microcontroller control the relay for motor.

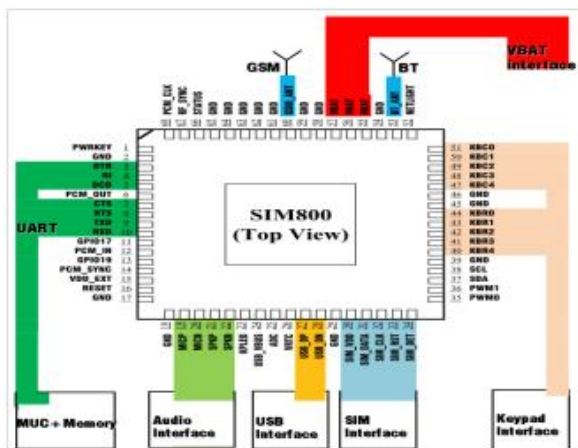
**Controlling unit-** For controlling purpose PIC 16F631 is used. These devices have an 14 bit code memory. It has an 256 byte of EEPROM data memory. It support an 2 programming port. Internal oscillator is up to 8 MHZ - 32MHZ.This include an 12 channel of 10 bit A/D an analogy comparator module with two comparator programmable on chip voltage references.



**V. COMMUNICATION UNIT**

For providing Data to mobile system from sensor we have use GSM system. For this project we have use an SIM 800 design. This system use an Designed for global market, SIM800 is a quad-band GSM/GPRS module that works on frequencies GSM 850MHz, EGSM 900MHz, DCS 1800MHz and PCS 1900MHz. SIM800 features GPRS multi-slot class 12/ class 10 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4.

SIM800 is designed with power saving technique so that the current consumption is as low as 1.2mA in sleep mode



Hence by using this GSM system sensor will provided data to an mobile number which is provided in programming. This include data from a Heat sensor, Smoke sensor, Fire sensor .By using this system operator will get an real time data

**VI. WORKING**

In this system both robotic arm and electrical vehicle were controlled by a microcontroller. When controlling signal is send by devices to Bluetooth connected module it operate an command. This signal provide an basic instruction for movement of robot . when a fault occurred at the machine Sensor will detect it and send signal to microcontroller . Now

microcontroller will provide signal to GSM system . This GSM system will send an message to mobile number which include in programming. Hence by using an GSM and Microcontroller system we can control this robot.

It will also provide an real time data for system .which will be useful for analysis purpose .

**Application**

- It is useful for small scale industry.
- It is mainly useful for fault analysis in machine
- Fire and Smoke condition for machine can detect by robot.
- It can work in hazardous condition.
- It can provide a Real time data of industry machine.

**VII. CONCLUSION**

Hence this system provide an real time data for Industry . This system is a combination of sensor and robotic arm .This system is not only low cost as compare to existing system but also contained an ability to fault detection. This system also consume less amount of power.

Also its compact size provide great amount of mobility. Hence it has number of advantages to existing system.