Lesson 9
(Review / Iterate + Temperature)

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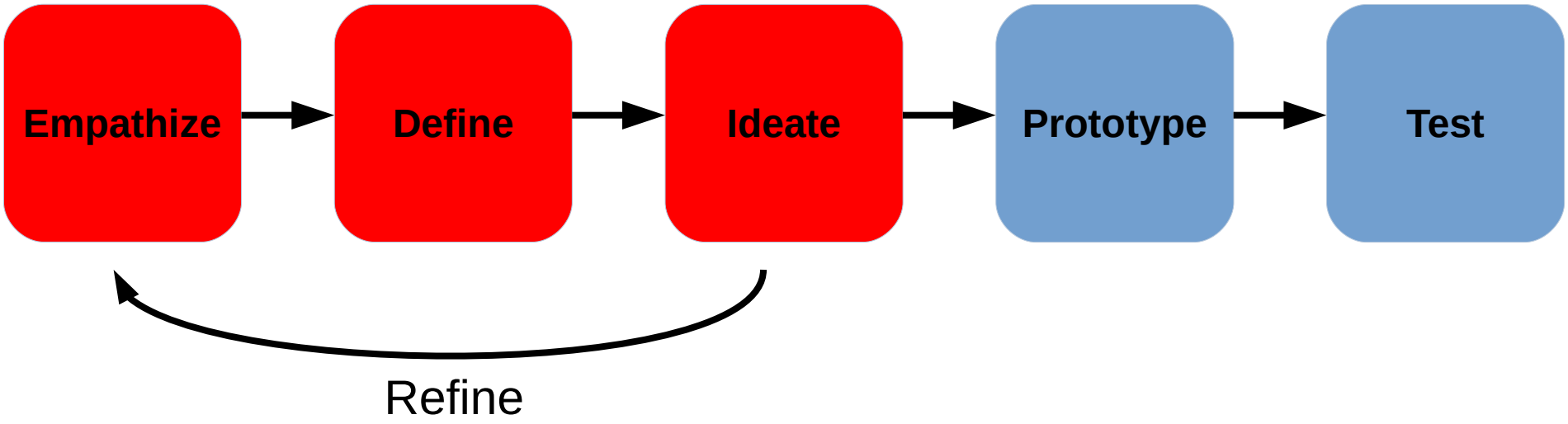
Play · Experience · Learn

Target for Today!

- Design Thinking: Review & Iterate
- Learn how to use Temperature Sensor

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

Design Thinking Process



Review / Iterate

- **Review Your Problem Statement & Solution**
- **Refine or Re-Iterate until happy with solution**
- **Solution must solve a well-defined problem**
- **And be doable!**
  - **Time Limitations**
  - **Hardware / Cost**
  - **Complexity**

Lite Project Management

- Break down solution to multiple components
- List steps to complete each component

Stroke Patient Game

- Mblock Game
  - Game Design
  - Art (Background, Characters, Props)
  - Coding Sprites
  - Testing / Refinement
- Electronics / Hardware
  - Hardware Design
  - Wiring (Potentiometer, LEDs)
  - Packaging
  - Coding Arduino Device
  - Testing / Refinement
- Presentation Prep

Lite Project Management

- **Table With Dependencies**

Stroke Patient Game

ID	Description	Completion Date	Dependency (ID)
1	**Mblock Game**	23 April 2020	
2	Game Design	26 March 2020	
3	Artwork	9 April 2020	
4	Coding Sprites	16 April 2020	
5	Testing	23 April 2020	8
6	**Electronics & Hardware**	23 April 2020	
7	Hardware Design	2 April 2020	2
8	Wiring (Potentiometer, LEDs, etc)	9 April 2020	
9	Packaging	16 April 2020	8
10	Coding Arduino Device	16 April 2020	8
11	Testing	23 April 2020	4
12	**Presentation Preparation**	23 April 2020	

Lite Project Management

- Commit to Certain Milestones (work backwards)
  - Finish Design by …
  - Finish Coding by …
  - Start Testing by …
  - Presentation on _____

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Lite Project Management

- Figure out what you need to get project done, and by when
  - Parts
    - Cardboard
    - Wood
    - Other - propellers, gears, levers, etc
  - Tools
    - Glue gun
    - Soldering iron
    - Paint
    - Other – scissors, tape, hammer/nails, saw, etc

Refinement & Iteration

- No product ever gets made in one iteration
- Testing & Refinement should be expected and built-in
- Always keep a skeptical, critical mindset
  - Will this actually work?
  - How can this be improved?
  - Did I test every circumstance?

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Refinement & Iteration

- Beta Testing / User Testing
- Let others to review, test and critique your design/product
  - Analyze all critiques
  - Decide if it’s appropriate and worth making a change over
  - Not all criticism mandates design changes...

Refine / Review

Worksheet

Review / Refine (2-5 min)

- Pitch idea to teachers, listen to critique, and refine problem statement & solution, if necessary

Project Management (15 min)

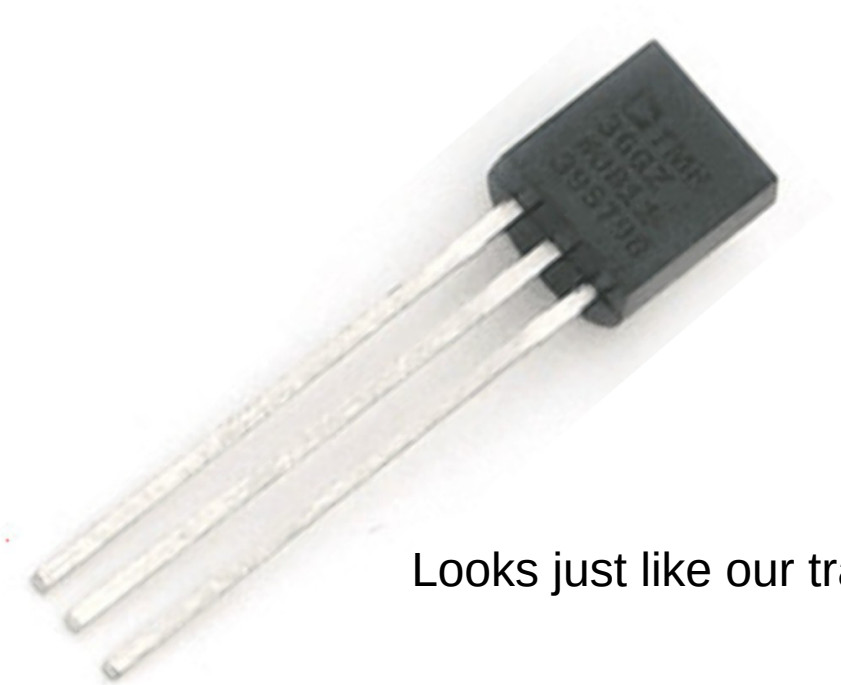
- List your design components
- List steps to complete each component
- Analyze dependencies
- Schedule dates to complete all work by _____

ALP Project

Keep what you have written!

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

Temperature Sensor



Looks just like our transistor...

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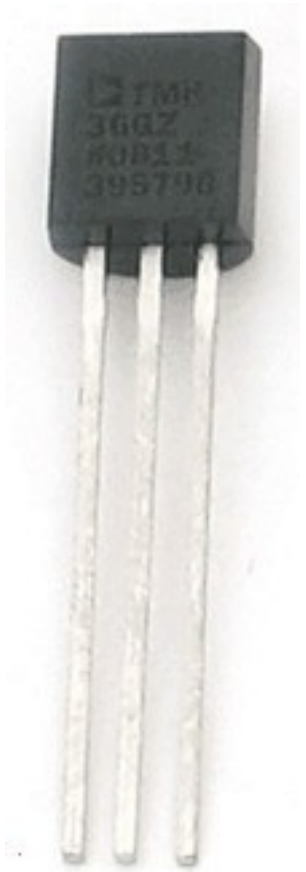
Temperature Sensor

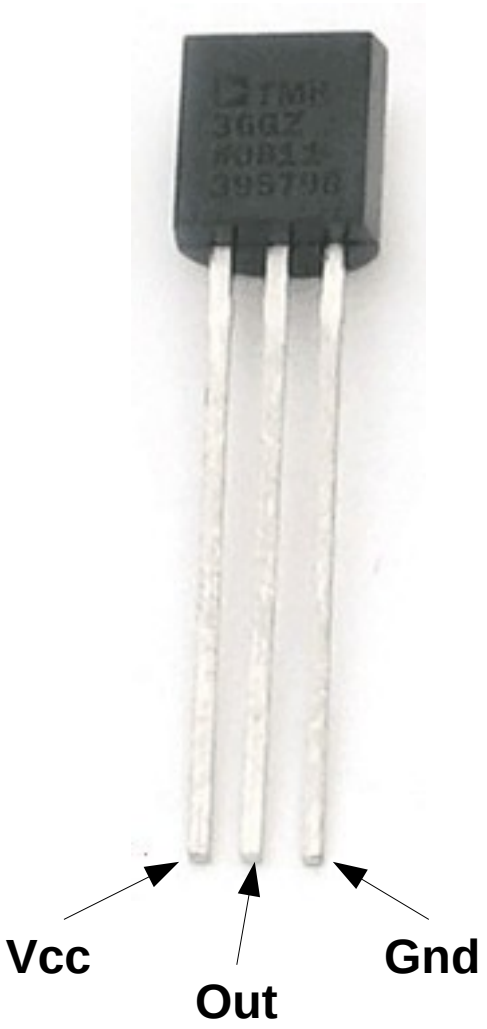
- Model: TMP36
- Range: -40°C to 150°C
- Uses semi-conductors to measure temperature
- Outputs an analog voltage



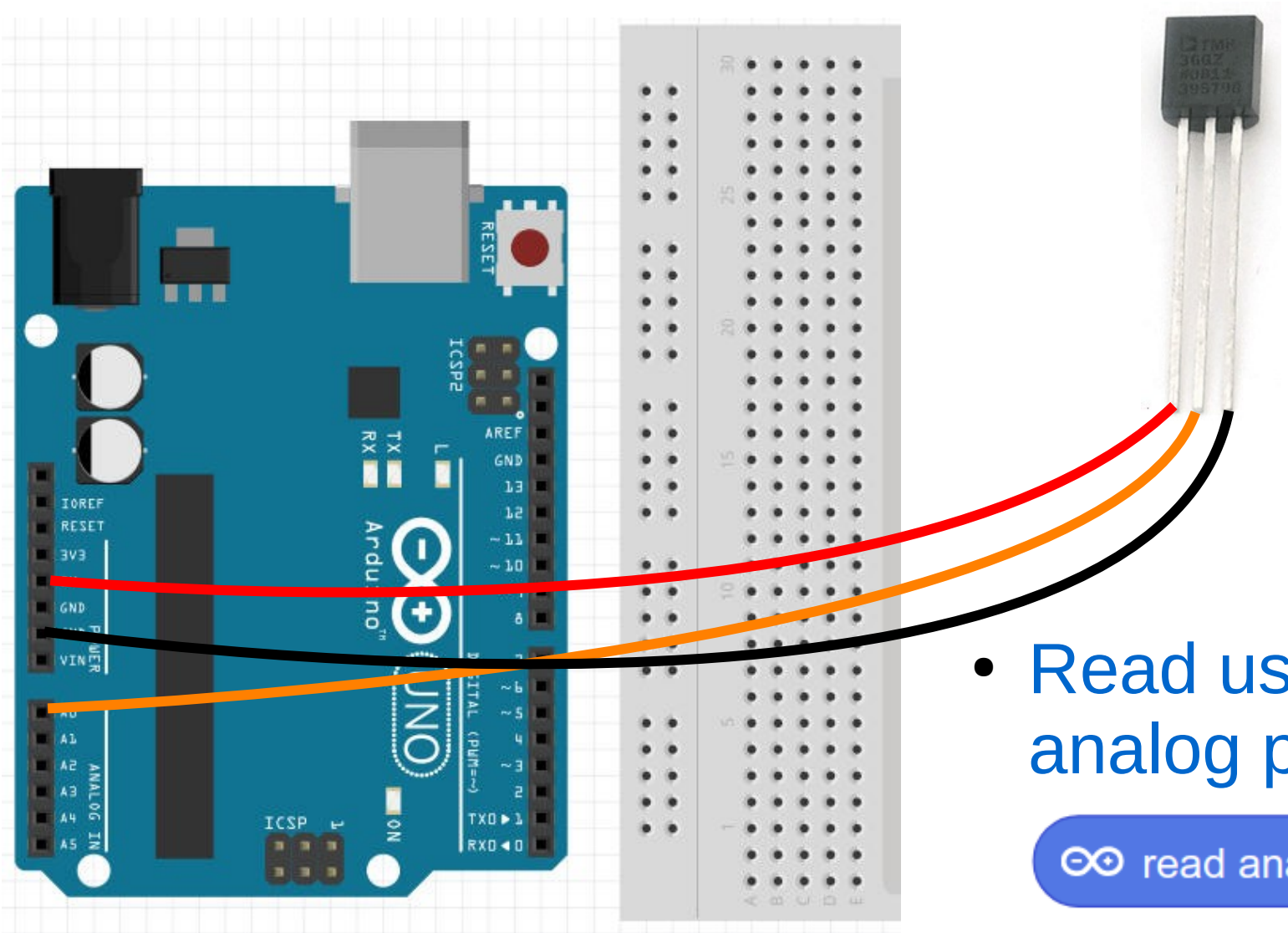
Temperature Sensor

Pins Connections

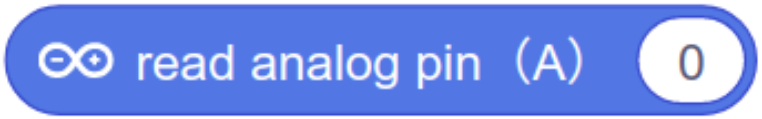
Sensor	Arduino
Vcc	5V
Out	Any Analog (A0 - A5)
Gnd	Gnd



Temperature Sensor



- Read using “read analog pin”



Temperature Sensor

Calculate temperature:

- Convert analog reading to voltage (mV)

- Convert voltage to °C

  Temperature = (mVoltage – 500mv) / 10

Temperature Sensor

- Plot Sensor Temperature on the screen
  - You can make it a timeline
  - Sprite can just *Say* current temperature
  - Anything else...

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Active Buzzer

Pins Connections

Buzzer	Arduino
+	Any I/O (Pin 2 to 12)
-	Gnd

- Doesn’t require a resistor
- Cannot be reversed
- Plays only a single tone, cannot control tone or play music

Challenge

- Measure Temperature
- Turn on Alarm When Too Hot!
  - When sensor passes a threshold
- Test the Temperature sensor to see what should constitute a heat alert.
  (Hint: Also cold alert...)

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