Design and Development of Signage Displays

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Abstract— Previously, operating the signage displays using microcontroller already existed. Displays were wired to the microcontroller and updated through software programme. There is limitation with this method due to wired connections to use software to update the displays. In this paper, another further approach will be carried on by only using mobile phone to update the displays through GSM module. Solar energy will be the source of energy for this project.

Keywords— GSM, Microcontroller, Signage

1. Introduction

Signage has been used to convey messages and information to the people. It has evolved from conventional to the digital signage. During the old days, conventional signage has been utilized using printed papers or handwritten. Digital signage normally used in industries such as food and beverage industries, shopping malls, universities and also highways to show information and messages. Normally, all the displays are linked to a control system whereby update process can be done. In other words, displays update can only be done in one place only. Therefore, to ease the job for people, updates should be able to carry out anywhere not necessary at one place. This paper shows how GSM module can be used as interaction with the microcontroller to improve the signage displays update.

2. Objectives and Scopes

2.1 Objectives

I. To write and upload the source code for the microcontroller chips
II. To build a MCU circuit board to interface with the GSM modem and 8 x 8 dots matrix displays
III. To build the multiple 8 x 8 dots matrix displays.
IV. To power up the signage displays using solar energy.

2.1 Scopes

I. Using mobile phone to update the information displays instead of using software.
II. Avoid unnecessary travelling to update the displays for the digital signage.
III. Using solar panels to power up the project.

3. Literature Reviews

Lim Sheng has done a project on Multi-level dots matrix display. The overall design of his project is to display the information on the matrix display by using Visual Basic software through PIC microcontroller [1]. In his paper, he describes that changing of content can be done by reprogramming the codes in the microcontroller. In other words, is to refresh the memory and download a new source code into it. The main components in his project are a LED matrix display and microcontroller. Information is programmed into the PIC 18F877A microcontroller and decoded it to enable all the port from Port A to give bits to 48 LED in the dot matrix column. Proteus VSM Source Code Editor is used to programme the code.

Huang Wei described on how to use web-based remote control as user interface to change the contents in the LED Dot Matrix Display [2]. User can send data and control this LED panel using web browser. Web controller will generate a web page after connection is established from the computer. Instructions will appear in the web page on how to enter messages. These data will transfer to the web controller via internet protocol. These data will be transmitted using IR transmitter to the LED matrix display. The whole process is a one way signal transmission.

Siti, Isolehah had used mobile phone with GSM modem to send text message to user in her project, Smart Security Alert System via SMS [3]. AT89S52 chip interfaced with sensor ,GSM module and the alarm circuit. Whenever there is sign of break in, programmed AT89S52 chip will send signal to the relay driver circuit. This driver will operate the GSM modem in the mobile phone to send alert SMS to the user and switch on the alarm.

According to the previous studies shown, different methods of interfaces has been use for updating their displays contents. Lim Sheng has used PIC microcontroller to display the informations on dot matrix display. Through computer, visual basic programe is used to change the information on the dot matrix displays. Range of microcontrollers are wide. For instants, PIC and Atmel microcontroller. Any microcontroller can be used as interface as long as appropriate assemble languages are used for programming. As for Huang Wei ,the signage display is configured using websites whereby web controller is applied in his project.

As for this project, method proposed is sending messages using mobile phone, received by GSM and transmit the information from GSM to the microcontroller. Lastly, information stored in the microcontroller will be display in the dots matrix display. The microcontroller chip that will be used is Atmega328P chips from ATMEG company. Compared to PIC microcontroller, Atmel chip is relatively bigger in size compared to PIC chip. Atmel chip has serial capability whereby PIC do not have this feature [4]. Serial Capability allows coding to be programmed into the Atmel chip using Serial to USB converter connect to the Arduino Software where sketch uploads can be done. PIC chip uses pipelining which the Atmel did not. Pipelining means every instruction in memory has to be fetched only can be executed.
4. Methodology

4.1 Setting up Atmega328P microcontroller board, LED dot matrix displays and GSM module.

4.2 Programming Code Sketching.
Programming code will be written and compile in Arduino IDE software.

4.3 Code uploading into Atmega328P chip.
FTDI serial to USB converter will be used for serial communication purposes. Once the software and the Atmega328P successfully recognized, coding can be upload into the microcontroller chip.

4.4 PCB Board for Atmega328P.
The Atmega328P will be using PCB board for the final end product.

4.5 Solar panels to power up the entire modules and enclosure to protect the microcontroller circuits.
Suitable solar panels will be used and place outside on the enclosure to generate power for the project and charge the battery. The whole project will be place into the enclosure for protection purpose.

5. Expected Results

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<tr>
<th>Input (SMS)</th>
<th>Expected Output on displays</th>
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<td>Text message will be sent from mobile phone.</td>
<td>Dot matrix will show the content on the LED display.</td>
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6. Conclusions

In conclusion, Atmega328P set up has to be extra careful as the chip is very sensitive especially the operating voltage. Crystal and capacitors are important to have in the connection of ATmega328P for programming purposes. Microcontroller plays the important role in this project. It is used as the interfacing circuits between the LED dot matrix display and GSM module. Serial programming is the major work in this project to programme the ATmega328P.

References


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