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DEVELOPMENT OF AN EFFECTIVE AND CONVENIENT BED SIDE CONSOLE SYSTEM

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ABSTRACT

The engineering industry is a vast updating field in Sri Lanka as a developing country. During the internship period I have found some drawbacks of the current system and develop a cost effective and convenient way to guest room lighting solution. This research is concerned on the circuit modification in a cost effective manner. Also this further considered on saving energy by system automation. This research used Dimmer circuit and port expander integrated circuit (IC) to the proposed system. ATmega8 microcontroller and MCP23008 are used to implement this research. ATmega8 microcontroller is used with the consideration of the initial cost. BT136 Triac, MOC3021 Opto coupler and Relay are used for design the "air condition controller", "dim beside the light of TV" and "inside light of room". Additionally, 4*3 Keypad is used intend of BSC. By adding "Dimming Circuit" into a Relay Control unit [RCU] can provide safe, convenient and reliable service for guest in order to prevent eye problems by controlling the light intensity. The new system is able to control guest room's A/C level, by fixing a temperature sensor to a room. According to the temperature readings the level of A/C will change. It is done by add a "PWM Fan Control Unit (FCU)" to RCU. This automatically temperature control system tends to save energy. There are so many technological findings in this field of lighting solution system and these can be used for gaining competitive advantage of a company over its competitors, and this can be further improve with more features as a future work.

Keywords: Bed Side Console System, Lighting Solution, Dimming System, Temperature control system

1. INTRODUCTION

This research is on developing a cost effective, energy saving and convenient way of lighting control solution for a guest room. The existing system has limitations to both of the manufacturer and client when design it and using it and they are as follows.

- High cost of the existing system
- Lack of controlling power of the intensity level of lights tend to health issues
- Waste of Energy

This new system is developed through identification of such significant cost creating procedures and components as well as inconvenience of existing system. The guest room lighting control system allows visitors/ hotel guests to experience comfort through bed side consoles from the comfort of the bed with a touch. Intelligent microprocessor-based system enabling user to operate all systems in the room such as lights, air conditioning, TV, music system, etc.

2. EXPERIMENTAL

For the research design it is used the components such as ATmega8, MCP23008 8-Bit I/O Expander with Serial Interface, 4*3 expander, Transistor, Relay unit and as well as this project used tools such as PCB drill, multi meter, soldering iron and sucker pump. To design the circuit as a solution for the problems of existing system, it is used the I2C-bus which allowed bidirectional, two-line communication between different ICs or modules also used Pulse Width Modulation (PWM), which is a technique used to generate analog output signal using digital signals which is commonly used to control average power delivered to a load, motor speed control, generating analog voltage levels and for generating analog waveforms.

This project used the Proteus software for microprocessor simulation, schematic capture, and printed circuit board (PCB) design also MikroC AVR software as programming language of the microcontroller[1].

2.1 Research Improvements

- Existing bed side console system consists with Programmable IC and Dual Layer Compl ex circuit system. But by using a single IC can design the whole system with same functi

oning. By this can cut off unnecessary component cost and can make simple bedside cont rol unit with cost effective manner. Company can invest the savings money to other proje ct and client also benefited with the price margins.

- This system is only operates for switch "on and off" commands, but for operating it to a dimming or light intensity control system, can add "Dimming Circuit" into a Relay Contr ol unit [RCU]. This may provide safe, convenient and reliable service for guest in order t o prevent health problems.
- The new system is able to control guest room's A/C level, by fixing a temperature sensor to a room. According to the temperature readings the level of A/C will change. It is done by add a "PWM Fan Control Unit (FCU)" to RCU. This automatically temperature control system tends to save energy[3].

2.2 Implementation of the Circuit

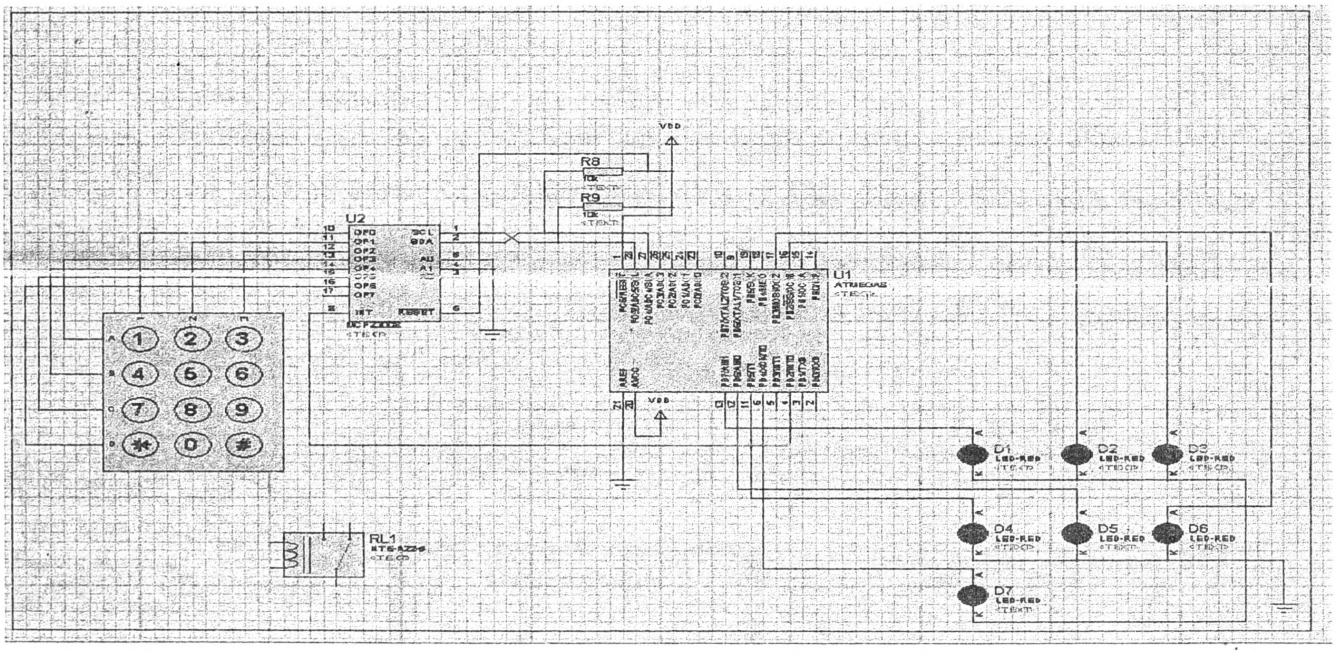

Figure 1: New design circuit by software

As in the above brief description about present system, here the modified systems also implement in order to have a cost benefit to company and create a comfortable environment to the guest. But the real difference in this system is one layer has been used in manipulation of the device due to the IC "MCP23008" and can process all the functions that can be done through bilayer technique.

3. RESULTS AND DISCUSSION

The final outcome of this research is to minimize the cost and the energy conserved in a guest room and modifies the system as more convenient place for the user. Currently Metropolitan Company used a bed side console for the purpose of guest room lighting system and that contain some drawbacks regarding with the cost, energy and safety aspects.

The existing system has no option of dimming system and only has a switch on/off option. This may create a health issue for a guest when the time of watching television, as well as the user cannot control the light intensity as per his/her convenience. But the new design comes up with the design of "dimming system" as a solution for this problem and also this save energy. This health advantage can be informed to both the client (Hotel, Guest house) as well as to the users (guests). Then automatically by time the customers tend to go for a guest house which has these kinds of modern system. It will result in increasing the projects to the manufacturing company, more business opportunities and energy savings to the client company.

When considering the research methodology, this research used dimmer circuit and port expander integrated circuit (IC) in my proposed system[2]. ATmega8 microcontroller and MCP23008 are used to implement this research. ATmega8 microcontroller is used with the consideration of the initial cost. BT136 Triac, MOC3021 Opto coupler and Relay are used for design the "air condition controller", "dim beside the light of TV" and "inside light of room"[4]. Additionally, 4*3 Keypad is used intend of BSC.

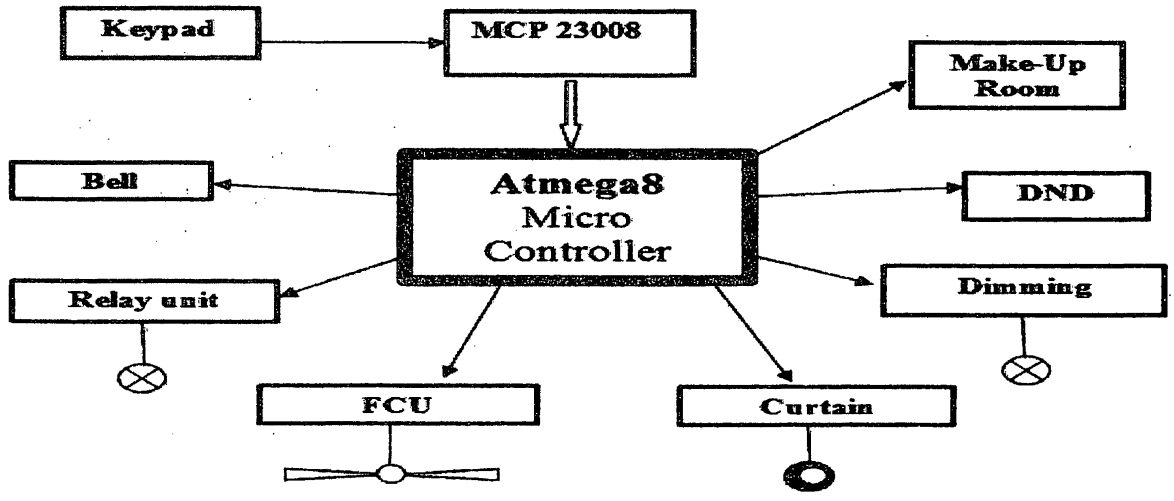

Figure 2: Research design method

The resultant device has an "MCP23008" IC and it designed to give out serial connection for parallel connections. This device contributes lot of advantages to Metropolitan Company during the technical site surveys. Instead of using expensive number of components in a complex system, this simple new system can functioning all operation using one IC. This may minimize excess cost of manufacturing and those savings can be used for another company

projects or new improvements. Also with these cost savings manufacturers tend to reduce the price margins and this will benefit to the client when purchasing the new system.
Also the new system is developing with a temperature sensor to control guest room's A/C level according to the temperature readings. This will result in more energy savings and the client company gets more benefit. Therefore they are tending to purchase a new system from the manufacturer and the number of projects of the system owns company.

4. CONCLUSION

As a developing country, Sri Lanka is experiencing an exponential growth in technological advancements in the field of engineering. As a leading company in engineering field, there is a huge competition with the other co-companies both in local and foreign companies. Always to be success as the service provider, company need to provide low cost, high quality, high accuracy, high efficiency and safety service and product to client. Using this type of new designs company can achieve these targets easily in an effective and efficient manner.

This new design eliminate unnecessary cost components, gives more savings, consider user health and safety more than the existing system, this will give advantages to the whole parties. This system can be recommend as one of the best feasible solution in bed side console system, this can be further developed and market with the support of the company in financial aspects.

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