

School: \_\_\_\_\_

Teacher: \_\_\_\_\_

Grade: \_\_\_\_\_

*Presents*



## Directions

Run the bases by collecting 4 stamps and win a prize!

2<sup>nd</sup> Base

3<sup>rd</sup> Base

1<sup>st</sup> Base

Home Plate

## Finish!

Take your worksheet to booth P77 to Claim your prize!

Visit the website to learn more about the science and engineering of our featured booths:  
[www.lovestemsd.org](http://www.lovestemsd.org)

These bases were run by:

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## Collect 4 stamps from any of these awesome booths:

### **UC San Diego Bioengineering Graduate Society (BEGS)**

*“DNA: The Game of Life”* – Booth P51

Visitors to the booth can participate in a walkthrough illustrating the basics of genetics and how DNA can affect our physical beings. Visitors can enjoy three hands on activity stations. The first is a Build your own DNA station, where visitors can build a base or practice pairing them. The second is a genetic engineering station, where student can manipulate circuits or help insert a plasmid (glow bracelet) into a bacteria (balloon). At the final station, a robot can be build based on the selection of dominate or recessive genes from two parent robots.

### **UC San Diego Biomedical Engineering Society (BMES)**

*Booth P21*

A demonstration and presentation on stresses in bones using acrylic and polarized light, allowing us to see the stress fields present in the material. There will also be an interactive demonstration of a home-made ECG sensor built with an Arduino board to showcase the accessibility of bioengineering to everyone. Finally, there will be a matching game matching organs, common afflictions, and the bioengineering solutions associated with them.

### **San Diego Office of Education**

*“Talking Trash!”* – Booth P5

Visitors to the booth are invited to play an interactive SpongeBob basketball game with select trash items after learning the rules, shooting hoops into either the recycling or trash bins. We will also feature a spinning wheel game, with recycling trivia questions. Recycle-themed prizes are awarded to participants, such as pencils made from newspaper, rulers made from boxes, and recycling activity books.

### **Qualcomm**

*“Talking Tom”* and *“Artificial Intelligence”* – Booth PC3

Instead of using capacitive sensor as a mean to detect touch, Talking Tom is using an Infrared Sensor to handle contactless gesture. Another display demonstrates the ability for a camera, while you are taking the picture, to understand what the picture is about and tell you "this is a cat" or "this is a beach" all in real time. Another demonstration is showing "unconstrained handwriting recognition". All of these demonstrations show the power of these learning systems to understand the world around the device.

**5. Biocom Institute** in partnership with the Media Arts Center San Diego's Digital Gym in North Park:

Booth P28

Students will be asked to think about all of the STEM applications they have seen at Expo Day and in their daily lives. They will have the opportunity to record a video of themselves stating the answer to one of the following questions. (1) What is the best part of STEM to you and why? (2) Who is your STEM hero and why? or (3) How has STEM affected you or your family? Students will learn of an opportunity to produce their own 60-second video on STEM and compete for cash prizes in the STEMVoice Video Competition.

**Bring your completed sheet to the Home Run Challenge Booth ( P77 ) to collect your prize!!**

# Home Run Challenge 2015 Booth Descriptions

## 1. UC San Diego Bioengineering Graduate Society (BEGS)



**Key Concepts:** DNA is the basic material of life. Small changes in the genetic code can result in larger scale changes in physical appearance. Each person has two copies of each gene. A simple way to look at these genes is that one will be

dominate over the other and determine the physical expression. Bioengineers can manipulate genetic material to help target disease or to develop genetic circuits with novel applications.

**Booth Activities:** Visitors to the booth can participate in a walkthrough illustrating the basics of genetics and how DNA can affect our physical beings. Following the walkthrough, visitors can enjoy three hands on activity stations. The first is a Build your own DNA station, where visitors can build a base or practice pairing them. The second is a genetic engineering station, where student can manipulate circuits or help insert a plasmid (glow bracelet) into a bacteria (balloon). At the final station, a robot can be build based on the selection of dominate or recessive genes from two parent robots.

## 2. UC San Diego Biomedical Engineering Society (BMES)



**Key Concepts:** The UC San Diego Biomedical Engineering Society will be presenting on different aspects of bioengineering at UCSD, as well as on more general bioengineering topics, in order to educate and excite children about the field.

**Booth Activities:** There will be a demonstration and presentation on stresses in bones using acrylic and polarized light, allowing us to see the stress fields present in the material. There will also be an interactive demonstration of a home-made ECG sensor built with an Arduino board to showcase the accessibility of bioengineering to everyone. Finally, there will be a matching game matching organs, common afflictions, and the bioengineering solutions associated with them.

## 3. San Diego County Office of Education/City of San Diego Department of Environmental Services



**Key Concepts:** Many waste reduction techniques are easy to implement, and are beneficial to the environment by conserving natural resources and reducing energy use and thereby improving air quality and decreasing the production of greenhouse gases. Composting of green waste is one of these techniques, as is effective recycling of appropriate trash items. Buying only what you need, buying environmentally friendly products, and repairing broken items rather than throwing them away, are other ways to assist. Working together, individuals can make a big difference in aiming towards zero waste goals in San Diego.

**Booth Activities:** Visitors to the booth are invited to play an interactive SpongeBob basketball game with select trash items after learning the rules, shooting hoops into either the recycling or trash bins. We will also feature a spinning wheel game, with recycling trivia questions. Recycle-themed prizes are awarded to participants, such as pencils made from newspaper, rulers made from boxes, and recycling activity books.

## 4. Qualcomm



**Key Concepts: Talking Tom:** Smartphones are equipped with a number of sensors to respond to user inputs and the environment around it. These sensors include accelerometer to detect acceleration, gyroscope to detect orientation, magnetometer to use for compass application, proximity sensor to detect if something is nearby the phone and touch sensor to determine if the screen has been touched. The touch sensor is integrated with the display and based on capacitive coupling. Our human body capacitance will provide the input for the capacitive sensors to detect something that is conductive to signify that area has been touched.

*Artificial Intelligence:* We've been hearing more and more about "artificial intelligence". What Qualcomm is showing today is a form of artificial intelligence, applied to visual perception problems. What we mean by artificial intelligence is that unlike "normal" computer programs that one writes where you give the machine step by step instructions, in this case you "train" the system by showing it examples of things you want it to learn about. So you show it a bunch of pictures of cats, and then flowers, and then cars, and it starts to learn what makes a cat, flower, car different from each other, just like we do when we are babies. These systems are based on an approach called Deep Learning and we are getting better and better at using these systems for understanding the visual world around us, but also in speech analysis, handwriting analysis and so on. This is great in cell phones, but also in robots and cars where the robot or car needs to be able to "see" the world around it and "understand" what is going on.

**Booth Activities: Talking Tom:** Instead of using capacitive sensor as a mean to detect touch, Talking Tom is using an Infrared Sensor to handle contactless gesture. The proximity sensor will detect something is nearby. It will sense the type of gestures based on algorithms developed Qualcomm. Users do not need to touch in order to perform the needed actions.

*Artificial Intelligence:* In our booth we are showcasing a number of Deep Learning based demonstrations which are running entirely on the Qualcomm prototype device and are not talking to the cloud in order to operate correctly. You will be able to see up to three demonstrations. The first is the ability for the camera, while you are taking the picture, to understand what the picture is about and tell you "this is a cat" or "this is a beach" all in real time. Also, the ability to sort your pictures based on those labels so that later you can easily find your pictures. A second demo is the same, but applied to identifying faces in the picture. So you can not only find faces, but actually label who the people in the picture are. The final demonstration is showing "unconstrained handwriting recognition", that is, the ability for us to take a picture of something written by hand onto a piece of paper or a white board, and convert that, in the phone, back into text. All of these demonstrations show the power of these learning systems to understand the world around the device, and from a few examples, generalize to a wide variety of situations.

## 5. Biocom Institute in partnership with the Media Arts Center San Diego's Digital Gym in North Park



encompassing it is. If we pause and pinpoint the way STEM defines our view of the world, we can become more sensitive and appreciative of this.

**Key Concepts:** Kids see and use STEM every day and not just in science class. STEM is used to make the video games they play, to improve the world cup soccer ball, to keep them electronically connected to their parents and friends. STEM professionals' research cures for disease, make airplanes, study dolphins and produce 3D movies. STEM is such a normal part of our everyday lives we often forgot how applied and all-



**Booth Activities:** Students will be asked to think about all of the STEM applications they have seen at Expo Day and in their daily lives. They will have the opportunity to record a video of themselves stating the answer to one of the following questions. (1) What is the best part of STEM to you and why? (2) Who is your STEM hero and why? or (3) How has STEM affected you or your family? Students will learn of an opportunity to produce their own 60-second video on STEM and compete for cash prizes in the STEMVoice Video Competition.