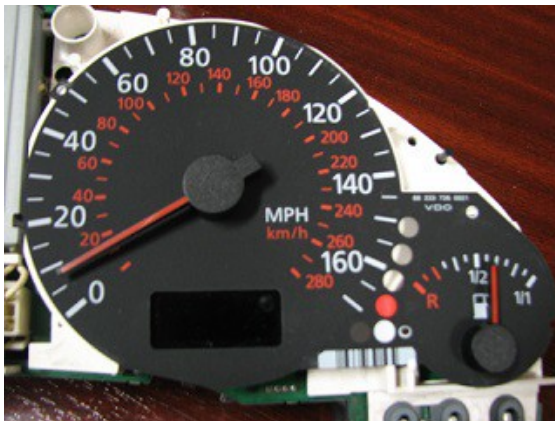


## ARM XMC - experiment No. 6



- **L6.1 Name**

**Infineon Relax kit - control DC Motor for eVehicle**

- **L6.2 Overview and purpose**

The experiment aims to develop an alternative drive traction motors used in electric vehicles using XMC 4500 relax kit. At the end of the experiment will hold details about implementation PWM generation operations, use resources from DAVE 4 environment for DC Motor interface and software .

- **L6.3 Resources:**

**Hardware:**

XMC4500 Relax kit, DC motor driver IBT-3, connection wires , solar accumulator .

**Software:**

Infineon DAVE 4.1

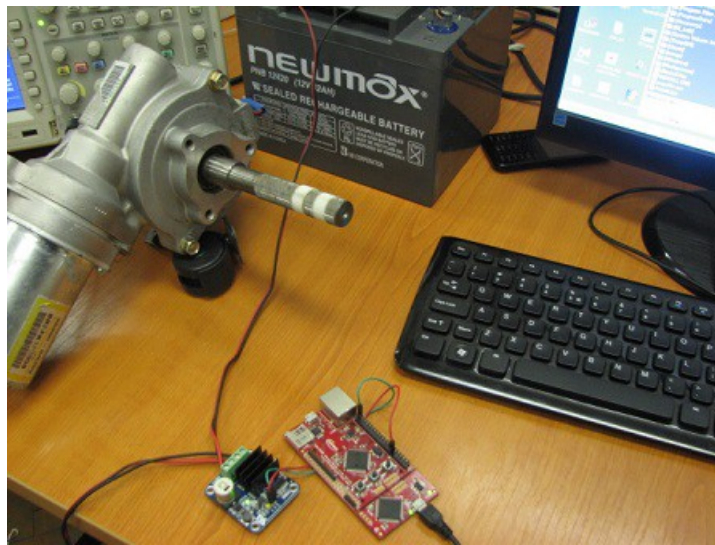


Fig. 6.1 Experiment equipment

- L6.4 Software example:**

APP Pin Name	Pin Number (Port)
buton1	
pin	#69 ( P1.14 )

APP Pin Name	Pin Number (Port)
buton2	
pin	#68 ( P1.15 )

APP Pin Name	Pin Number (Port)
PWM Output Pin	#7 ( P3.0 )

```
/*
DC Motor controller
*/
#include <DAVE.h>           //Declarations from DAVE Code Generation (includes SFR
declaration)

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

t=5000;
PWM_SetDutyCycle(&PWM_0, t);
    while(1U)

        {

            if(DIGITAL_IO_GetInput(&buton2)==0) // hight speed
            {
                t=t+10;
                if(t>9900)
                    t=9000;
                PWM_SetDutyCycle(&PWM_0, 7500);
            }

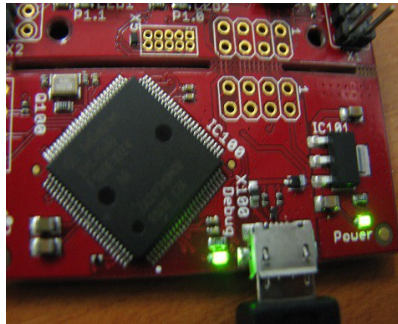
            if(DIGITAL_IO_GetInput(&buton1)==0) // slow speed
            {
                t=t-10;
                if(t<1)
                    t=1;
            }
        }
}
```



```
PWM_SetDutyCycle(&PWM_0, 1000);  
}  
  
}
```

#### • L6.5 Method of running experiment:

- Analyze the kit Relax interconnection scheme IGBT 3;
- Explore how to make DC Motor driver;



- Explores existing PWM modules from DAVE environment;
- Creates a DAVE CE project with software example and run/test it on the Realx kit;
- Solve the proposed problems.

#### • L6.6 Problems proposed:

1. Create a sequence program that allows bidirectional control of the motor;
2. Make a program that will generate full-spectrum PWM signals for the entire range of the motor;
3. Make a schedule that will allow variable speed motor drive and display them on the HMI;
4. Develop a solution to stop the DC motor in case the imposed load exceeds a value;
5. Develop a solution to stop the motor in case the temperature has exceeded a value imposed;



Fig. 6.2 DC Motor for eVehicle

- **L6.7 The experiment can be extended to be used for:**

- Making traction systems for vehicles;
- Realization of industrial automation equipment;
- Implementation of guidance systems of photovoltaic panels;
- Make conversion classic car to electric car.



Fig. 6.3 DC Motor for servo

- **L6.8 More helpful information:**

1. [DC Motor advantage](https://www.youtube.com/watch?v=QgTpFFLOgk) - <https://www.youtube.com/watch?v=QgTpFFLOgk>
2. [Industrial DC Motor](http://www.go-ev.com/) - <http://www.go-ev.com/>
3. [Controllers for DC motor](http://www.evwest.com/catalog/index.php?cPath=1) - <http://www.evwest.com/catalog/index.php?cPath=1>
4. [Example of DC motor](http://www.evwest.com/catalog/product_info.php?manufacturers_id=1&products_id=84) - [http://www.evwest.com/catalog/product\\_info.php?manufacturers\\_id=1&products\\_id=84](http://www.evwest.com/catalog/product_info.php?manufacturers_id=1&products_id=84)



5. [Siemens DC Motor](http://www.industry.siemens.com/drives/global/en/motor/dc-motor/pages/default.aspx) - <http://www.industry.siemens.com/drives/global/en/motor/dc-motor/pages/default.aspx>
6. **History of electrica vehicle-**  
[https://en.wikipedia.org/wiki/History\\_of\\_the\\_electric\\_vehicle](https://en.wikipedia.org/wiki/History_of_the_electric_vehicle)
7. [Car conversion](https://en.wikipedia.org/wiki/History_of_the_electric_vehicle) - [https://en.wikipedia.org/wiki/History\\_of\\_the\\_electric\\_vehicle](https://en.wikipedia.org/wiki/History_of_the_electric_vehicle)
8. **Electric car conversion business -** <http://www.hybridcars.com/top-7-issues-electric-car-conversion-25839/>
9. **Resources car convection -** <http://rebb1.com/ev-conversions-useful-links/>