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AN INTEGRATED AND UNIQUE AUTOMATION SYSTEM WITH AXIAL ROBOTICS

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Abstract - The domain of Automation is thriving across the globe with a fantastic speed and features. A lot many types of applications arena are being addressed and also under consideration to implement a many others futuristic scenario. In contrast the project has been chosen for this particular field up importance in order to make the demand by industry learners and academies as well. MNC s plays an important role still the chance is open to welcome medium size company also to make PLC platforms as per local demands and budgetary frame. In most of the cases it is founded the big corporation often design their own portfolio and accordingly come out with the total solution through embedded customizes chips . In this way they manage their secrecy , profitability and control over the industry concern. In lieu with this standard portfolio to boast up local industry flexible PLC system can go in a big way and find also sizable export market.

Therefore our group has already framed a small PLC console with dry some apps of advanced nature and found working fine. The extendibility of this system is tremendous of upgraded to any scale as per the requirements of the customers within our preview selection of our 2 to 3 robotics apps blended with machine intelligence and auto control facility have been taken care off. The overall power consumption is considerably low and compromising with the quality never comes.

It is our strong belief that through support from federal government, other venture capitalists.

Keywords - domain of automation, PLC system, extendibility of the system, machine intelligence, auto control facility.

INTRODUCTION

The proposed work has been chosen which has got tremendous potentiality in terms of understanding application. It is now often found in industries that PLC domain is increasing at fantastic scale and industries ranging between micro to large all are thriving towards installation of varied nature of automation system coupled with robotics, photonics and other important industrial applications.

The core sectors like petrochemical, cement, fertilizers, rubber, power, nuclear etc. mainly going for a larger PLCs made of industrial giants like Alien-Bradley, Daniele Automation etc. where smaller organizations they bring in their choice of china or Russia made PLCs.
In light of above we attempted to focus our engineering expertise to make in a miniature scale covering all important features as like that of a professional PLC. It is needless to say that all PLC incorporate sophisticated processor with tremendous speed, similarly in our project out

of a lot of industrial MCU manufacturers to boost up and employ for providing necessary features. Our selection was addressed towards an industrial giant ATMEL corporation. INC USA those who make and supply globally there products with optimum reliability.
ATMEL 89C2051 chip is extremely reliable, tiny in size, les power consuming product but with a fail-safe design.
We have checked reached for many ours and the group is satisfied with the condition. The unique features will further enhance possibility of uses for our juniors to act as an engineering tool kit.
Along with this as prominent apps interfaced 2 to 3 axial robotics to execute various operations like loading-unloading auto sawing etc. in place of installed apps as per custom requirement many other apps can be handshake in course of time.
Therefore technologically and commercially it is our firm belief of group that this project will bring an era of industrial electronics in a Indian subcontinents.

OBJECTIVE AND SCOPE OF THE PROPOSED WORK

The objective of the proposed work is to design an integrated and unique automation project with Axial Robotics. In which three apps can be run when interfaced with microcontroller. The primary purpose of the proposed work is to show how the automation industries work.it enables the user to run multiple apps at the same time by only one instruction . the user can also very time sequence of apps as per the requirement of the productivity of the apps. It saves the time and the productivity of the industries is increased. Now a days industries take huge interests in PLCs. There are many PLCs available in market so, there is no second thought that there will be a time when industries will be fully automated. So, the scope of PLC is huge.

THE METHODOLOGY OPERATION OF THE SYSTEM

Our main scope of this system is to design an reliable PLC device. As we know the core sectors and other industries become more and more automatic day by day. Our PLC system consists of AT89C2051 microcontroller, SIP network, clock , relay , oscillator etc. The industries now a days option for more and more automation so, PLC is the system they are looking for. This system has the power to make 15 devices work at the sequence the user wants.
The power supply of PLC get the power by SMPS and it started working. There is a potentiometer attached to the device to change the sequence of duty cycle. In our project we are showing 3 applications cutter, loading , unloading and opt annunciator to show how our PLC works. The program is already set on the microcontroller so as the microcontroller get power on it process the program and as the port change their set an led to notify which port is ready to work here we connect 4 port. So, 4 led are connected and the work started in the applications. There is also other components are present there to support the PLC and work properly. There exists a network block which consists of two SIP (A472J) in opposite direction from each other. There exist also a buffer block consist of transistor to amplify the current and it's also need to be biased by resistor to get the proper power to start the applications. There is also a 2^{nd} power supply attached to the applications to start the devices to work.
At first the three applications run at a same time for a checking purpose then at first cutting machine will run then loading- unloading and then Led strip. We can also work all 3 device at a same time but for showing purpose it is programmed at one after another.

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GENERAL DESCRIPTION OF COMPONENTS

i. *ATMEL 89C2051 Microcontroller*

The AT89C2051 is a microcontroller depend on Intel 8051 core , the AT89C2051 series remains very familiar as general purpose microcontrollers, due to their industry standard instruction set , low unit cost and availability in DIL(DIP) packages.

AT89C2051 has 2K bytes of reprogrammable flash memory. The range on which it operates is 2.7V to 6V. It has internal RAM 0f 128x8 bit. There are 15 programmable input output lines, two 16 bit Timer or counter, 6 interrupt sources, 1 programmable serial UART channel, Direct Led Drive outputs. It has low modes. The Idle Modes stops the CPU while enabling the RAM , timer, counters, serial port and break in the system to continue functioning. The power down mode saves the RAM contents but sotore at very low temperature to the oscillator disabling all other chip functions until the next hardware reset.

ii. *CRYSTAL OSCILLATOR*

Crystal oscillator is an electric device that is used to generate periodic oscillating electronic signal. The signal produced by the oscillator is square wave or sine wave generally. The signal is generated by utilizing the vibrating crystal's mechanical resonance made of piezoelectric material. Quartz crystal is the most used material in these oscillators.

iii. *IC 7805 VOLTAGE REGULATOR*

7805 is a voltage regulator or integrated circuit. A voltage regulator is a system designed to automatically maintain a cinstant voltage lebel voltage sources in a circuit may have fluctuations resulting in not providing fix voltage outputs.

iv. *IC 555 TIMER*

IC 555 timer is an IC which can produce very accurate time delays and oscillations. This IC has 3 operation modes- astable, monostable and bistable .

This IC is made by using various components like transistors, resistors, diodes and flip-flops. Operating range of the IC range between 4.5V to 15V DC supply. This has 8 pins . the 8 pins are consists of 1 GND , 1 Trigger , 1 Output , 1 Reset , 1 Control voltage , 1 Threshold , 1 Discharge and 1 Power supply pin.

v. *SIP (SINGLE INLINE PACKAGE)*

A single inline package is a computer chip package that contains only a single row of connection pins this is different from dual inline package (DIP), which have two rows of connected pins. A single inline package may also be known as single inline pin package (SIP).

SIPs have been used to package various resistors and RAM chips with a common pin.

vi. *RELAY*

A relay is an electrically operated switch. It consists of a set of input terminals for a single or various control signals, and a set of running contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, or combinations thereof.

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WORKING OF THE SYSTEM

From the circuit diagram. We see that the AT89C2051 a 8 bit microcontroller with 2K bytes of flash programmable and removable read only memory (PEROM). It is a low voltage , high executed CMOS. It is major part of our project.
Microcontroller get into work after the power supplied and it has 15 ports put here we use only 4 ports to show output. We connected crystal oscillator with microcontroller which acts as an oscillator here (to shift the resistor one after another which is in microcontroller to able to show us output (as in apps) of the system one by one) we also added a time buffer to the microcontroller to change the sequence of duty cycle.
Microcontroller output is always 1.8 volt (approx.) which is sufficient to do any work so we need multichannel driver array direct SIP (single inline package) network. Here we are using two SIPs A472J which positioned on opposite direction from each other.
When the power is coming out from SIP the amount of power is huge that it can cause serious problems in the circuit. So we have to reduce the power , and here we are using Transistor to step down the power to our required one and transistor also biased by resistor to provide direct current. From buffer the power goes to CLR (current limiting resistor) to limit the power to require which is essential from the LEDs.
Now the power goes to relay drives. Here we use 4 relay drives for our output purpose. Relay drives are acts as a switch.
Here in this project we are using 3 small applications but our PLC can do the same job over big applications if we simply change the size of drives. From EM drive the power goes to our 3 small application cutter, loading- unloading and opt annunciator. To run the applications we have to give DC power supply to those applications.

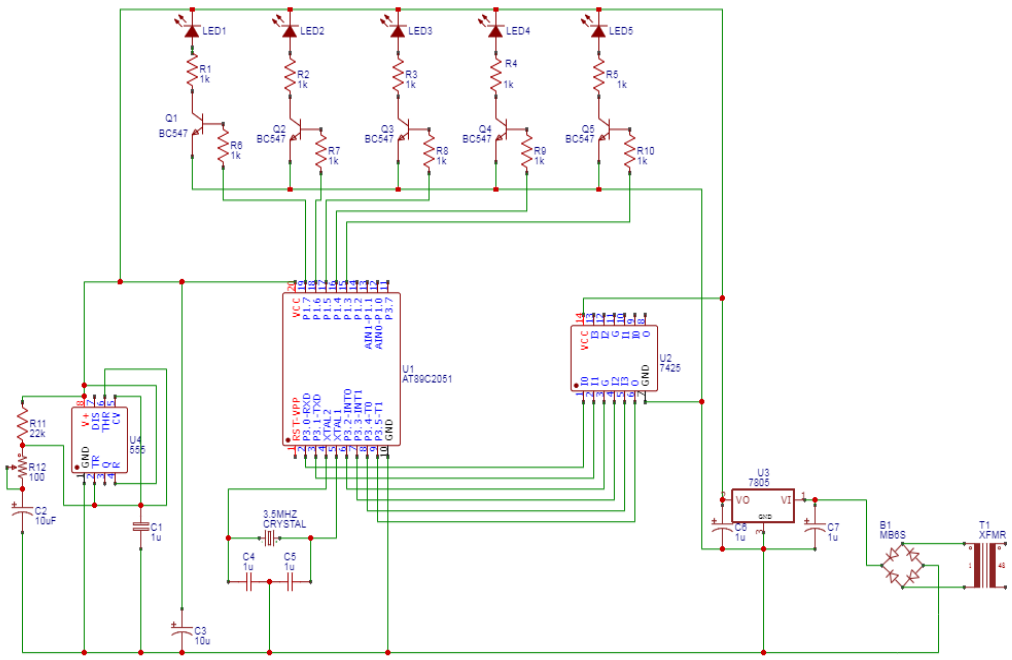

FIG 1: CIRCUIT DIAGRAM OF THE PROPOSED SYSTEM

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FUNCTIONAL FLOW CHART

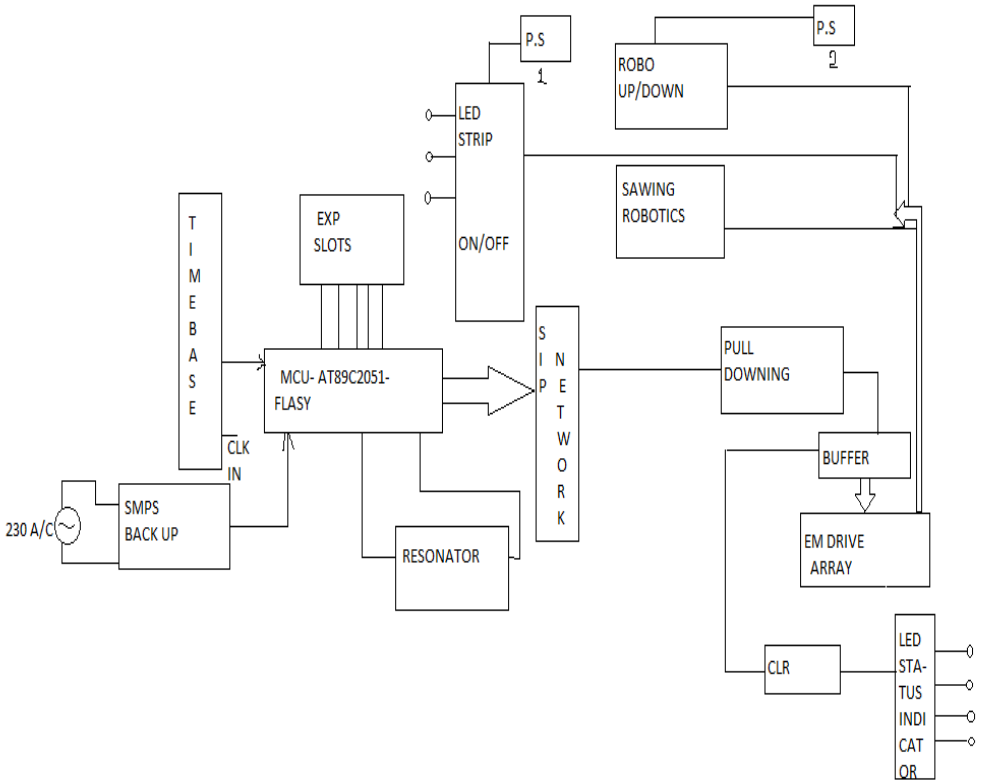

FIG 2: FLOWCHART OF PROPOSED SYSTEM

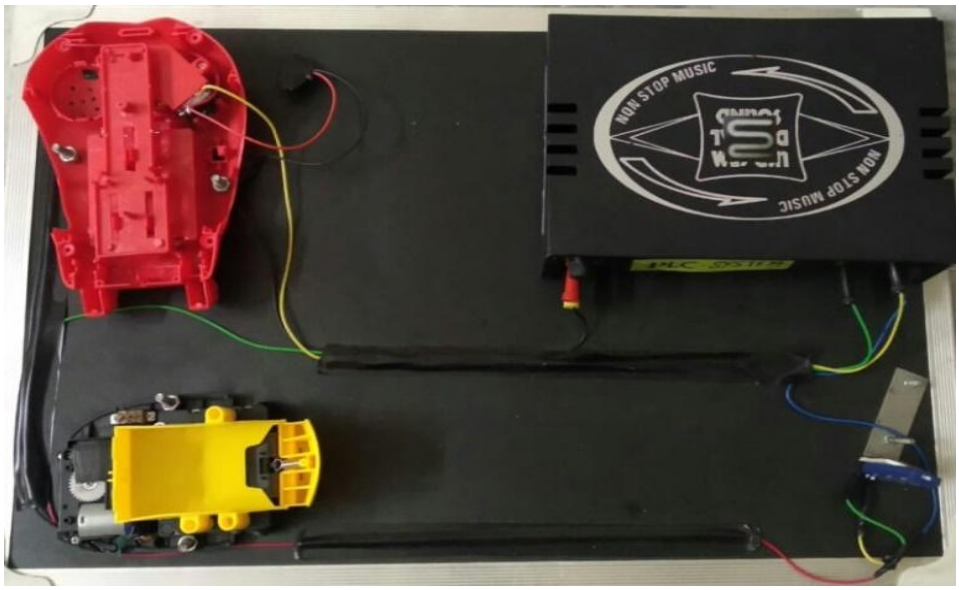

FIG 3. PROTOTYPE OF THE PROPOSED SYSTEM

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CONCLUSION

The proposed work includes an integrated and unique automation, every industry is now going for automation. So, programmable logic control unit become more and more reliable, but the price of PLC also increase with market interest. So, we want to make an PLC which is both effective in respective to work and also the cost is low. Our PLC can also work on a power supply .We also can change the sequence of duty cycle to increase and decrease the time for the Robotics applications will run. We can get the work form those Robotics apps at a time or a sequence wise as the user wants. We can work with 15 Robotics apps at a time. AT89C2051 microcontroller use in this PLC system. The microcontroller chip is a small in size which has number of pins but processing of this chip is 100 times multiple of microcontroller chip 8051.

FUTURE SCOPE

1. Now day's industries take huge interest in PLCs. There are many PLC's available in market. SCADA drive is the professional PLC. In industries they are going for PLC so there is no second thoughts that there will be a time when the industry will be fully automated. So, the scope of the PLC is huge.

2. PLC has 15 input output ports so at a time it can control 15 devices easily. But the size of PLC is same. So, our made PLC can control any device or app from small in size to large there is no problem but we have to change the relays.

3. This PLC's part was assembled by us so the cost is very less and this PLC is very much compatible with the applications.

4. Time taken by PLC is very less than an average person. So industry prefers it and also cost cutting is also the matter.

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