# 2015 Summer STEM Program
# C$^3$: Car to Car Communication

Taught by: Dr. Monika Rathod

Assisted by: Alain Edwards and Gee Won Han

C-cubed (C$^3$) introduces wireless sensor networks in a vehicular setting using cutting-edge engineering technologies.

## Topics

➤ Work with industry leading sensors, RF chips, microprocessor boards, and RC cars

➤ Develop Radio Frequency circuits

➤ Build problem solving skills

➤ Learn real world Engineering development techniques

➤ Design and print 3D models

➤ Create custom printed circuit boards and solder LEDs to create a flashing police car light display
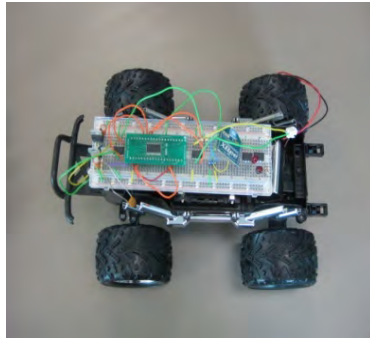
*Start your engines and race to the finish line!*

# 2015 Summer STEM Program

## C³ : Car to Car Communication



**Instructors: Monika Rathod, Ph.D. and Imad Mahgoub, Ph.D.**
**Week One: June 8 - 12**

*Would you like to build a prototype car that is able to talk to other cars?*




*If your answer is yes, then we have just the class for you!*

*C-cubed* (**C³**) introduces wireless sensor networks in a vehicular setting using cutting-edge engineering technologies.  You will get to:

- ➢ Build a sensor application using a radio chip, microprocessor boards, wires, and a battery operated vehicle
- ➢ Use PCs to modify the radio chip
- ➢ Define a problem, design and create a plan of action
- ➢ Execute the plan, and test  your prototype vehicle




*Join a team to build your **C³** car & see how it performs against other teams' cars!*

The following example describes a problem that will be solved using the $C^3$ application: *Send a wireless message to vehicles ahead of approaching emergency vehicle. Clear the road for this emergency vehicle to proceed without delay.*



This course uses an abundance of manipulatives including video presentations, illustrations, and Power Point presentations. Students will get the opportunity to express their curiosity through discussion groups and hand-outs.

| Schedule | Morning Session | Afternoon Session |
|---|---|---|
| **Monday** | -Introduce engineering design concepts such as streamlining, friction for vehicles<br>-Students have fun creating car body designs using materials such as Styrofoam, wood, etc. | -Car design competition<br>- Each student will race their car to see which one travels the farthest |
| **Tuesday** | -Present the experiment kit to all student groups<br>-Explain each component and let students examine them<br>-Introduce the concept of vehicular networks | -Students begin to work on putting together the physical components<br>-This activity is interspersed with Power Point sessions and fill-in-the-blanks handouts |
| **Wednesday** | -Test the circuits<br>-Discuss components in use<br>-Modify code on the radio chip to allow vehicle movement | - Upload code onto the radio chip<br> -Students will place the chip on their vehicles<br>- Test code |
| **Thursday** | -Students learn how to solder components that are part of the circuits they are building | - Students test their circuit implementation<br>-Modifications are made and the vehicle to vehicle communication is tested |
| **Friday** | -Final competition to see which team's $C^3$ car achieves the best result<br>-Each student is presented with a CD containing their videotaped presentation and scanned images of their worksheets for this class | *Course concludes in the morning session.* |

This one-week program is designed to promote successful completion of the tasks provided to each student where the students will gain confidence and knowledge that will spark their desire to learn more. $C^3$ is designed with the intent to create a life-long passion for engineering and help students become the next-generation leaders in the field of computer engineering.

**We look forward to seeing you in the $C^3$ class!**