Lesson 8
(Ideation + Heart Rate)

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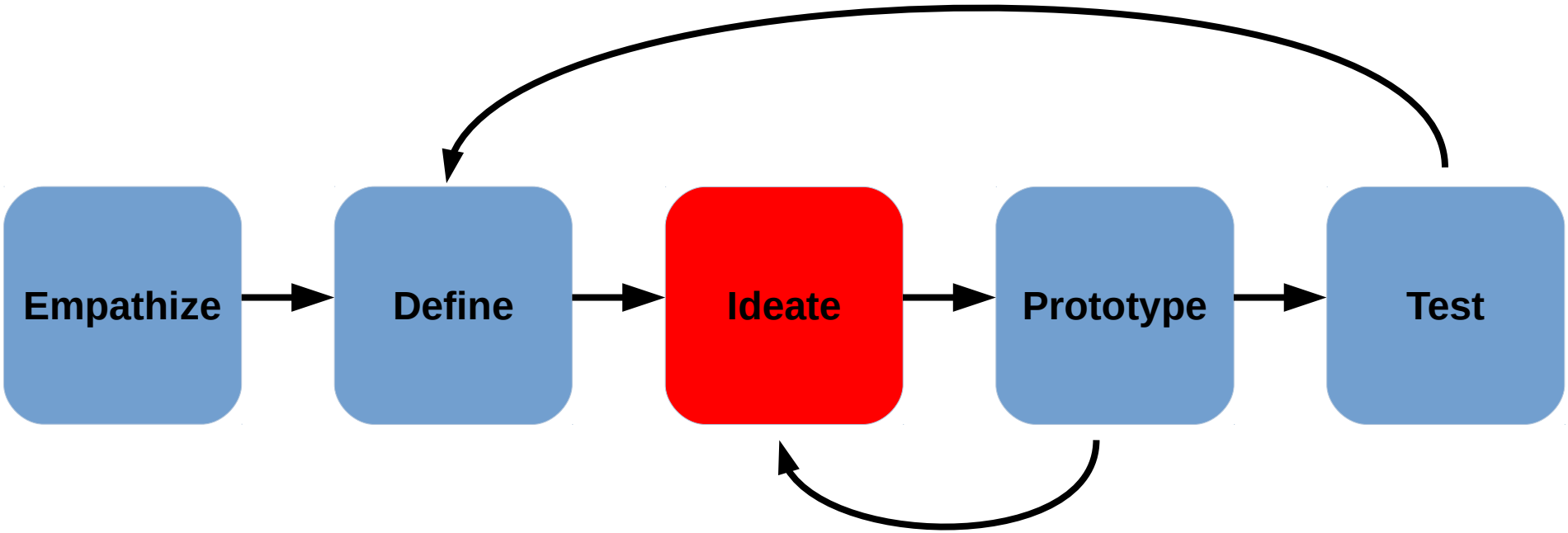
Play · Experience · Learn

Target for Today!

- Design Thinking: Ideation
- Learn how to use Heart Rate Sensor

Slides available at: http://a9i.sg/huayi

Design Thinking Process

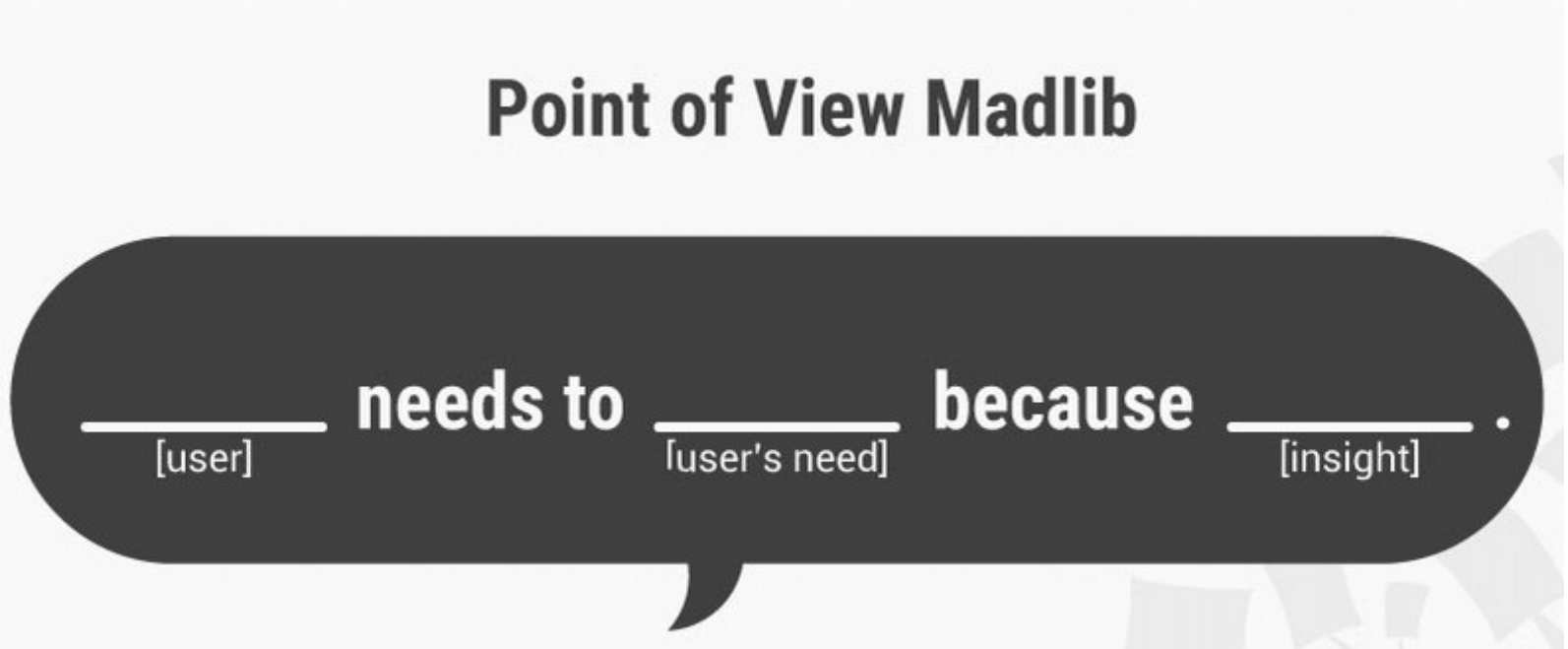


Ideate

- **Generate Solutions for Problem Statement**
- It's a creative process, trying to come up with non-obvious, unique ideas
- **Define** gave us a clear sense of what we want to solve
- As a **Group**, we can come up with some **Unexpected Solution**

Before We Ideate

- Important to have a well-defined Problem Statement from last Design Thinking stage:



How To Ideate

- Keep Open Mind
- Listen to Others – We Each Have a Unique View
- No Stupid Questions
- No Wrong Answers
- Break Down Problem Statement:
  - **How Might We... (HMW)?**

Brainstorming

- Take turns discussing the problem and your ideas
- Take notes, but don’t let that slow down conversation
- Add to ideas you like
- Pause before you give up on ideas you initially dislike
- A pictures tells a thousand words…
- Encourage wackiness – OK to be silly

> It is easier to tone down a wild idea than to think up a new one.
>
> - Alex Osborn

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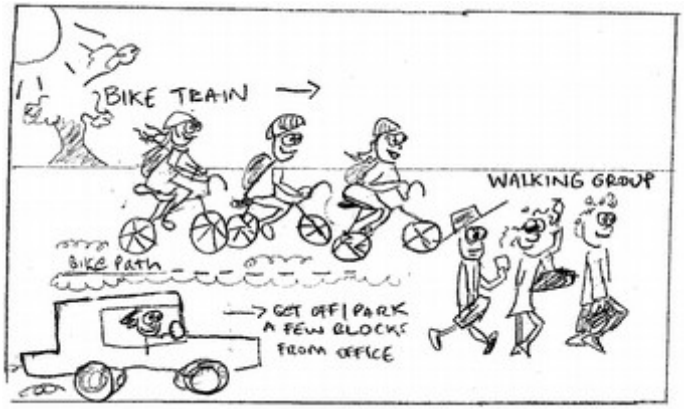
Worst Possible Idea

- Come up with as many bad ideas as we can
- List properties – what makes the worst idea so bad
- Search for opposite attributes
- Look for substitutes
- Mix & Match

- Once analyzed, a bad idea may turn out not so bad, after all...

Storyboarding

- Develop a story to illustrate problem/solution
- You need
  - Characters
  - Setting
  - Plot



- Draw story out, like a comic
- Concentrate on relevant scenes
- Artistic skill not important, only convincing illustration of problem & solution matters

Ideate

Worksheet

Choose Ideation Technique and Produce Idea (20 min)

- Brainstorming
- Worst Idea Possible
- Storyboarding

You will need to pitch your idea to the teachers before committing to it!

Re-Define

Rewrite your problem statement, if you find it lacking

ALP Project

Keep what you have written!

You'll need to include it into your ALP Project write-up.

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Heart Rate Sensor

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Heart Rate Sensor

- Measures amount of light passing through skin
- Amount of light changes with blood flow
- Provides analog voltage signal

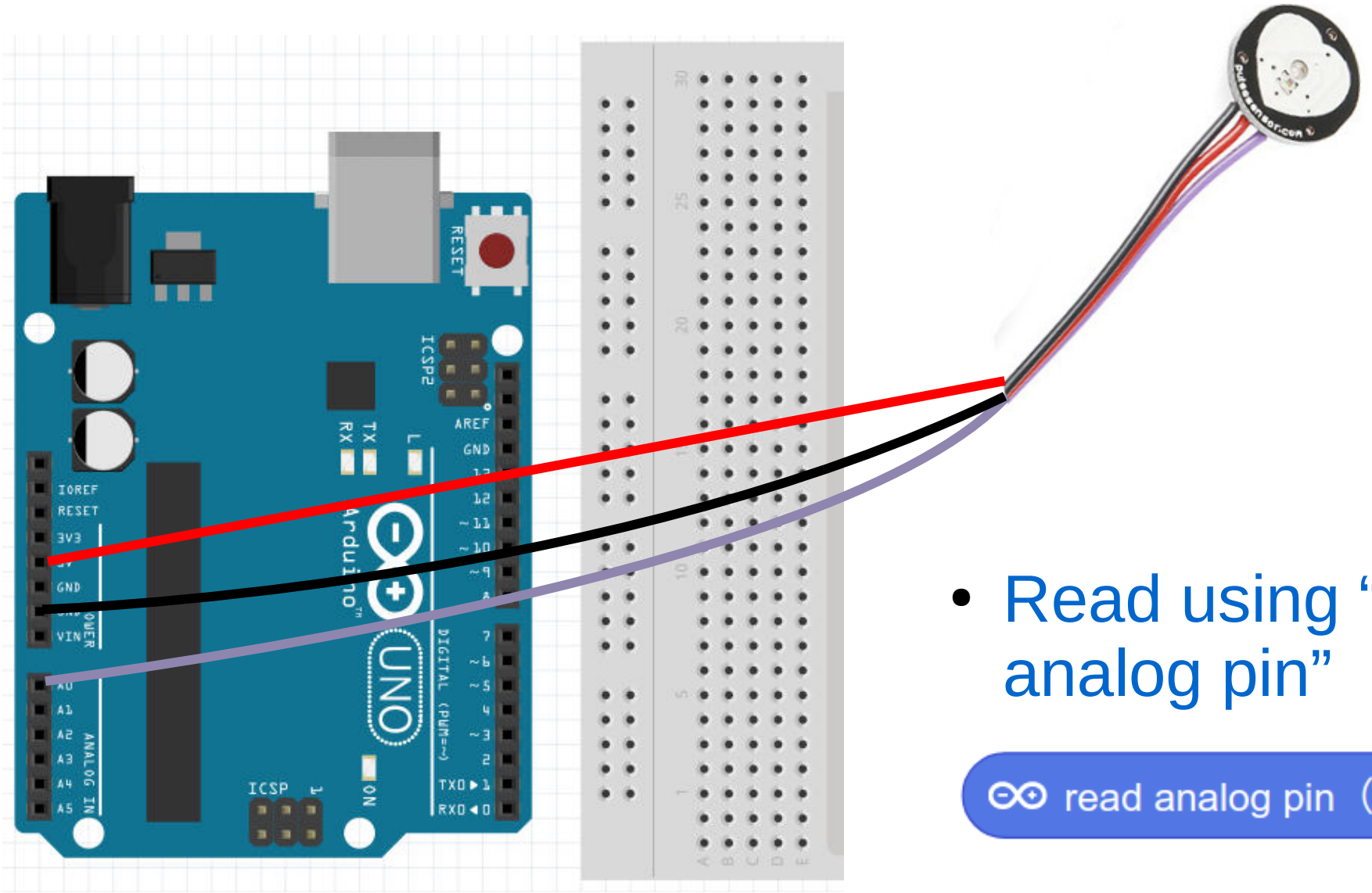
Heart Rate Sensor

Pins Connections

Sensor	Arduino
Red (+)	5V
Purple (S)	Any Analog (A0 - A5)
Black (-)	Gnd

- Voltage rises above mid-point (512) on every pulse

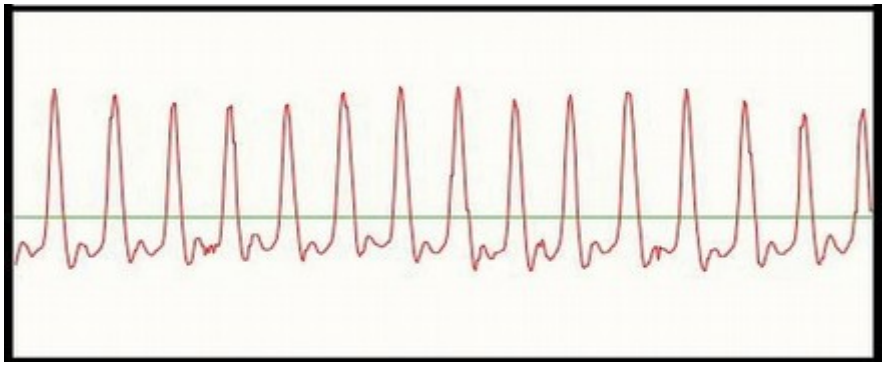
Heart Rate Sensor



- Read using “read analog pin”

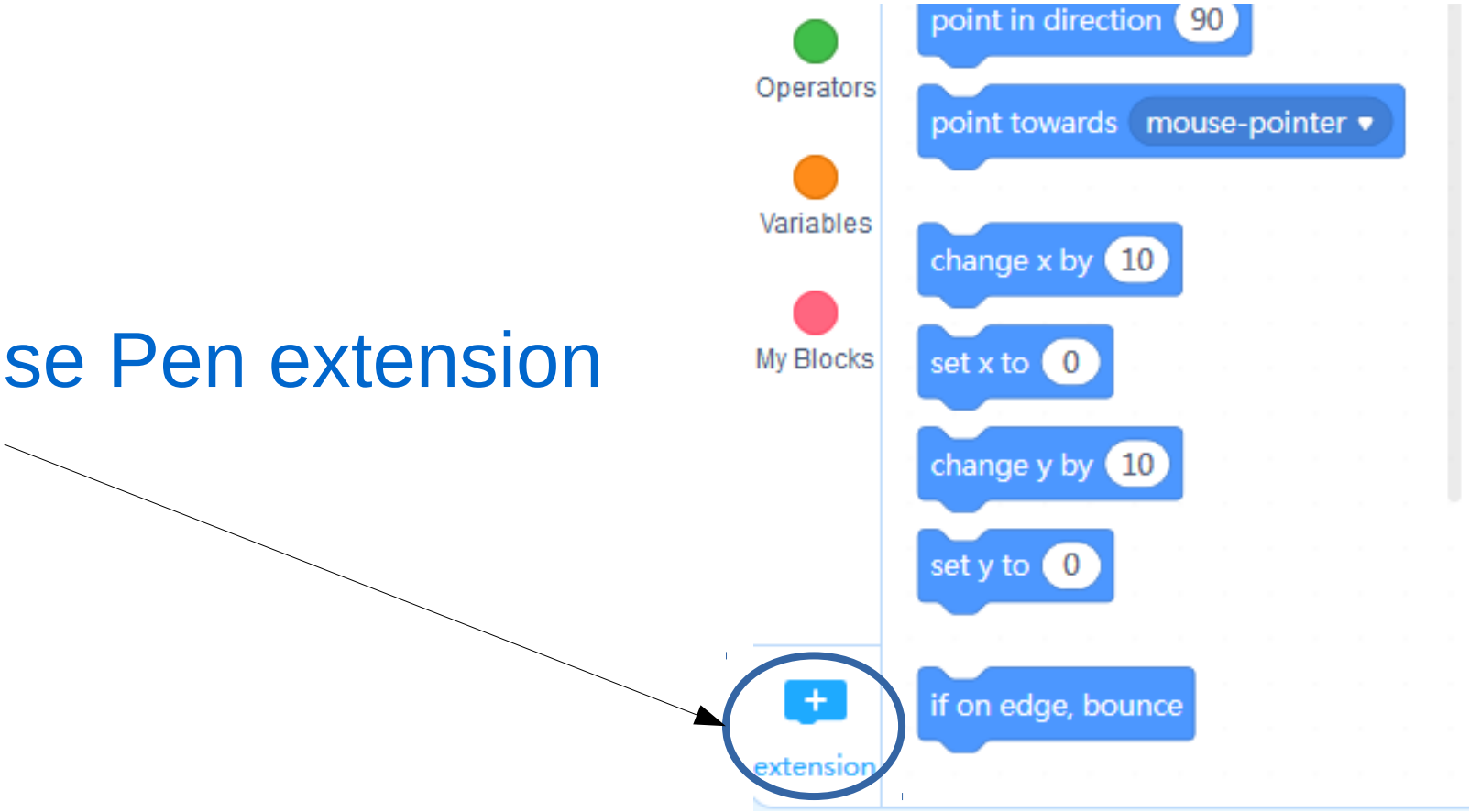
Heart Rate Sensor

- Plot Sensor Voltage reading, create Heart Monitor
- Need to from Voltage to Y (-150 to 150)
- Plot using any sprite

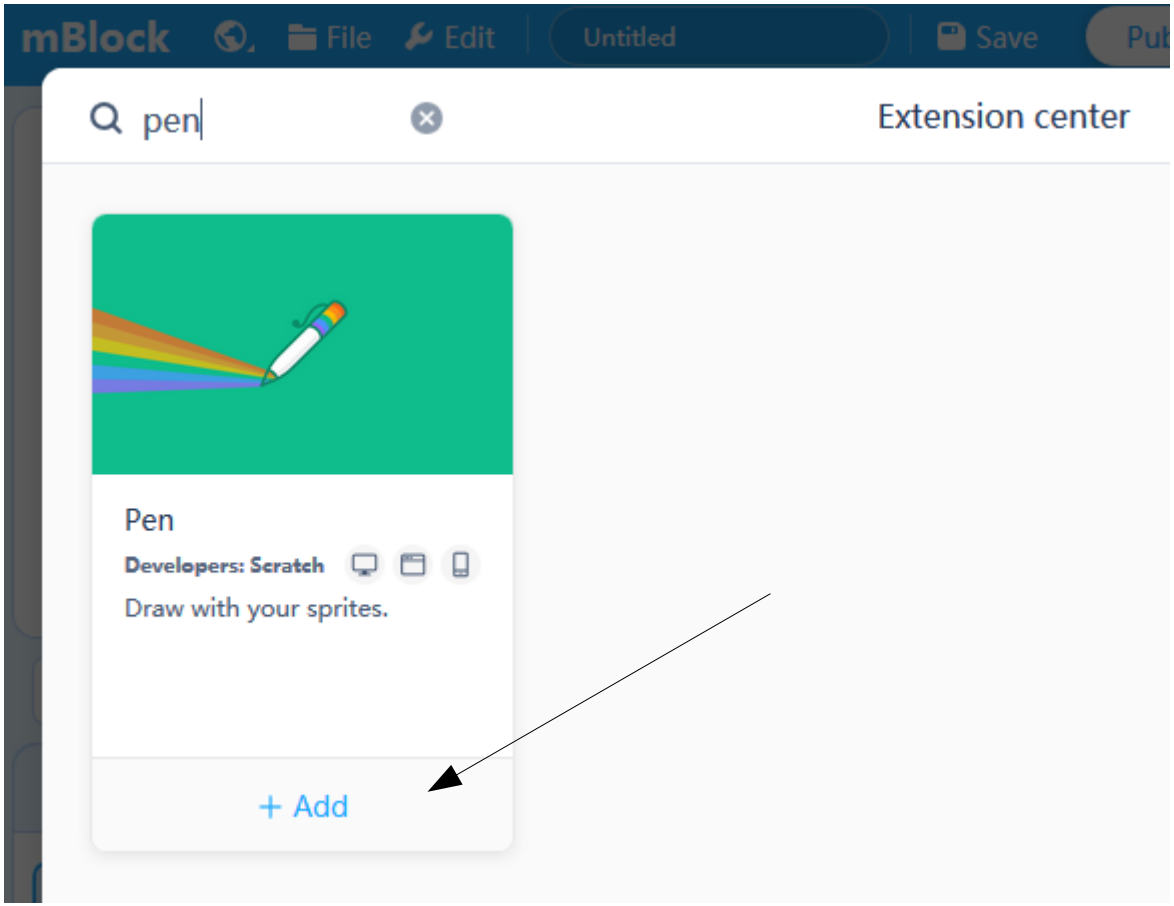


Pen Extension

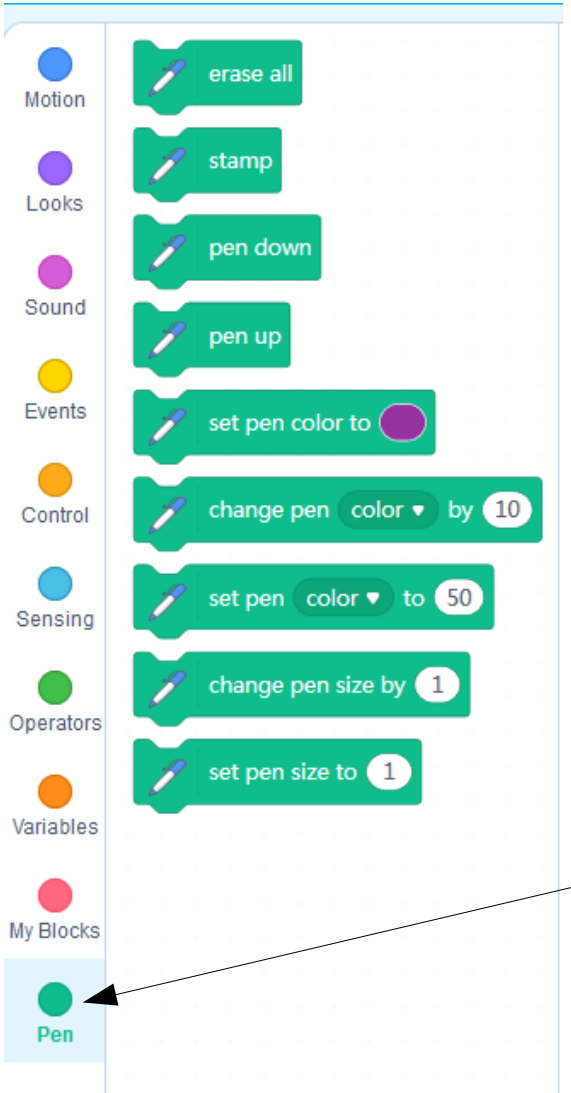
- Need to use Pen extension



Pen Extension



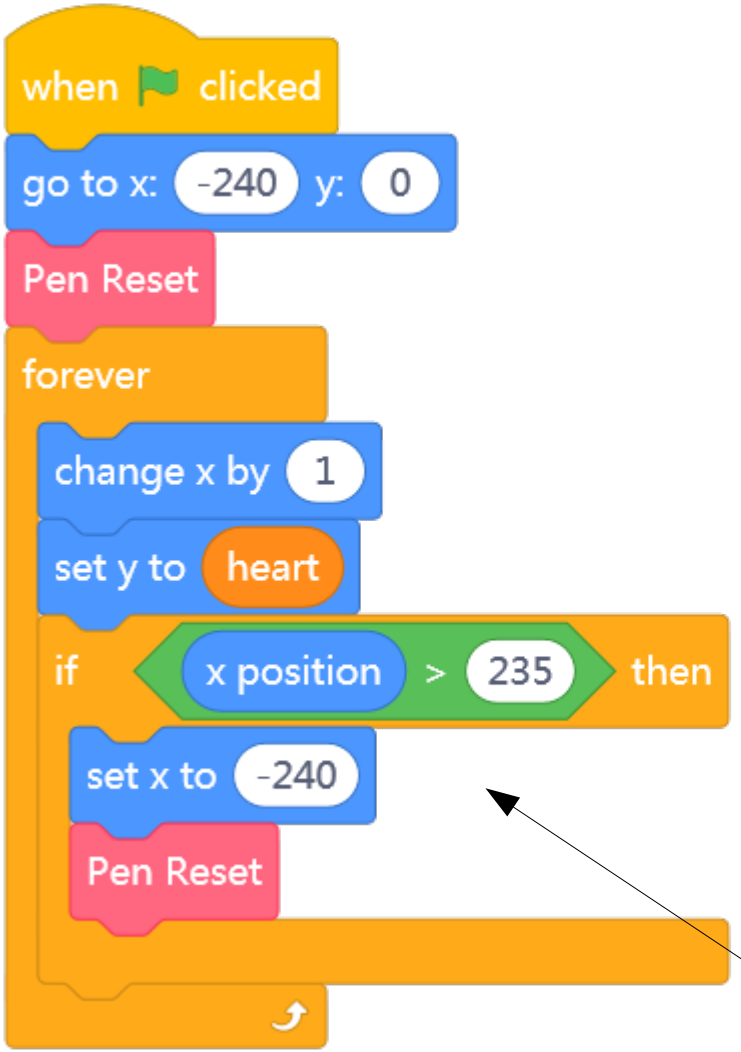
Pen Extension

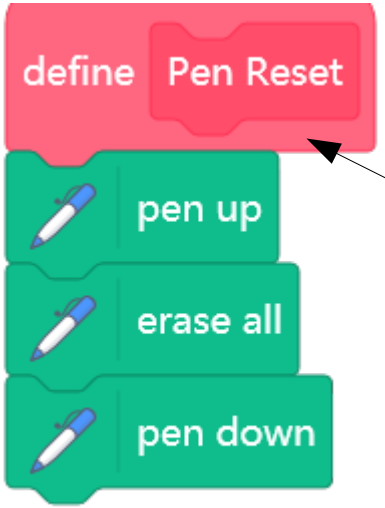


Useful Blocks:

- Pen Down
- Pen Up
- Erase All

Heart Rate Monitor

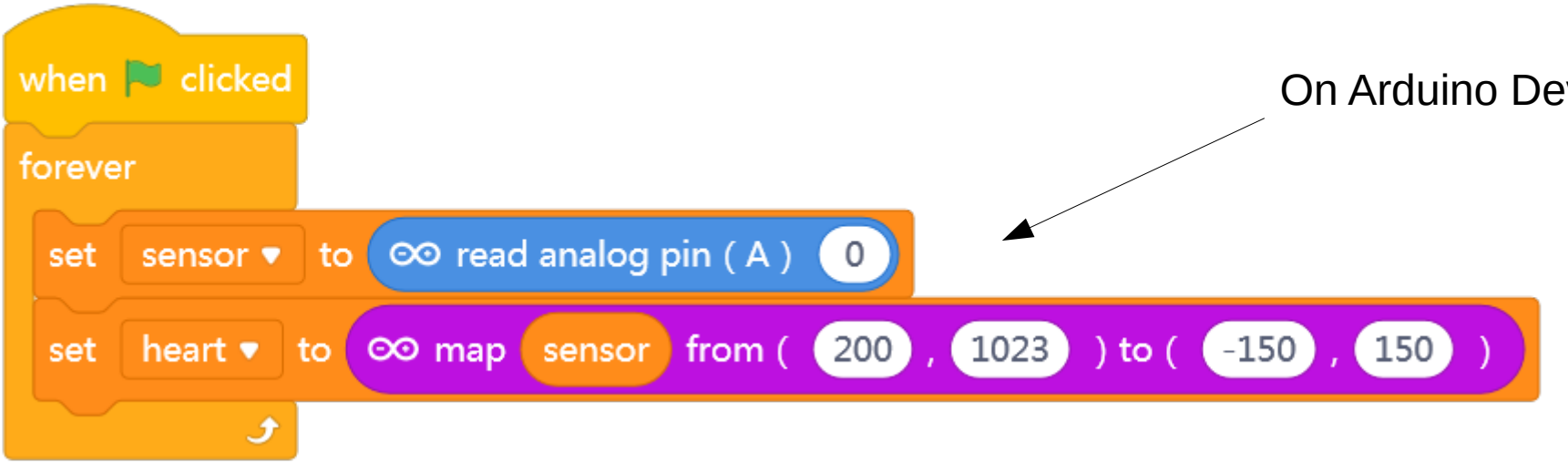




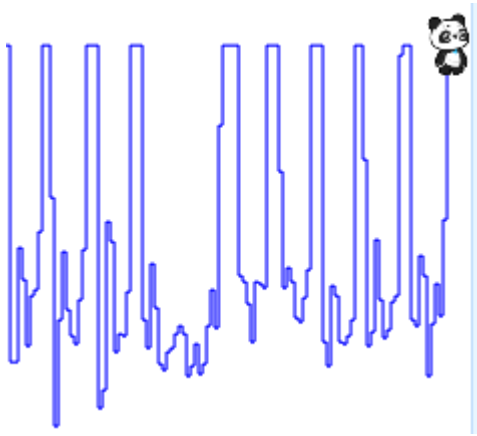
My Block

Panda Code

Heart Rate Monitor

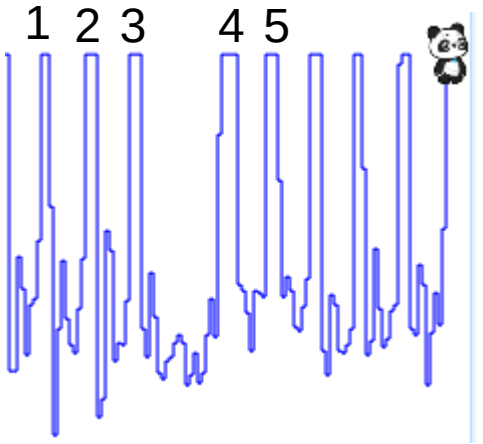


On Arduino Device



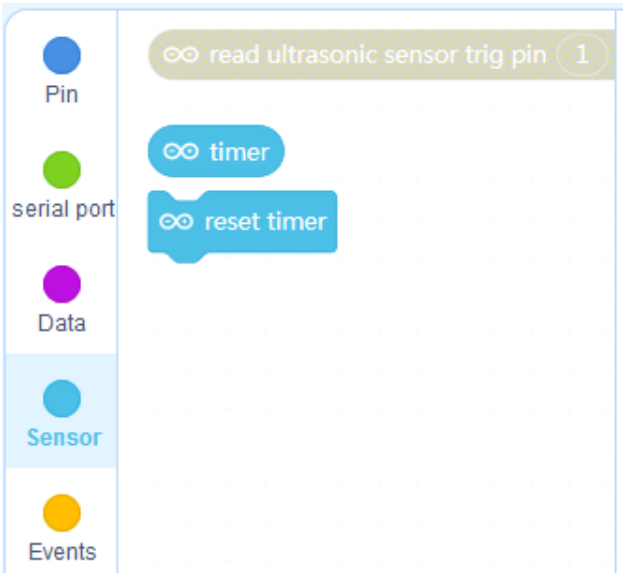
Challenge : Beats Per Minute

Challenge



- Count beats
  - When sensor passes threshold
- No over-counting
  - Before you can count another beat, you have to wait for the first to finish
- Hint: See how we waited for Ultrasonic Sensor to count a full push-up...

Challenge : Beats Per Minute



- Use **Timer** to keep track of time
- On every beat calculate:

BPM = # of beats / time-in-seconds * 60

Challenge : Beats Per Minute

- Record your resting Heart Rate in Beats Per Minute
- Do 60 jumping jacks
- Record your Heart Rate again

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