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55:036 Embedded Systems

Post-Lab Report 2

Each report must start with an introduction that summarizes the problem

1. Introduction

The goal of this lab was to create a microcontroller based RC5 Manchester pattern generator which is activated by a momentary pushbutton switch and will act as a mute button for any TV using the RC5 standard. We used loops to generate the delays necessary for creating the 36kHz carrier signal and for timing the bit patterns and breaks between messages.

Organize the report in different sections

2. Schematic

Figure 1 shows the circuit design as it was implemented, with PB0 as the input and

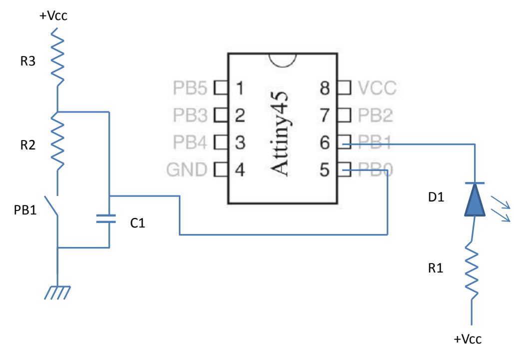

Figure 1: Circuit as implemented.

Use figures along with captions to enhance your report

3. Discussion

The circuit was programmed with the source code and the output was connected to an oscilloscope in order to take measurements of the waveforms. The following items were verified:

Bit timing for signal is correct	☒
Data strings are constructed correctly	☒
36kHz carrier has correct frequency and duty cycle	☒

Bit timing for the signal refers to meeting the RC5 standard for the logic 1 and logic 0, which is a pulse of two 889µs periods, one with a carrier, the other with no signal. The data string construction refers to the correct series of logic 1s and 0s in order to send the correct message. The 36kHz signal must have a period of approximately 28µs and a duty cycle between 1:4 and 1:3.

Use tables to summarize information

The planning for this project consisted of two basic phases: Hardware and software. The hardware design is minimal and consisted mostly of verifying that our switch de-bounce circuit did not impede circuit responsiveness. This is why a lower 1KΩ value was selected for R2, providing a faster response, as opposed to a 10kΩ, which would provide a longer safety after the switch state changed. The LED setup was the same as used for lab 1, with the current sinking to the controller through a 470Ω resistor.

The software planning started with the carrier wave signal. The RC5

Insert a figure shown protocol, timing, etc. Add figure caption

ones were then built into signals which represented the START, TV1, TV2, and MUTE commands. Finally, an infinite program loop was written which would check the activation button and execute the proper order of the commands via a separate subroutine upon the pressing of the button. There was a bit of difficulty in coming to the correct usage of the SBIS and BREQ commands, but once this was sorted out the code ran nicely.

4. Conclusion

From this lab I have gained more experience with how complex timing issues can be solved in

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5. Appendix A: Source Code

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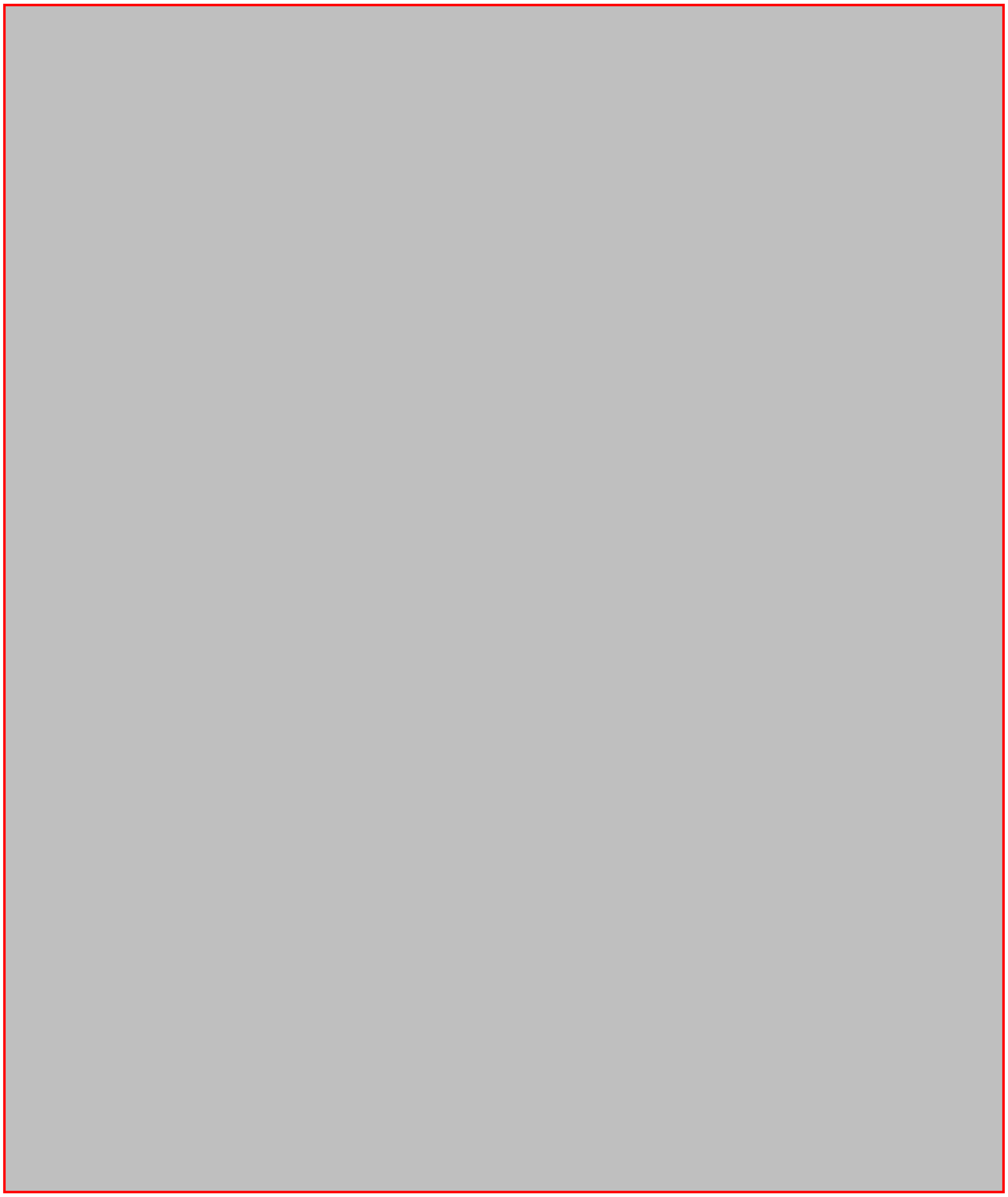
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;
; Assembly language file for Lab 2 in 55:035 (Embedded Systems)
; Spring 2010, The University of Iowa.
; Author
; 2/16/2010
```

Working code goes here



6. Appendix B: References

Kruger, Anton. 8-*Bit Development Board used in 55:036 Embedded Systems, Spring 2010*. University of Iowa. 1/28/10. <http://www.iihr.uiowa.edu/>

“Philips RC-5 Protocol”< www.sbprojects.com>. San Bergmans, 5 Feb. 2010. Web. 23 Sep. 2009.