ARM XMC - experiment No. 7

- **L7.1 Name:**

Infineon ARM XMC – LED lighting control

- **L7.2 Overview and purpose:**

The experiment shows an example of using the Infineon ARM family of microcontrollers to control LED lighting. It explores the possibilities for interfacing platforms for development of control systtems for automotive headlamps and street lighting. At the end of the experiment will have detailed information about Infineon concerns in the development of lighting and how to achieve a system for adjusting the light intensity of power LED .

- **L7.3 Resources:**

Hardware:
XMC4500 Relax kit, Interface IBT-3, LED 1W , cable connections, solar accumulator.
Software:
Infineon DAVE 4.1

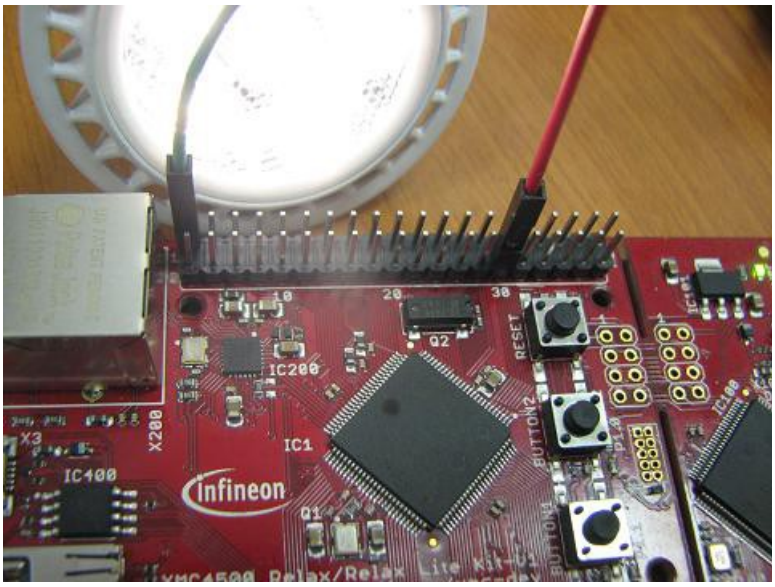
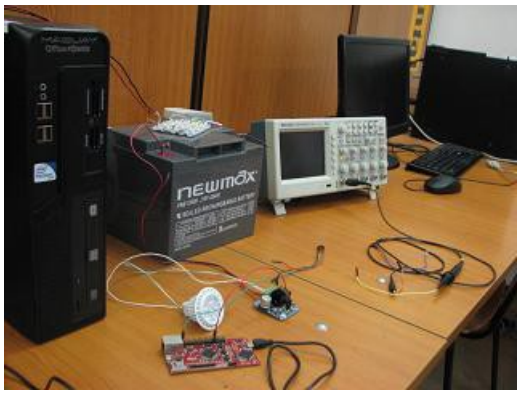


Fig. 7.1 Relax kit with power LED

- **L7.4 Software example:**

```
/*E7
 Power LED control using
 Controller  IBT-3;
 Connections:

 buton1 - p1.14
 buton2 - p1.15
 PWM    - p3.0

 */

#include <DAVE.h>                 //Declarations from DAVE
Code Generation (includes SFR declaration)

/**

 * @brief main() - Application entry point
 *
 * <b>Details of function</b><br>
 * This routine is the application entry point. It is invoked
by the device startup code. It is responsible for
 * invoking the APP initialization dispatcher routine -
DAVE_Init() and hosting the place-holder for user application
 * code.
 */
int t=1;
int main(void)
{
```

```
  DAVE_STATUS_t status;

  status = DAVE_Init();           /* Initialization of DAVE
APPs  */

  if(status == DAVE_STATUS_FAILURE)
  {
    /* Placeholder for error handler code. The while loop
below can be replaced with an user error handler. */
    XMC_DEBUG("DAVE APPs initialization failed\n");

    while(1U)
    {

    }
  }

  /* Placeholder for user application code. The while loop
below can be replaced with user application code. */

  PWM_Start(&PWM_0); // start pwm0


  PWM_SetDutyCycle(&PWM_0, 25); //lum. min.
  while(1U)
  {

       if(DIGITAL_IO_GetInput(&buton2)==0)
                       {

                PWM_SetDutyCycle(&PWM_0, 1500); //medium light
                       }

       if(DIGITAL_IO_GetInput(&buton1)==0) // slow speed
                       {

              PWM_SetDutyCycle(&PWM_0, 9000); //max. light
                       }
  }
}
```



- **L7.5 Method of running the experiment:**

- Analyze the Relax Kit interconnection with IGBT 3 driver;
- Explore tehe components of the DC driver ;

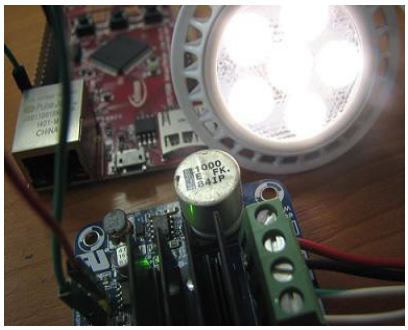


Fig. 7.2 IGBT-3 as LED Driver

- Develop a project using source of prototype program and follows proper execution.
- Explore existing PWM modules from DAVE environment;
- Solve the proposed problems.

- **L7.6 Problems proposed:**

1. Attach a potentiometer and develop a program that lets you control LED intensity;

2. Develop a program through which it will determine the optimal frequency signal for LED intensity control ;

3. Analyze how switching levels and eliminate light signal transitions that occur in prototype program;

4. Attach a LCD-OLED and display LED lighting level;

5. Develop the prototipe program for XMC 2Go Infineon platform;

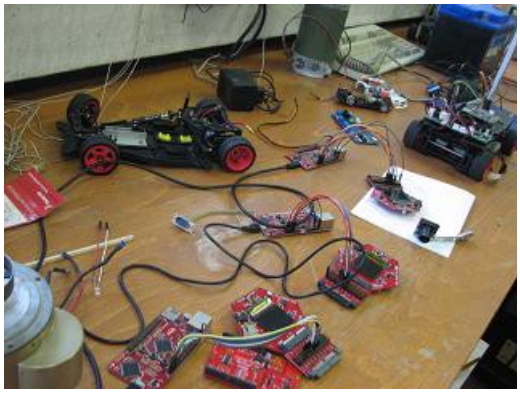


Fig. 7.3 XMC based laboratory

- **L.7 The experiment can be extended to be used for:**

- Making lighting home / public;

- Making lighting systems for vehicles;

- Making light for urban farming ;

- Make ambient light for entertainment / Medical rooms

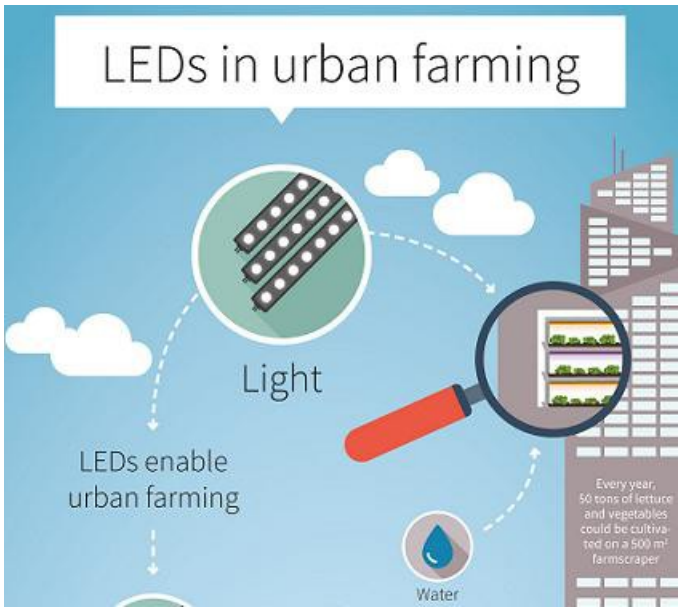


Fig. 7.4 Infineon LED for urban farming

- **L7.8 More helpful information:**

- 2015 - International Year of Lights - http://www.light2015.org/Home.html
- Research lightings systems - http://www.lightsources.org/regions
- Infineon LED lighting - http://www.infineon.com/cms/en/product/power/led-driver-lighting-ics/channel.html?channel=db3a304319c6f18c011a154f7fb62712
- Infineon Urban Farming - http://www.infineon.com/cms/en/about-infineon/company/our-contribution/urbanfarming/
- 12Vower LED - http://www.alibaba.com/showroom/power-led-30w-12v.html
- Automotive LED - https://www.superbrightleds.com/cat/led-vehicle-replacement-bulbs/
- Automotive CAN BUS LED - https://www.superbrightleds.com/moreinfo/miniature-wedge-base/194-can-bus-led-bulb-5-smd-led-tower-miniature-wedge-retrofit-car/1127/.