Example Project:

Tea-Bot

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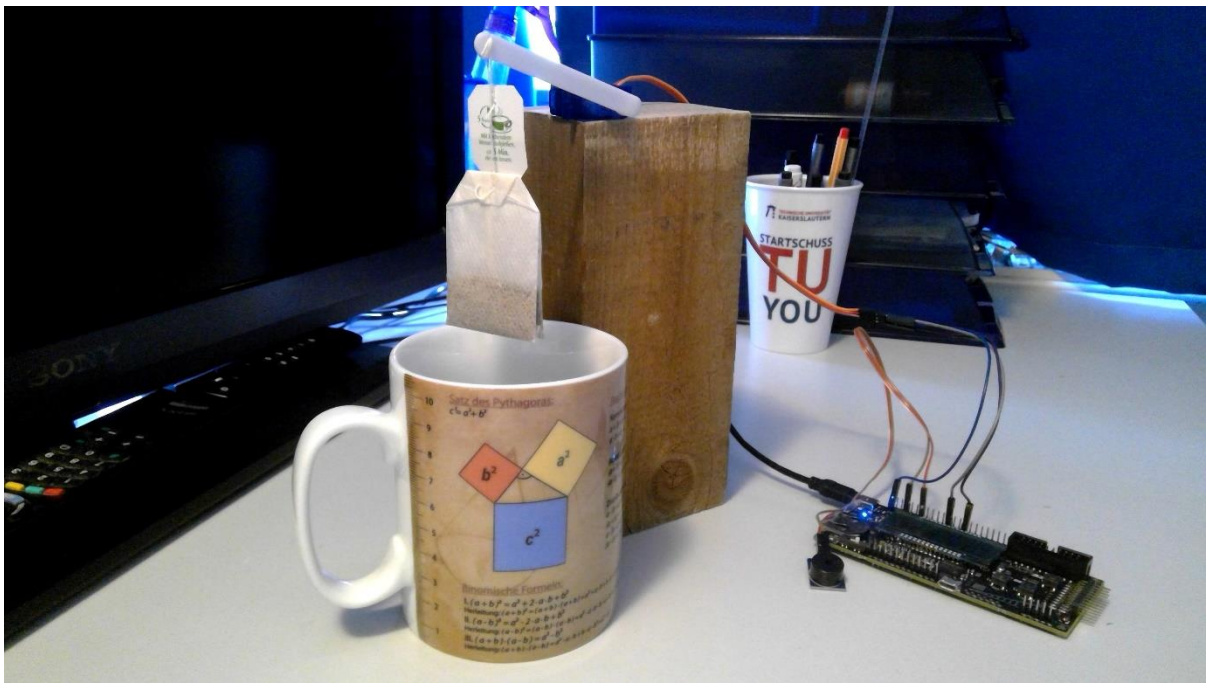

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1 Motivation

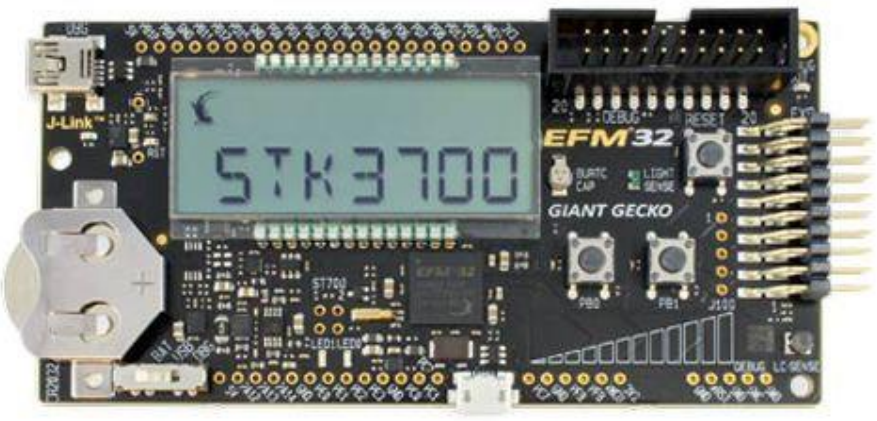
With the Tea-Bot you will never forget your tea while brewing. It ensures that the tea bag is lifted out of the water after the set brewing time has elapsed and emits an alarm sound. This prevents the tea from becoming too strong.

2 Hardware Components

The project is based on an EFM32GG-STK3700 from Silicon Labs and uses an EFM32 Giant Gecko ARM Cortex-M3 based 32-bit microcontroller.

It provides the following features:

- EFM32GG990F1024 MCU with 1 MB flash and 128 kB RAM
- Advanced Energy Monitoring system for precise current tracking
- Integrated Segger J-Link USB debugger/emulator with debug out functionality
- 160 segment LCD
- 20 pin expansion header
- Breakout pads for easy access to I/O pins
- Power sources include USB
- 2 user buttons, 2 user LEDs and a touch slider
- Ambient Light Sensor and inductive-capacitive metal sensor
- EFM32 OPAMP footprint
- 32 MB NAND flash
- USB interface for Host/Device/OTG
- 0.03 F Super Capacitor for backup power domain

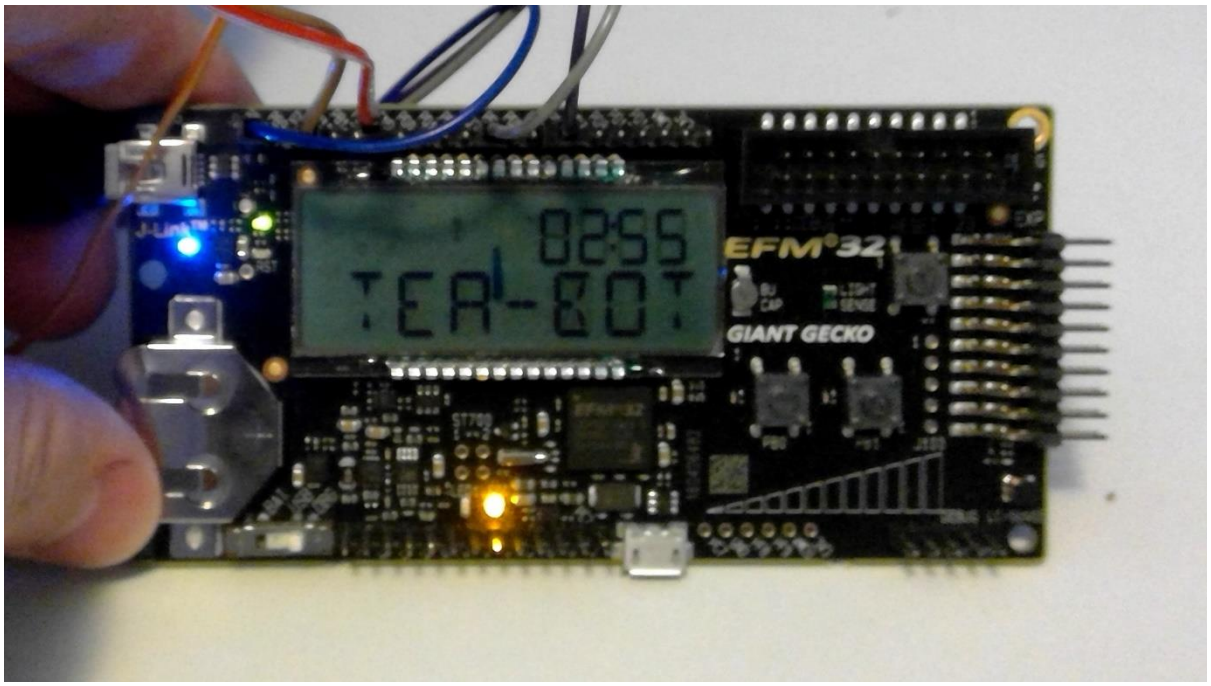


To generate the alarm sound the piezo speaker B26_1 from the Allnet 4duino kit is used and it is driven by a PWM signal.

The MiToot Micro Servo 9g SG90 is used to lift the tea bag and it is also driven by a PWM signal.

3 Structure and Functionality

On the LCD display you can see the current time that is set in minutes and seconds. With the left button of the board you can increase the brewing time by 1 minute using a simple interrupt. If the wanted time is configured, you can press the right button to start the brewing, again using an interrupt.



Then the servomotor is controlled with a PWM signal and brought into the lower position. Now the time starts to decrease on the LCD, which is implemented using a real time counter to ensure the correct timing behaviour.

If the counter reaches 0, the servomotor is returned to its initial position and the piezo speaker is driven with a PWM signal to start beeping periodically to signal that the tea is ready. It will continue until the right button is pressed. Then the Tea-Bot is ready for the next use.