**Project Description:**

A four-wheel car running in two modes: auto-pilot mode and controlled mode using USART to send commands from the controller to the car.

**User Guide:**

* There are two modes to drive the car and the default mode is auto-pilot, while the other mode is controlled mode.
* Auto-pilot mode is where the car will drive on its own and as soon as it gets about 30 cm from an obstacle (any object on its path) it stops, backs-up, then make a left turn until the obstacle is avoided completely.
* Controlled mode is where you can give directions of the car with joystick via USART communication.

**Technologies And Components:**

* (2) Atmega1284 microcontrollers
* (2) DC motors
* (4) Wheel
* (2) Breadboard
* (4) AA battery
* (1) 9 Volt battery
* (1) HY-SRF05 Ultrasonic Sensor
* (1) 2-axis joystick
* (1) Button
* (1) H-Bridge motor driver SN75441one
* (4) LED
* USART
* Atmel Studio 6

**Demo Video:**

[link](http://youtu.be/mpjmLJbvC4Y)

**Source Files:**

* ***Controller***
  + **ADC\_controller.h** (ADC Header): used to set up the pins for ADC on the microcontroller, and to utilize the pins for ADC
    - [Link](https://drive.google.com/open?id=0B5lIQ_9DNB5kSFN0aFh6c2g2Ym8&authuser=0)
  + **usart\_controller.h** (USART Header): used to set up the pins for USART on the microcontroller, and to provide the functions necessary to make USART work between the microcontrollers.
    - [Link](https://drive.google.com/open?id=0B5lIQ_9DNB5kQm82U0hVb1hlaGc&authuser=0)
  + **Controller.c** (Main): main code, sets up the timer, the task scheduler, and the state machines that enables the controller to turn the car.
    - [Link](https://drive.google.com/open?id=0B5lIQ_9DNB5kYzJEOUdpMHd1UGM&authuser=0)
* ***Car***
  + **usart.h** (USART Header): used to set up the pins for USART to work on the microcontroller and to provide the functions necessary to make USART communicate between the microcontrollers.
    - [Link](https://drive.google.com/open?id=0B5lIQ_9DNB5kNlFhMFg0YzY5czQ&authuser=0)
  + **timer.h** (Timer Header): used to set up the timer, timer ISR, and timer flag.
    - [Link](https://drive.google.com/open?id=0B5lIQ_9DNB5kb0Y4SWVRWDlpdHM&authuser=0)
  + **car.c** (Main): used to set up the function for the ultrasonic sensor, and to set up the state machine that enables the car to run.
    - [Link](https://drive.google.com/open?id=0B5lIQ_9DNB5kczBFNE11S0thUFE&authuser=0)

link to the custom lab folder:

<https://drive.google.com/folderview?id=0B5lIQ_9DNB5kR19HaTY0NTljWU0&usp=sharing>