REQUIREMENTS

Introduction:

While executing retro style the alarm clock in its original state lacked many desirable features of todays alarm clocks. The only controls consisted of a single on/off switch. It also lacked AM/PM indication, making it impossible to sleep for more than 12 hours.

This project sought to maintain the integrity of the original alarm clock while using a microcontroller to automatically manipulate the controls, in order to implement features like snooze, alarm, reset, and daily alarms.

Advantages:

- Protection
- Deterrent to burglars
- Peace of mind
- Convenience and energy savings

Disadvantages:

- After all, digital alarm clocks are electronic products, and electronic products all have radiation.
- However, digital alarm clocks are extremely harmful and so not harm to the human body.
- They are not as radiant as mobile phones.

Features:

- Text to speech synthesizer.
- Three ways of wake-up sound.
- Play local mp3 files.
- Play internet radio station.
- Play latest news as podcast (independent to the alarm time).
- Set alarm via smartphone or any other computer.
- Running apache2 server.
- Automatic display brightness adjustment.

High-Level Design:

- Time Signal: A circuit was constructed to convert the 60Hz 120VAC utility power into a 60Hz 5V digital signal, which we used to keep microcontroller time synchronized which that of a alarm clock.
- PM Indication: We mounted an LED to the front of the alarm clock to given a quick and easy indication of PM time.
- Alarm wheel control: The alarm works on a wheel type mechanism that activates the buzzer based on its position. This alarm wheel in the original clock is adjusted

manually, but we added a stepper motor that gave us the ability to manipulate the alarm with MCU software.

- Deactivating alarms: We maintained the full alarm mechanism of the original clock, which meant that an undesired alarm could potentially sound while manipulating the alarm wheel, as well as during the opposite AM/PM half of the day. To rectify this we added a solenoid which is able to temporarily deactivate the internal alarm mechanism.
- User control: The original controls consisted of only alarm and time setting gears, and a single on/off switch. In order to implement the desired functionality we added a total of 7 buttons for various functions.
- User interface: We mounted a small LCD to the rear of the clock to enable to user to set and query alarms and settings.

Software Design:

- Time Values
- Stepper Motor
- Solenoid
- PM Indicator
- Alarm Polling
- Button Input

S