Project Summary: Burglar Alarm with User Interface

Summary

The idea is to design a burglar alarm that can detect movements and provide auditory output. The user shall be able to turn the alarm on/off and configure the settings.

The goal is to get a basic understanding of designing applications on a multi-core microcontroller. Hence, I have tried to keep the application simple. I intend to do the project in 2-3 iterations, building a level of complexity after each iteration.

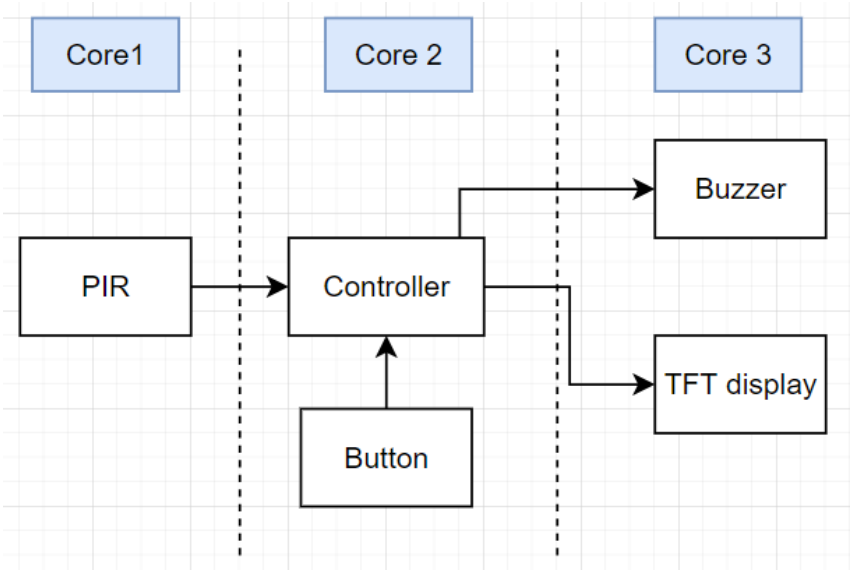
Components

1. Microcontroller (Aurix TC297)
2. PIR sensor
3. Buzzer
4. TFT display
5. Push buttons

Iteration1: Bare metal implementation

- Decide on suitable components for the controller.
- Set up the hardware connection
- Implement drivers for the hardware
- Test components individually

Limitation: Each core can run only one thread



Behavior:

Interrupt from the button turns the alarm ON/OFF based on the previous state.

When the alarm is ON, core 1 continuously reads the input from the PIR sensor. Core 2 monitors this value, sends a notification to Core 3 when a movement is detected.

Core 3 controls the buzzer and TFT display. Buzzer sound is played, and a simple message is displayed on the TFT.

Iteration2: Add Operating System

- Emulate the same behavior on an operating system
- The goal is to understand trivialities associated with an Operating system when used on a multicore controller

Iteration 3: Integrate more functionalities

- Behavior: User shall be able to configure initial time gap on the TFT, after which the sensor should start monitoring movements.
- Additional button to control settings on the TFT display