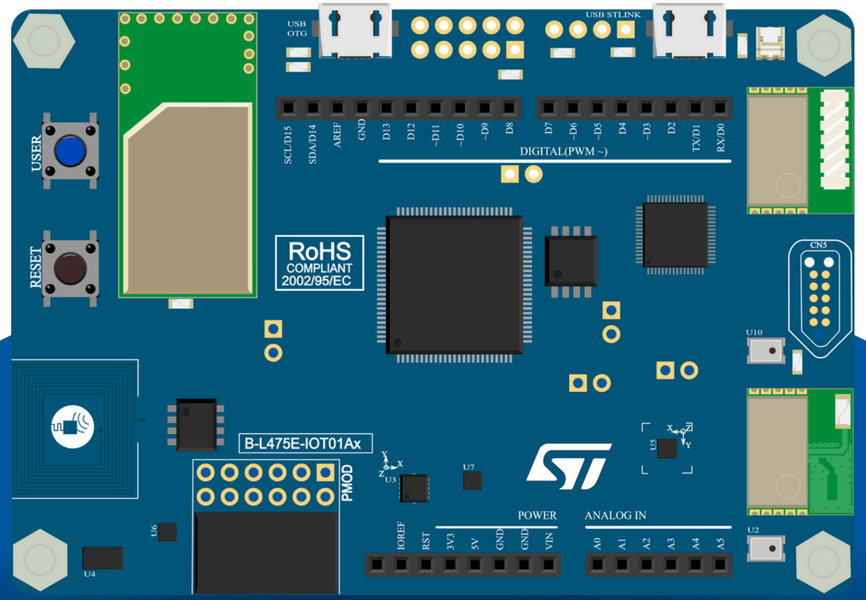
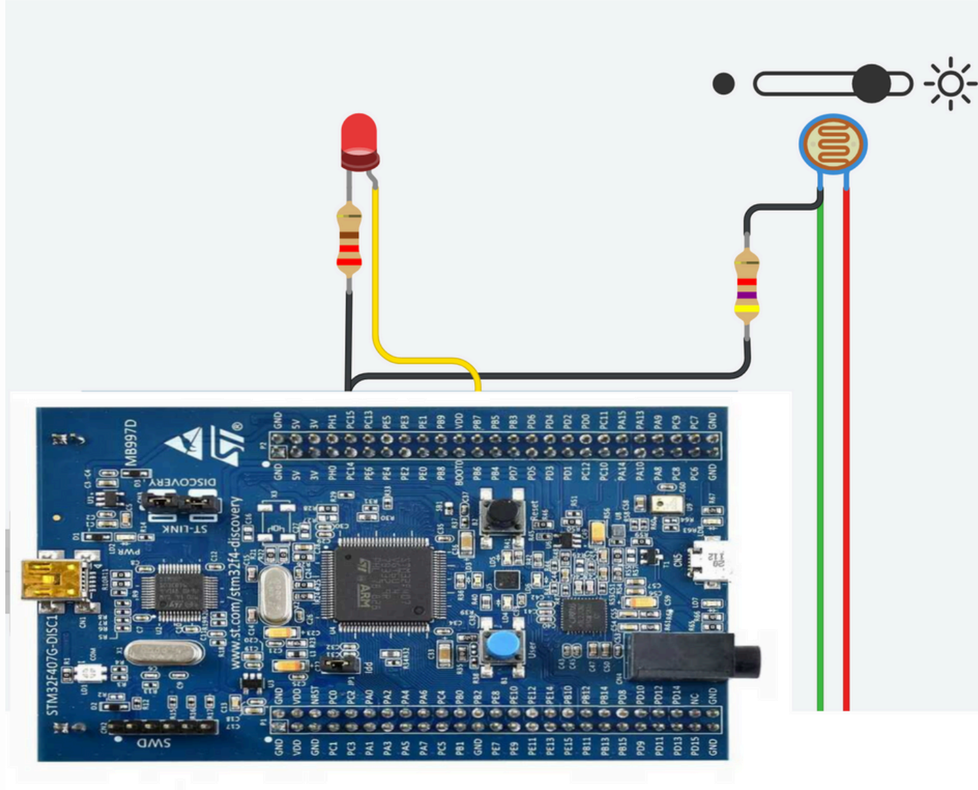
IoT on STM32

Team : ST



Light controller

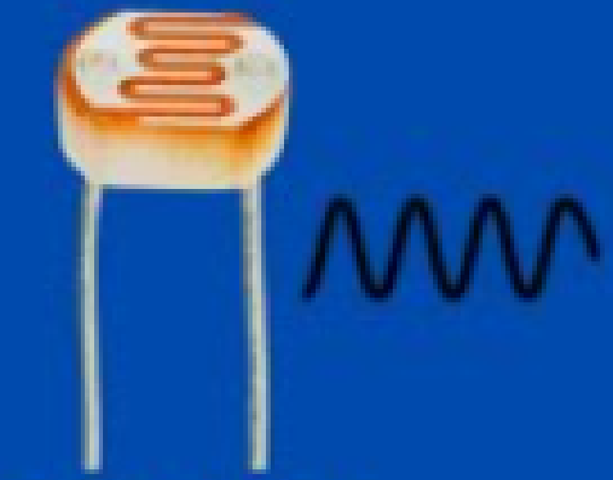
In this project, the photoresistor detects ambient light levels. The STM32 will read the analog value from the photoresistor and control the LED based on the light intensity. When it's dark (low light level), the LED will turn on, functioning as a night light. Conversely, when it's bright (high light level), the LED will turn off.



ANALOG SENSOR

ADC IN STM32

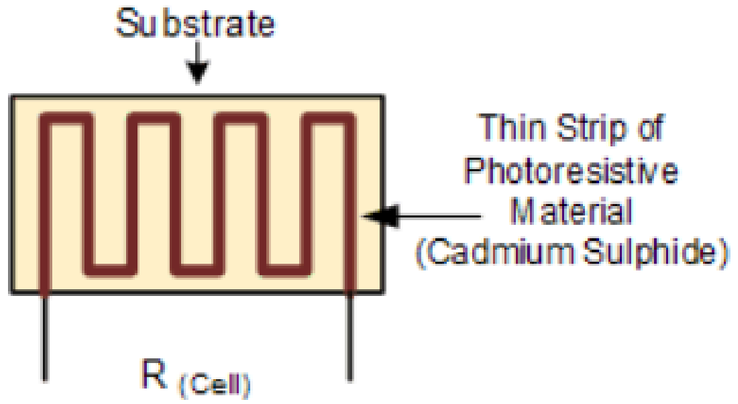
ADC

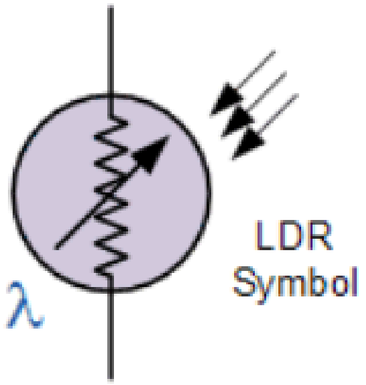


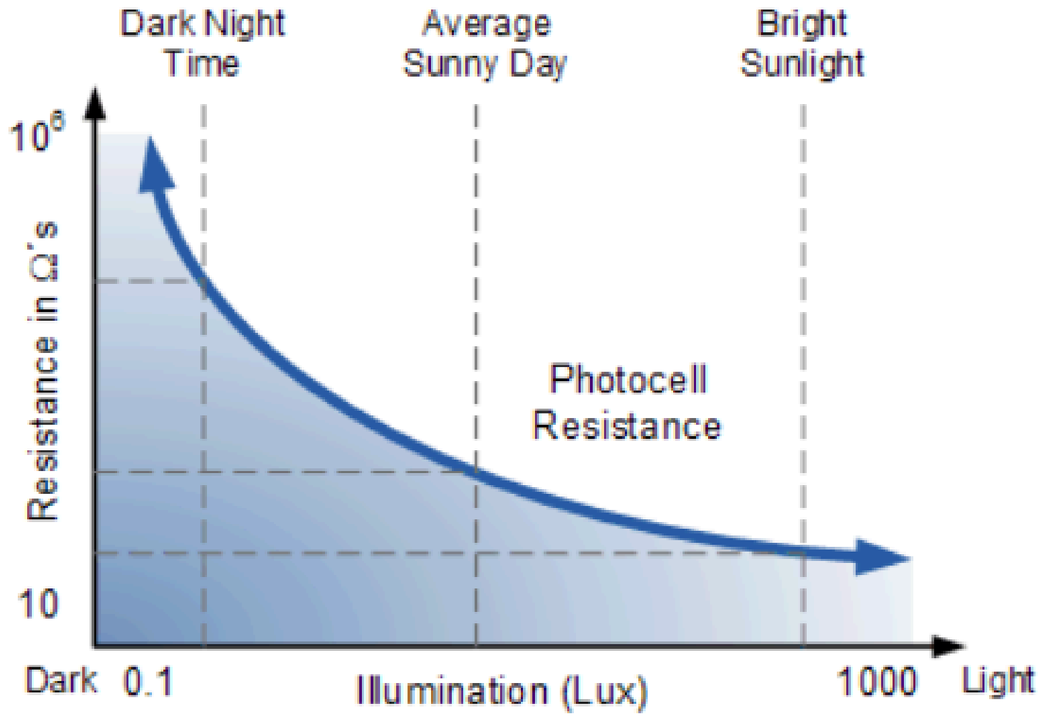
SENSOR

ADC CONVERTER

1010110





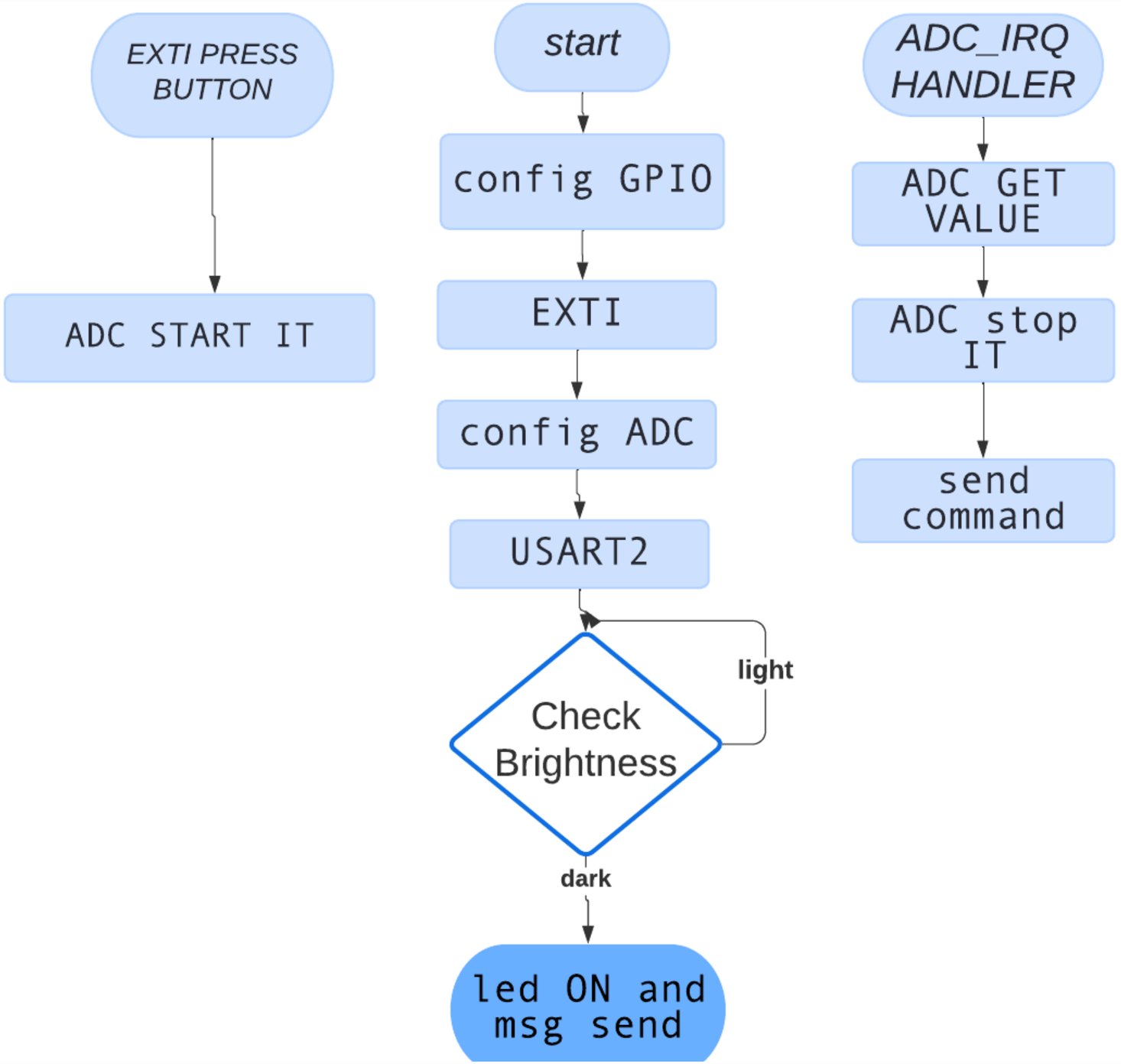


STM32 Light Sensor (LDR) Interfacing

STM32 Light Sensor (LDR) Interfacing

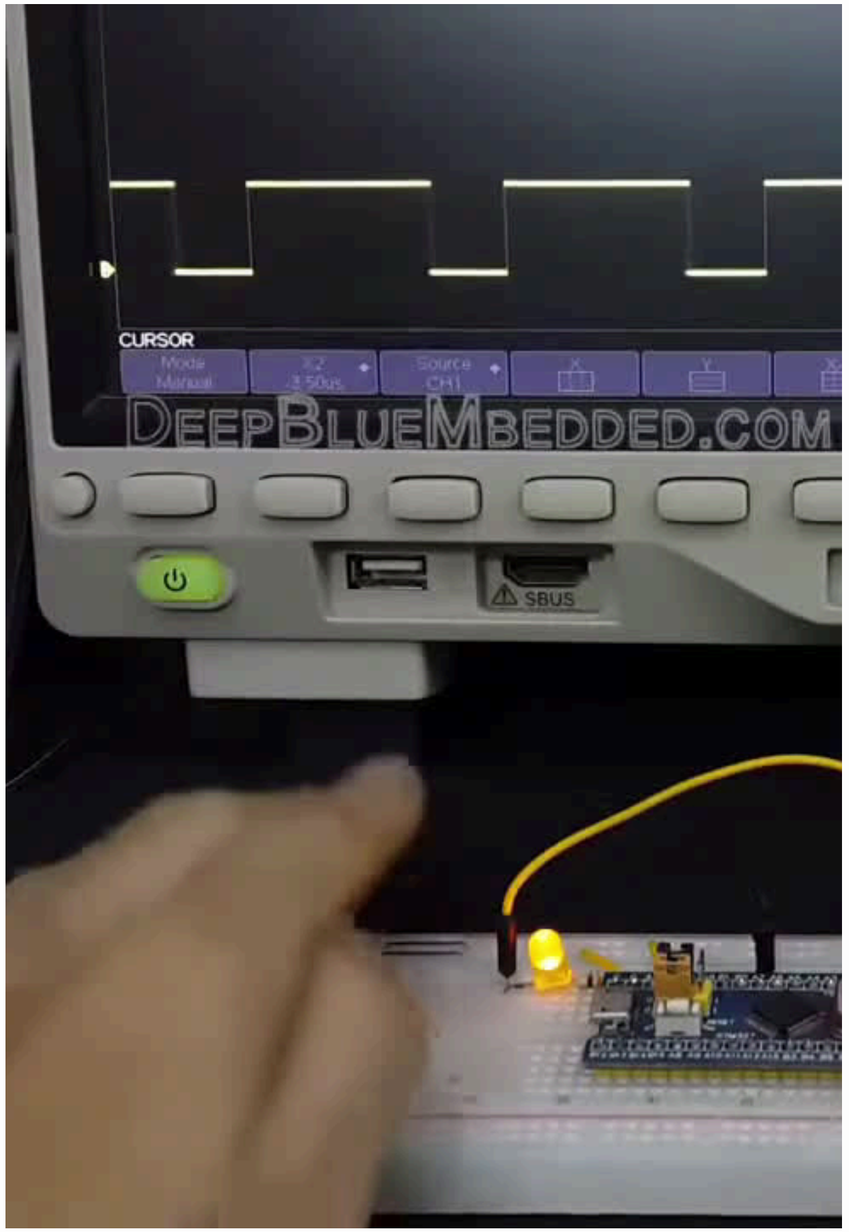
```
 while (1)
 {
   /* USER CODE END WHILE */

   /* USER CODE BEGIN 3 */
if (adc_value < 2000) { // Assuming low ADC value means light is dark and LED is on
  HAL_GPIO_WritePin(GPIOD, GPIO_PIN_15, GPIO_PIN_SET);  // Turn LED on
  HAL_UART_Transmit(&huart2, (uint8_t*)LED_ON_MSG, sizeof(LED_ON_MSG) - 1, 0xFFFF);  //
} else {
  HAL_GPIO_WritePin(GPIOD, GPIO_PIN_15, GPIO_PIN_RESET);  // Turn LED off
  HAL_UART_Transmit(&huart2, (uint8_t*)LED_OFF_MSG, sizeof(LED_OFF_MSG) - 1, 0xFFFF);
}
```

Flowchart


EXTI PRESS BUTTON
ADC START IT
start
config GPIO
EXTI
config ADC
USART2
Check Brightness
light
dark
led ON and msg send
ADC_IRQ HANDLER
ADC GET VALUE
ADC stop IT
send command

Prespective

On the previous slide, we explored a basic light controller design. Now, we'll delve deeper into how we can enhance this project by using Pulse Width Modulation (PWM) and timers. PWM allows us to control the average brightness of an LED by rapidly switching it on and off. By adjusting the duty cycle of the PWM signal (the on-time compared to the total cycle time), we can achieve a wide range of perceived brightness levels for the LED, creating a smoother and more nuanced response to ambient light changes.



THANK YOU!