When Are You Drunk Enough?

An Engineer's Perspective

How college students decide they are drunk enough is similar to how cruise control on a car decides whether to accelerate or brake

Analyzing Patterns in Drinking Habits

John Clapp, the director of the *Higher Education Center for Alcohol and Drug Abuse Prevention and Recovery*, ran a decade-long study which revealed that college students drank until they thought they were drunk, and then adjusted their pace afterwards (cruise control)

An Engineer's Perspective

By analyzing the data similar to how an engineer would tackle a problem, Clapp will be able to study complex behavioral patterns, and hopefully find the root causes behind these dangerous habits
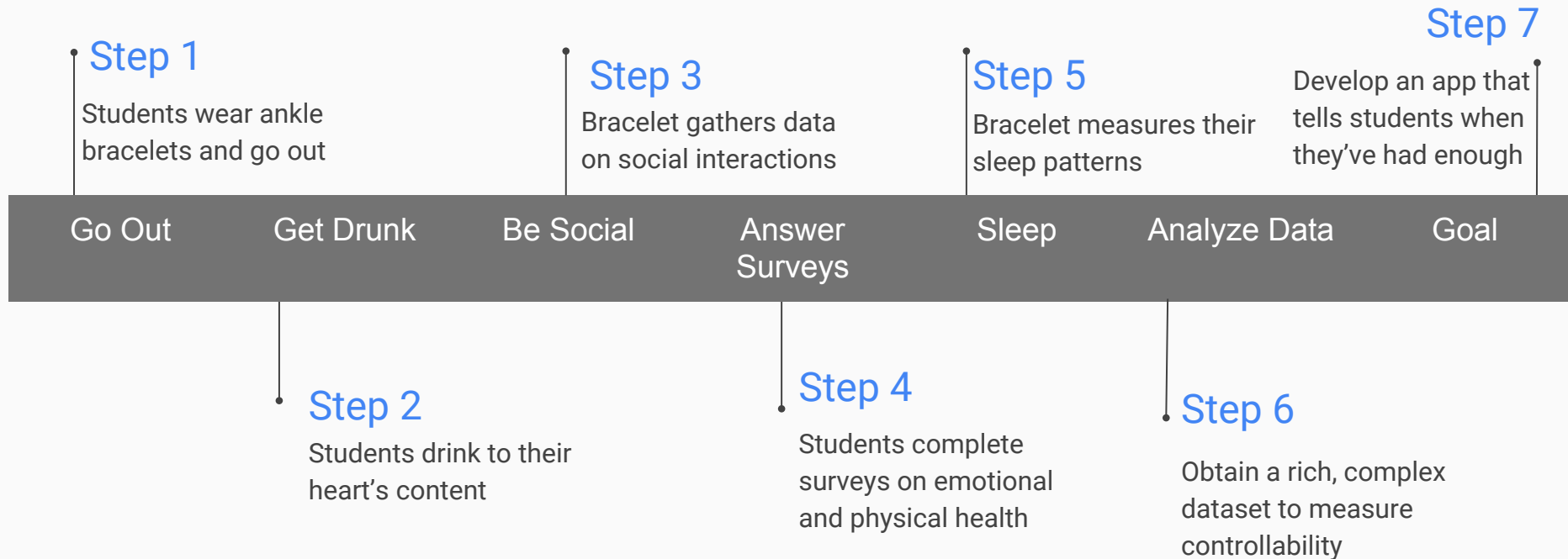
A Typical Engineering Problem

Clapp asked Kevin Passino, an electrical and computer engineering professor at Ohio State, to re-analyze Clapp's data and to approach the problem through an engineer's perspective. Passino found that the data on drinking habits actually resembled a feedback controller called the *proportional-derivative controller*, which:

> Measures how a system has moved from a point

> Adjusts the system accordingly

Proof of Concept Experiment

Measuring Controllability

Step 1
Students wear ankle bracelets and go out

Step 3
Bracelet gathers data on social interactions

Step 5
Bracelet measures their sleep patterns

Step 7
Develop an app that tells students when they've had enough

| Go Out | Get Drunk | Be Social | Answer Surveys | Sleep | Analyze Data | Goal |

Step 2
Students drink to their heart's content

Step 4
Students complete surveys on emotional and physical health

Step 6
Obtain a rich, complex dataset to measure controllability

The App

Functionality and Features

The user will be able to tell the app when they want to moderate their drinking. The app will periodically send messages and alerts to the user after they get the user's BAC via wearable technology. Since smartphones already have GPS capabilities, the app will have the option of calling a taxi company to avoid having the user drive.

Wearable BAC Biosensor

The *National Institute of Alcohol Abuse and Alcoholism* ran a design competition for a wearable BAC biosensor. The winner (pictured) connects via bluetooth to work in concert with their smartphone app

The biosensor will be on the market in 2017

BACtrack Skyn™

Mathematical Models

Researchers in the social work and engineering fields are using the data gathered by the professors to construct mathematical models

These models will help to uncover the factors behind the patterns in alcohol consumption
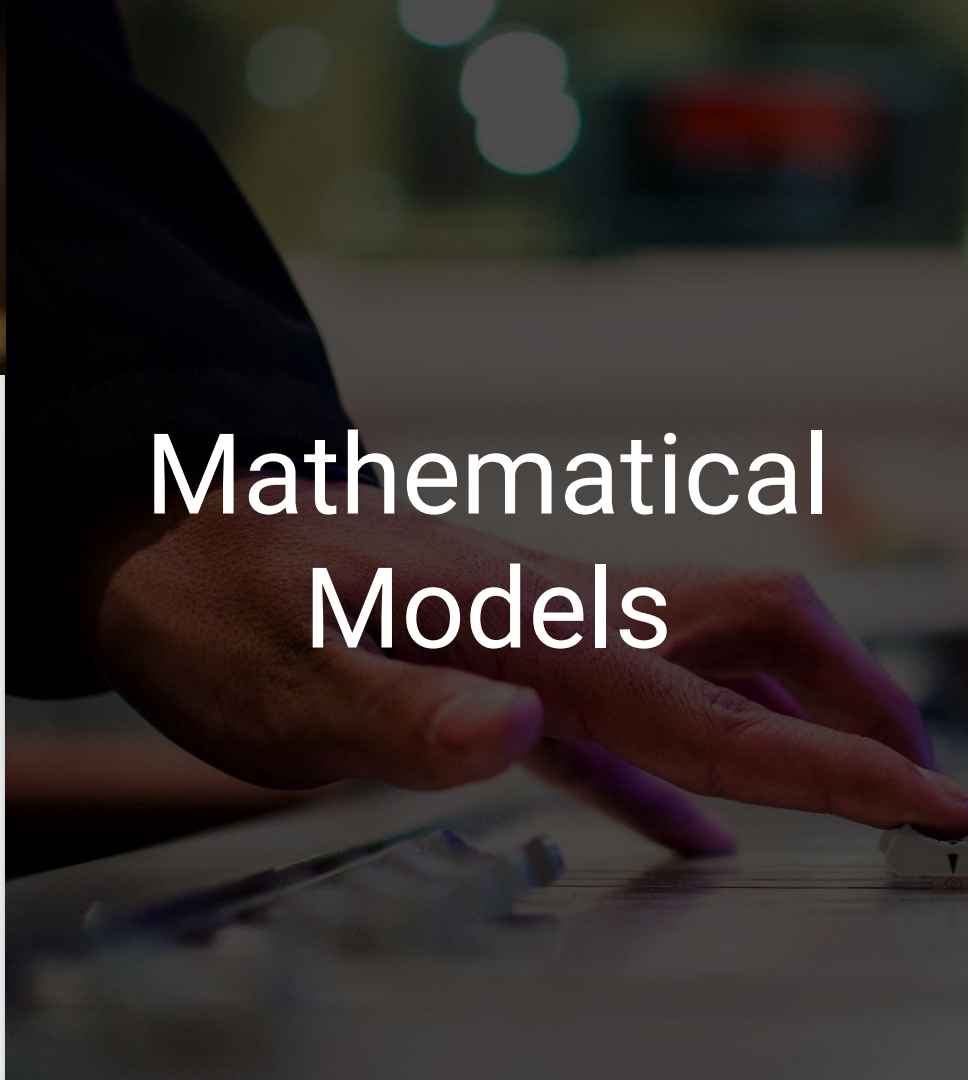
Educating Students on Alcohol

Steps for Success

Step 1
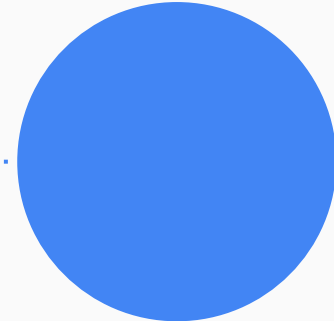Being educated about your alcohol intake

Step 2
Going out with a group of friends

Step 3
Remembering that your health is your priority

One Alcoholic "Drink"

Distilled Spirits

1.5 Ounces of Distilled Spirits is

40% Alcohol

Beer

12 Ounces of Beer is

5% Alcohol

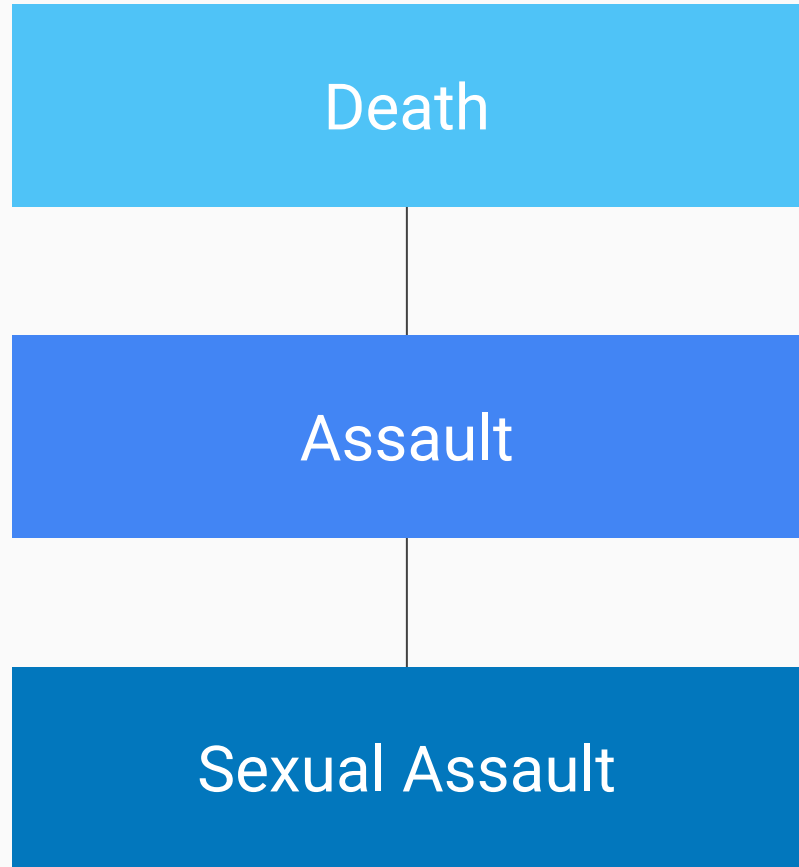## Wine

5 Ounces of Wine is

12% Alcohol

Why Care?

Every year, as a result of alcohol-consumption:

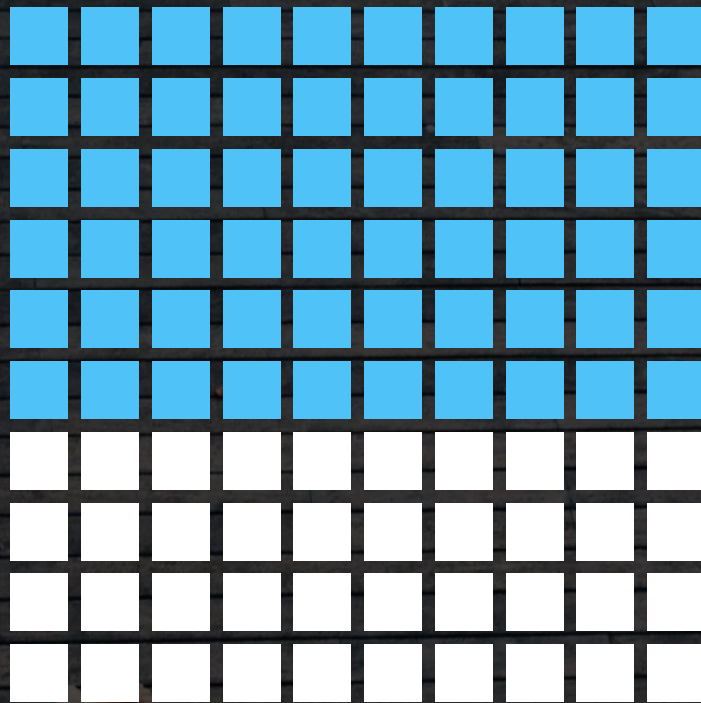**1,825** students die from alcohol-related incidents

696,000 are assaulted by another student who has been drinking

97,000 report experiencing sexual assault or date rape

Death

Assault

Sexual Assault

Their Goal

To look at the optimal points to intervene, so that they can aid a student in their decision-making and behavioral habits

Clapp and Passino agree that educating and guiding students on drinking is better than attempting to prevent drinking completely

Students will always find ways to drink, so it is better to aid them

Moral of the Story

Resources

"College Drinking." *The National Institute on Alcohol Abuse and Alcoholism*,
http://pubs.niaaa.nih.gov/publications/CollegeFactSheet/CollegeFactSheet.pdf.
Accessed 27 Oct. 2016.

Gorder, Pam. "Here's how young people decide when they're drunk 'enough,' according to
math." *The Ohio State University*,
https://news.osu.edu/news/2016/10/17/drinkmodel/?platform=hootsuite.
Accessed
27 Oct. 2016.