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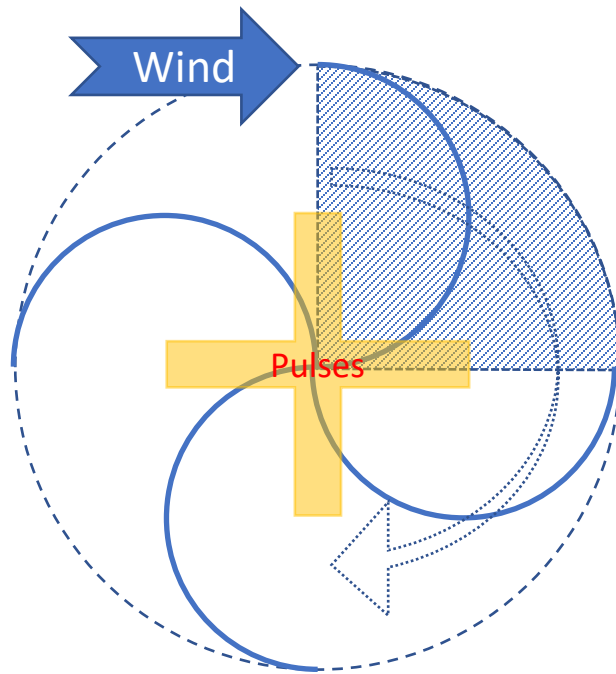
# Make an Anemometer using cardboard and a Fidget Spinner for the *Kookaberry*



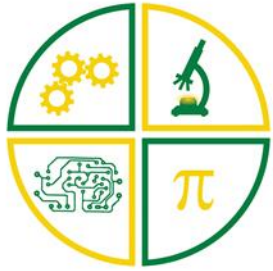


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# The Anemometer Explained



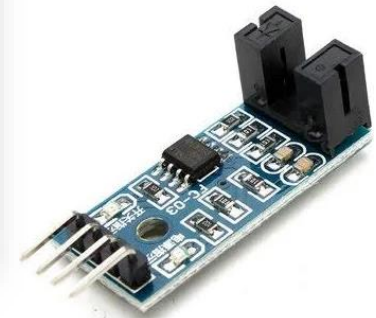
- Anemometers measure horizontal wind speed.
- Anemometers comprise blades that are pushed by the wind and spin around an axis.
- The rate of rotation of the blades is measured by the Kookaberry using an optical sensor. The anemometer interrupts a light beam on the sensor four times per revolution, that is at every 90 degrees. The interruption is detected as an electrical pulse which the Kookaberry counts.
- The circumference of the anemometer moves a distance (in cm) given by  $\text{Pi} \times \text{radius (cm)} / 2$  for every 90 degrees of rotation. Divide by 100 to change the distance moved to metres.
- For  $n$  pulses / second, the anemometer circumference has moved  $n \times \text{Pi} \times \text{radius} / 2$ . Adjusting that value by multiplying by 3600 (seconds/hour) and dividing by 100,000 to get the wind speed in kilometres per hour (kph)



# Materials

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- 500gsm (approx.) Cardboard
- Cardboard tube for paper towels
- Fidget Spinner
- DHT11 humidity and temperature sensor
- Optical sensor
- Kookaberry accessory cable (x2)
- Paper glue, sticky tape
- Blue tack
- Scissors\*\*, craft knife\*\*, ruler
- Cutting board

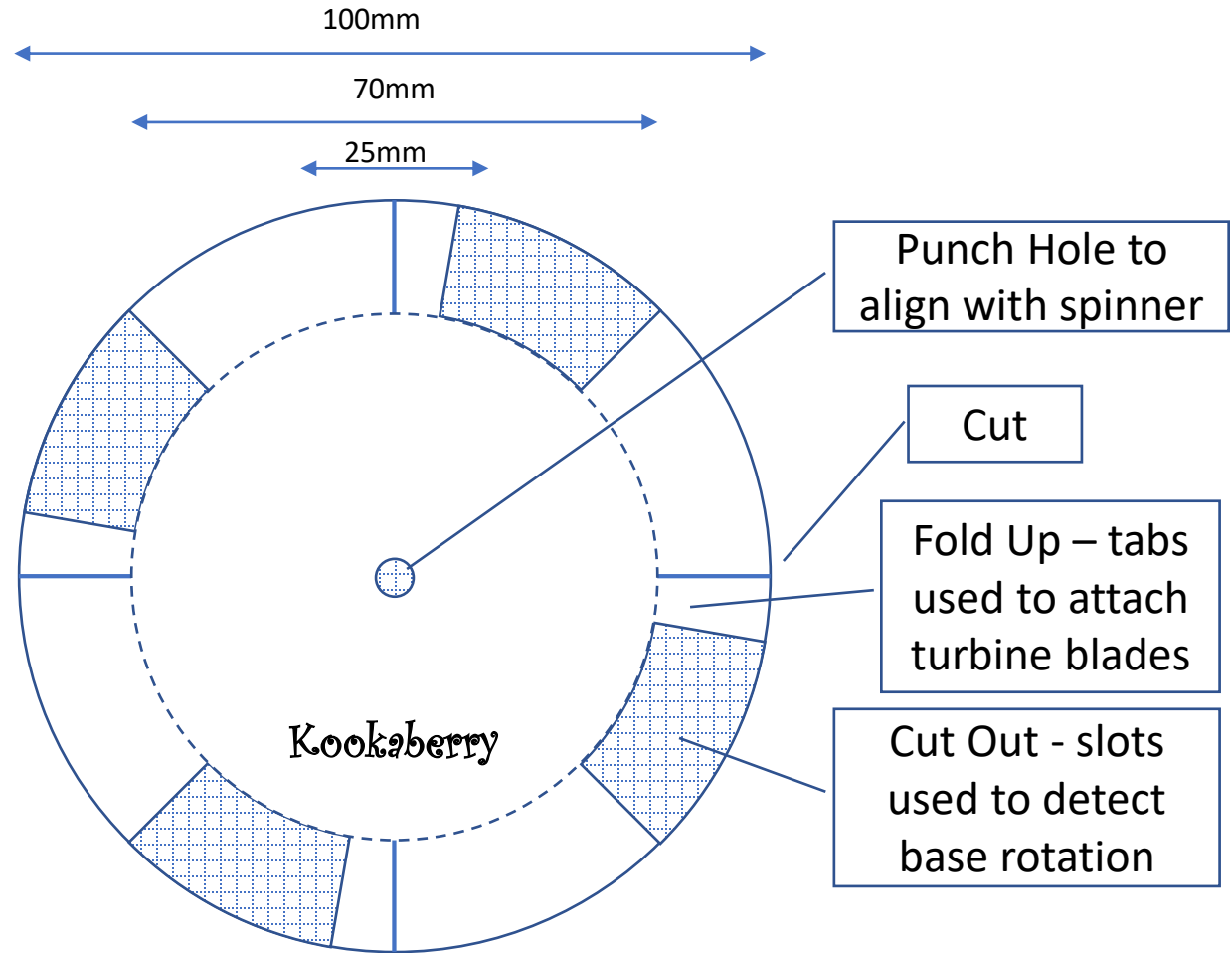


**\*\*Safety warning!**  
**Involves sharp tools that should not be used by children.**  
**Responsible adults should do the cutting.**



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# Dimensioned Template

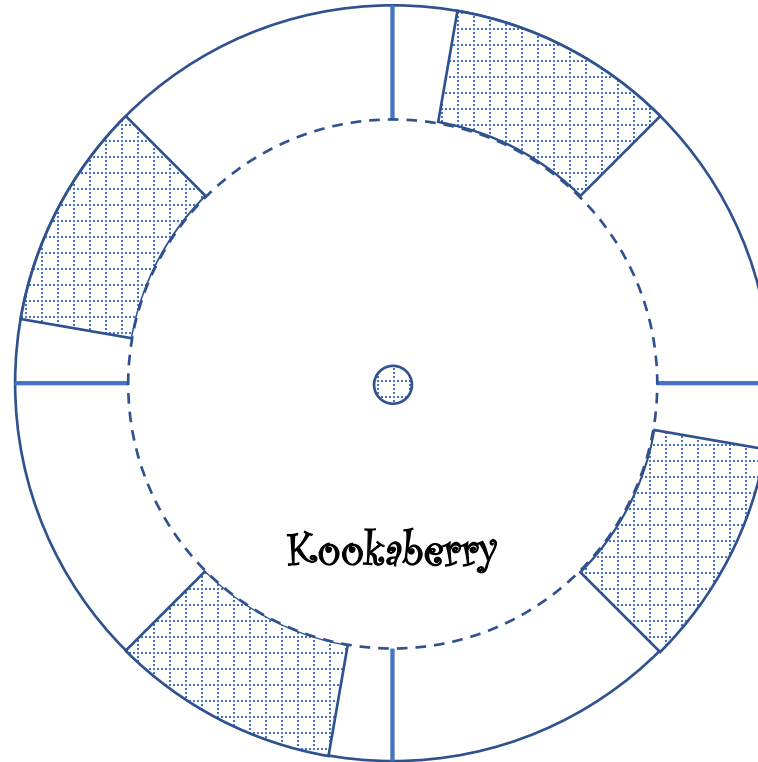


## Turbine Base

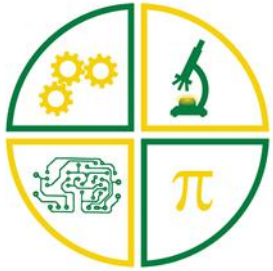


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# Printable Template

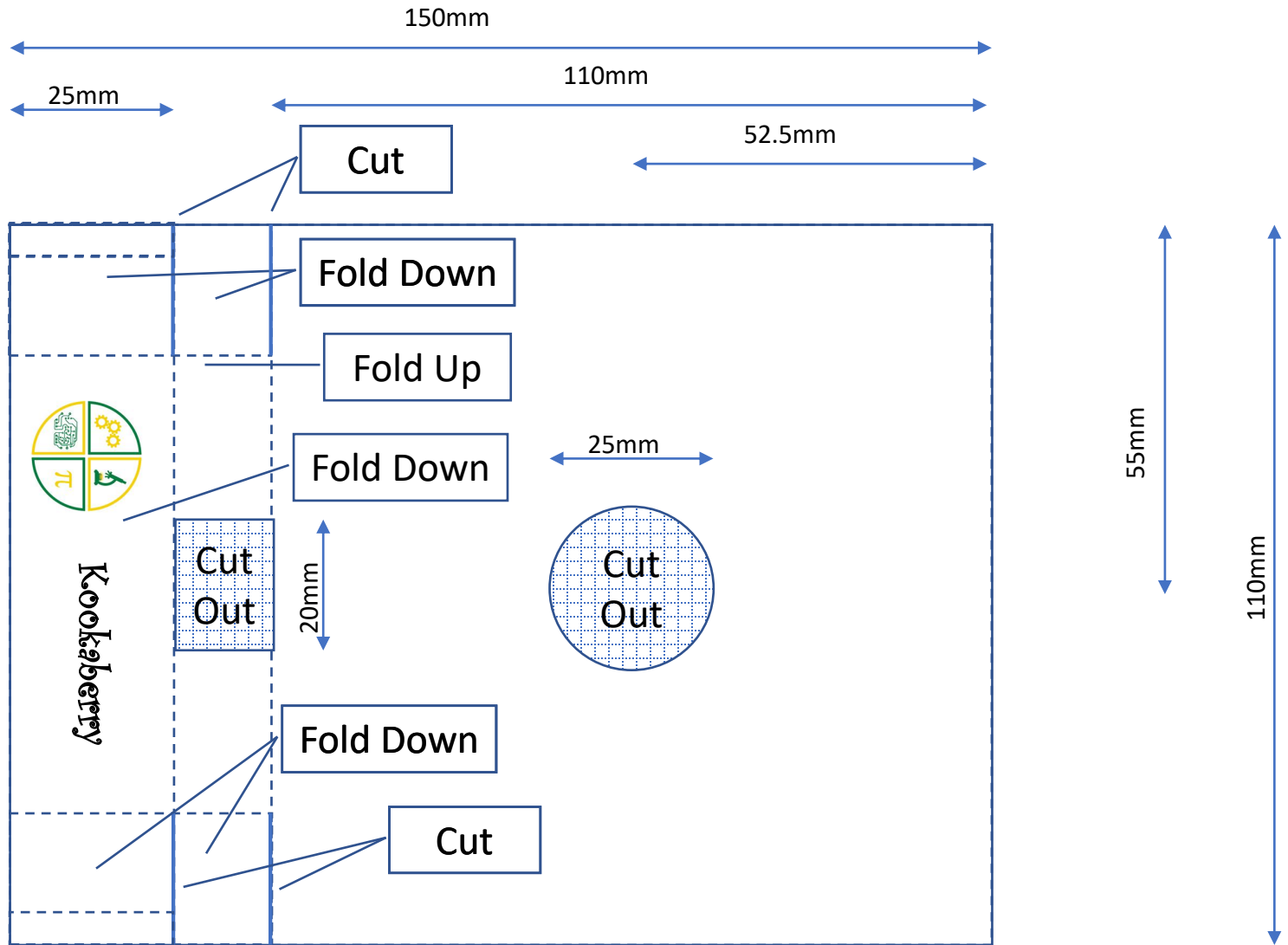


## Turbine Base

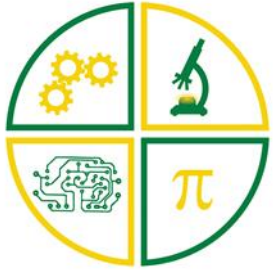


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# Dimensioned Template



## Weather Station Base Top Layer



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# Dimensioned Template

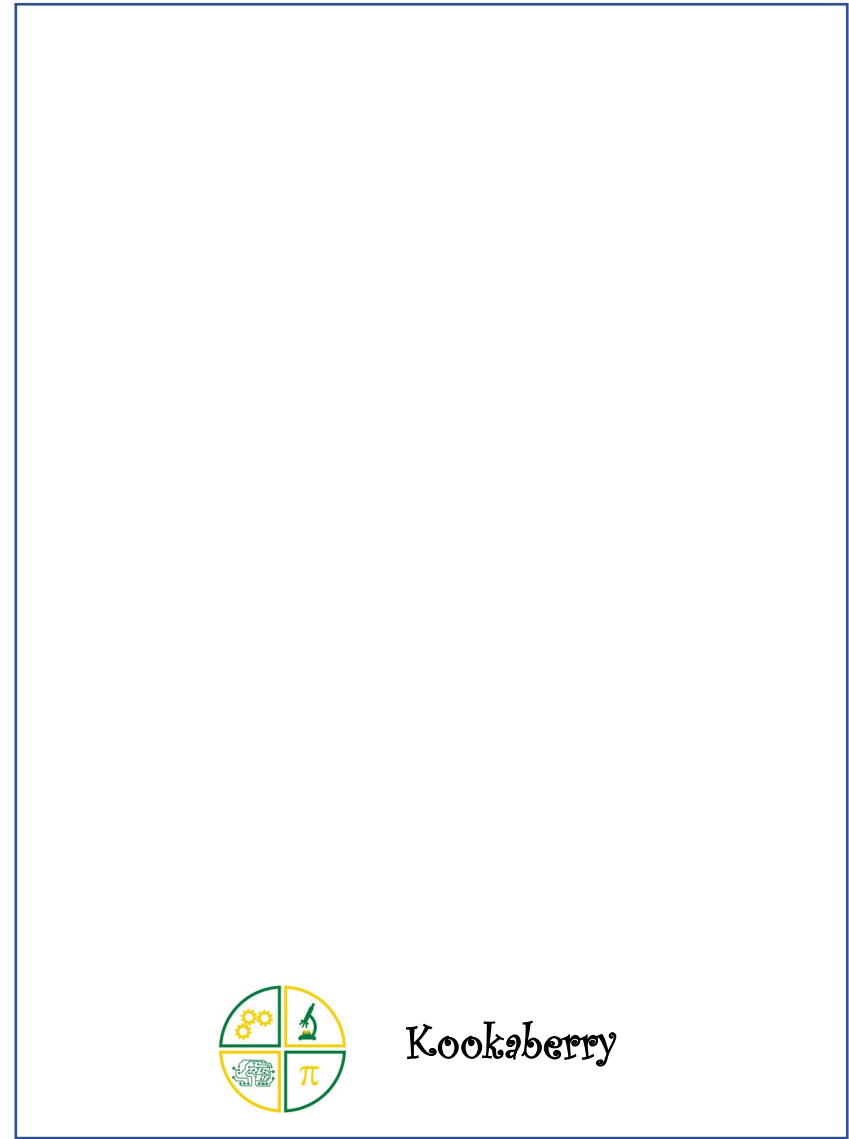
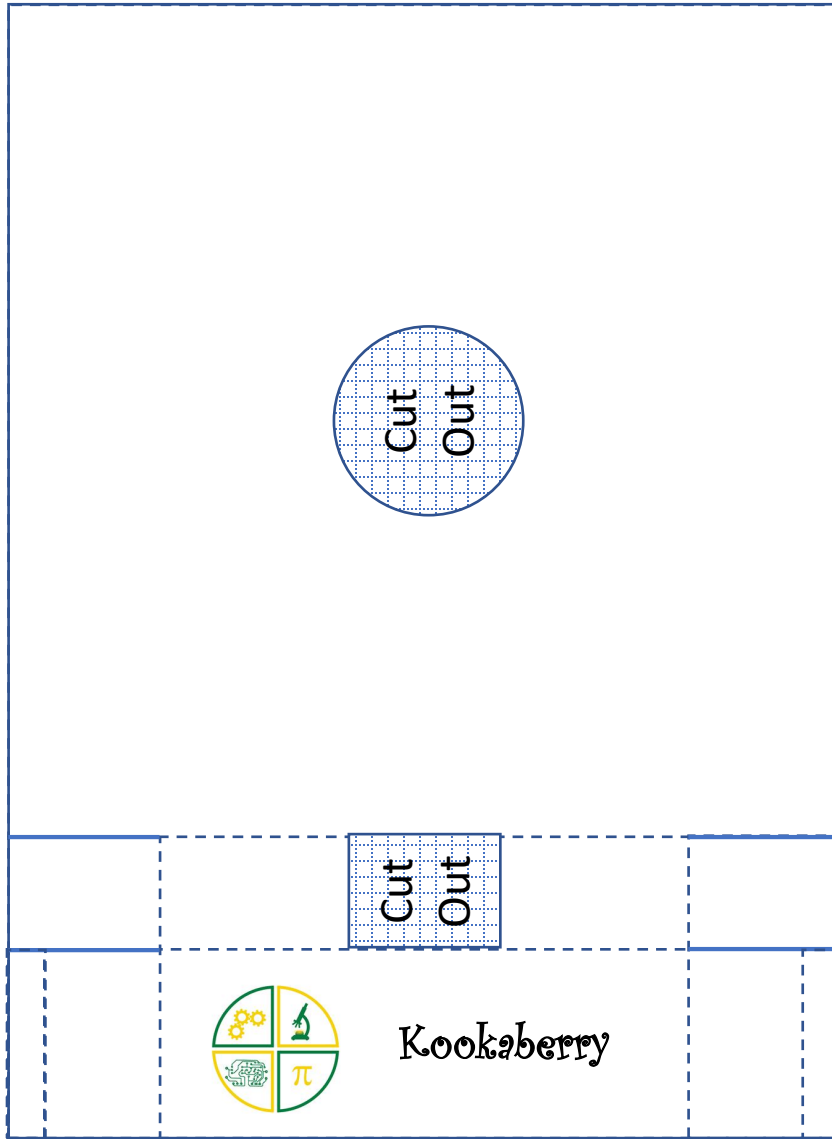


## Weather Station Base Bottom Layer



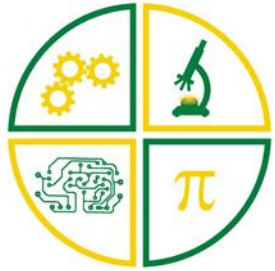
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# Weather Station Base

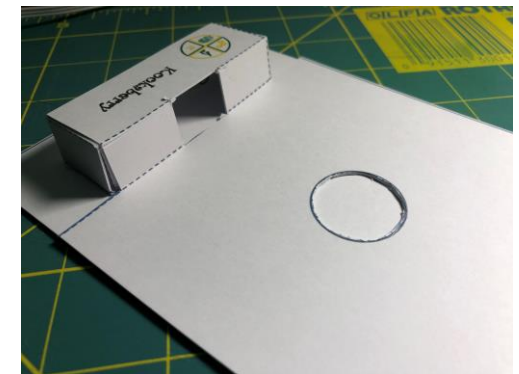
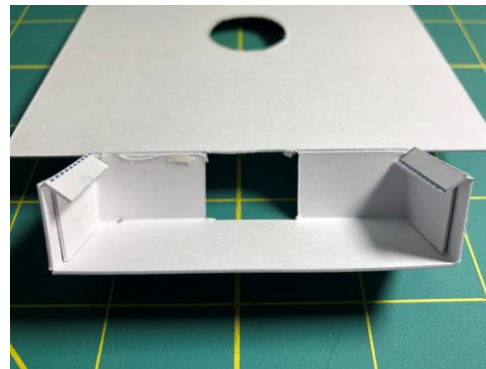
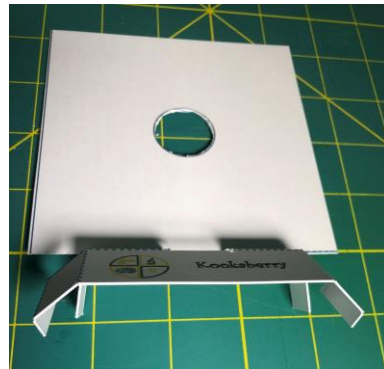




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# Assembly of the Anemometer Base

1. Cut out all the templates.
2. Fold the base top layer template on the dotted lines as shown and glue the side tabs to form the sensor box



3. Glue the folded top layer to the bottom layer of the base as shown

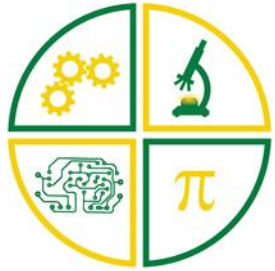


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# Assembly of the Anemometer Turbine

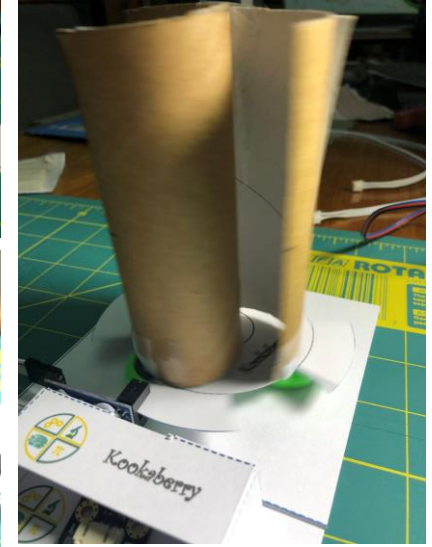
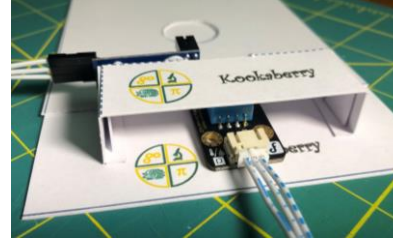


1. Remove one bearing cap from the fidget spinner and place blue tack as shown.
2. Fold up the tabs on the turbine base template and punch a central hole
3. Line up the hole with the centre of the spinner and stick the turbine base to the spinner with the blue tack
4. Cut the tube in half then split longways.
5. Tape halves together, one set halfway from the top, the other from the bottom
6. Interleave the two halves to form a turbine.
7. Stick turbine to the spinner base.



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# Assembly of the Anemometer Sensors



1. Locate the turbine spinner in the hole on the base and check it spins freely.
2. Remove turbine
2. Attach the optical and DHT11 sensors with blue tack as shown
3. Replace the turbine and ensure the slotted disc spins freely through the gap in the optical sensor. Adjust the sensor position as necessary
4. Plug the sensors into the Kookaberry and use the WeatherHere app to verify correct operation. Blow on the turbine to check it spins and the optical sensor blinks when it detects the gaps in the slotted disc.