

## Conception d'un chercheur d'étoiles (Prototype)

Technology and the Skilled Trades Grades 9 and 10

## Coding Guide

Use these instructions to code your Micro:bit to be able to detect pitch and roll (rotation up and down, as well as side to side), and identify when it's pointing at the North Star's location. Before starting, go to makecode.microbit.org and log in or make an account. This will allow you to go back to your work and re-download it later if needed. Then, create a new file.

Everything written in ALL CAPITALS are the block categories in the menu. Everything written in **bold** is the name of a specific block. If you want a picture of the entire code without step-by-step instructions, please go to the last page.

Coding Instructions:

**Step 1:** Go to BASIC and add a **Forever Loop** block. If there is already one in your work area, then leave it and delete any other blocks you may have started with.







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Step 3: You should have a block that says: 'Set Bearing to 0'. This is your Set Index block



Step 4: Add Set "Bearing" to 0 to your Forever block



Step 5: Go to INPUT. Add a Compass Heading block inside your red block, in place of the 0.





Step 5: Go to VARIABLES. Add another Set Index to 0 block.

**Step 6:** Click the drop down and click 'new variable'. Name it 'Angle'. Be sure that the drop down on your second red block now says Angle.





**Step 7:** Go to INPUT and then click 'more' from the menu. Add a **Rotation (°) Pitch** block in your second red block, again in place of the 0. Be sure the drop down says pitch.

magnetic force (μT) x 🔻
rotation (°) pitch 💌
running time (ms)
running time (micros)
compass heading (°)
· · · · · · ·
•rotation (°) pitch •



**Step 8:** Go to LOGIC and select **If True Then** block and add it below the red blocks, still within the **Forever Loop**.





Step 9: Go to LOGIC. Add a \_\_\_\_\_ or \_\_\_\_\_ block and put it in place of the 'true' spot on your If True Then block.



Step 10: Go to LOGIC and add a 0<0 block and put it in the place of the first empty hexagon of the \_\_\_\_\_ or \_\_\_\_ block.





set Bearing • to compass heading set Angle • to rotation (°) pitch if 0 <• 0 or •	(°)
set Angle ▼ to rotation (°) pitch	
if 0 < • 0 or •	
	> then

Double check the order of the turquoise blocks to the picture above.

Step 11: Go to VARIABLES and add a Bearing block to replace the first 0.



**Step 12:** Change the symbol in the middle to < (less than symbol).

**Step 13:** Change the second 0 to 15.





**Step 14:** Go to LOGIC and add another **0<0** block to the second blank hexagon.

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set	Bearing	g 🔹 t	:0 0	compas	ss hea	ading	(°)	r.			
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if	Bea	aring	Ð	< •	15		r -	(	0	 0	> the
$\odot$											

Step 15: Go to VARIABLES and add a Bearing block in place of the first 0.

**Step 16:** Change the symbol in the middle of your **0<0** block to a > (greater than symbol).

Step 17: Change the second 0 to 345.



ng - to compass heading (°) - to rotation (°) pitch - aring - < 15 or - Bearing - > 345 then	<pre>forever set Bearing ▼ to compass heading (°) set Angle ▼ to rotation (°) pitch ▼ if Bearing ▼ &lt; ▼ 15 or ▼ Bearing ▼ &gt; ▼ 345 the </pre>												
ng • to compass heading (°) • to rotation (°) pitch • aring • < • 15 or • Bearing • > • 345 then	<pre>set Bearing ▼ to compass heading (°) set Angle ▼ to rotation (°) pitch ▼ if Bearing ▼ &lt; ▼ 15 or ▼ Bearing ▼ &gt; ▼ 345 the </pre>	orever											
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Step 18: Go to BASIC. Add a Show LEDS block and use the LED buttons to make an 'N'.

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show leds										/		

Step 19: Go to LOGIC and add another If True Then block, this time inside the other one (just under the Show LEDS block).



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orever						1							
set Bearin	g 🔹 to (	compas	s hea	ading	(°)								
set Angle	🔹 to 🔽	otation	(°)	pitc	h 🔻								-
if Be	aring 🔹	< •	15	<b>)</b>	r 🔹 (		Bearin	g 🔹	> •	34	5	ther	n
show leds													
if tru	e 🔹 th	en											
•						+	+		+				
$\odot$													

Step 20: Go to LOGIC and add a \_\_\_\_\_ and \_\_\_\_ block in place of the 'true' spot.





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set Beari	ng 🔹 to	compas	s he	ading	(°)	e.								
set Angle	• • to ro	tation	(°)	pitc	h 🔻									
if B	earing 🔹	< 🕶	15		• •		Beari	ng 🔻	) > •	3	45	> th	en	
show led	s													
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Step 21: Go to LOGIC and add a \_\_\_\_\_ block and put it in the first blank hexagon of your \_\_\_\_\_ and \_\_\_\_ block.



SUDBURY, ONTARIO, CANADA

set Angle • to	rotati	on (°)	nite	°h.♥	5						
if Bearing		15		er 👻		Beari	.ng 🔻	) > •	34	45	> ti
show leds											
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if 🖉 🖉	• 0	and			the	n					

Step 22: Go to VARIABLES and add an Angle block in place of the first 0.

set Be	aring 🔻 to	compa	iss he	ading	) (°)	Ľ							
set An	gle 🔹 to 🤇	rotatio	n (°)	pit	ch 🔻								
if	Bearing 👻	< •	15		or 🔻		Beari	ng 🝷	> -	3	45	th	er
show 1	leds												
		1											
Н		1											
if 🔇	Angle •		0	<b>)</b> a	nd 👻		tł	ien					



Change the first 0 to 30.

**Step 23:** Make sure the symbol in the middle is  $a \ge ($ greater than or equal to).



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set Angle + to	ocución	-	pre	.cn •							
if Bearing -	< • (	15		or 🔻	$\langle \langle$	Beari	ng 🝷	> -	3	45	the
show leds											
	1.1										
if Angle •		30	26	and 👻	K	$>^{t}$	hen				
			_	_			_				

Step 25: Make sure the \_\_\_\_\_ and \_\_\_\_ block says 'and' in the middle, not 'or'.



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**Step 26:** Go to LOGIC and get another \_\_\_\_\_ block and put it in the place of the second empty hexagon.



Step 27: Go to VARIABLES and add an Angle block into the spot of the first 0.

**Step 28:** Make sure the symbol in the middle is  $a \leq (less than or equal to)$ .

Step 29: Change the second 0 to 60.



**Step 30:** Go to MUSIC and add a **Play Tone Middle C for 1 Beat Until Done** block and add it inside the empty **If True Then** block

Step 31: Change the tone (Middle C') to whatever you like, and change '1 beat' to '1/16 beat'.



Set	Bearing • to	o compa	ss he	ading	C	Ľ						
set	Angle 🔻 to	rotatio	n (°)	pit	ch 🝷							
if	Bearing	< •	15		or -		Beari	ng 🗸	> -	34	45	th
sho	ow leds											
		- A.										
		1.1										
if	Angle •	2 -	30	a	nd 🔻		Angle	D	< •	60	$\rangle$	then
	lay tone Mi	iddle C	for	1/16	🕶 be	at	unti	l don	ne 🔹			

Step 32: Go to LOGIC and add another If True Then block under the others (but still inside the Forever Loop).





Step 33: Go to LOGIC and add a \_\_\_\_\_ and \_\_\_\_ block and put it in place of the 'true'.

**Step 34:** Go to LOGIC and add a **0<0** block and put it in place of the first empty hexagon.

Step 35: Go to VARIABLES and add a Bearing block in place of the first 0.

**Step 36:** Change the symbol to  $\geq$  (greater than or equal to).

Step 37: Change the second 0 to 15.

Step 38: Make sure the \_\_\_\_\_ and \_\_\_\_ block says 'and', not 'or'.



**Step 39:** Go to LOGIC and add another **0<0** block in place of the second empty hexagon.

Step 40: Go to VARIABLES and add a Bearing block in place of the first 0.

**Step 41:** Make sure the symbol in the middle is  $a \le (less than or equal to).$ 

Step 42: Change the second 0 to 180.



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if	Angle	▶ ≥ ▼	30	) / @	ind 🝷	K	Angle	•	< •	60	)  angle	then
play	tone M	Middle C	for	1/16	🝷 be	at	unti	l do	ne 🔻	ж.,		
play ()	tone	Middle C	for	1/16	👻 be	at	unti	l doi	1e 🔻	а. С		
play The second	tone M	Middle C	for	1/16	e be	at	unti	l don	ne 🔹	- 6	80	
play Image: state	tone M Bearing	Middle C	for	1/16	e be	at	unti Bear	l don ing •	ne ▼	- (1	180	) tł
play € if	tone Rearing	Middle C	for	1/16	i ← be and ←	at	unti Bear	l don	ne →	- (1	180	→ tr

**Step 43:** Go to BASIC and add a **Show LEDS** block inside the **If True Then** block and use the LED buttons to make an arrow pointing left.



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**Step 44:** Go to LOGIC and add another **If True Then** block underneath the previous one, but still in the **Forever Loop**.

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set Bearing <del>-</del>	to comp	ass he	ading	0							
set Angle 👻 t	no rotati	on (°)	pit	ch 🕶							
if Bearin	<b>.</b>	15		or • <	Beari	ng 🕶	>	3	45	) th	en
show leds											
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lf Angl	Middle C	for	1/16	• beat	unti	il dor	ie =	1	1		
lf Angle play tone	Middle C	for	1/16	• beat	unti	il dor	ie =	1	-//		
tf Angle	Middle C	) for	1/16	- beat	unti	il dor	ie -				
tf Angl play tone ⊕ € 1f Beartm	Middle C	for 15	1/16	• beat	unti Bear	il don	ie -		180	) ) (	her
if Angle play tone to be if Bearin show leds	Middle C	for 15	1/16	• beat	unti Bear	il dor	- Di	•	189	>•	her
if Angle	Middle C	for 15	1/16	• beat	Bear	il don	ia - -	•	189	>.	her
if Angle	Middle C	for 15	1/16	• beat	unti Bear	il don	i0 - ≤	•	180	) •	her
if Angle	Middle C	for 15	1/16	• beat	Bear	il don		•	180	>•	her
if Angle	Middle C	for 15	1/16	• beat	Bear	il don	10 •		189	•	her
<pre>if Angle play tone  if Bearin show leds </pre>	Middle C	) for	1/16	• beat	Bear	il dor	10 •	- (	180	)) ( )	her
<pre>if Angle play tone  if Bearin show leds  if if true -</pre>	Middle C	15	1/16	• beat	Bear	il dor	<b>3</b>		189	e e	her

Step 45: Go to LOGIC and add a \_\_\_\_\_ and \_\_\_\_ block in place of the 'true' spot.

Step 46: Go to LOGIC and add a 0<0 block in the first empty hexagon.

Step 47: Go to VARIABLES and put a Bearing block in place of the first 0.

**Step 48:** Change the symbol in the middle to  $\geq$  (greater than or equal to).

Step 49: Change the second 0 to 179.



Step 50: Make sure the \_\_\_\_\_ block says 'and', not 'or'.

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	-											
	- +											
	+	+	+	+	+	+	+	-+	+	+	+	-
•												
if Bearing	• ≥ •	179		and 🖣			then					
+	+ +	-	+	-	+	+	-					
	+ +		-		-	+						

Step 51: Go to LOGIC and add a 0<0 block in place of the second empty hexagon.

Step 52: Go to VARIABLES and add a Bearing block in place of the first 0.

**Step 53:** Make sure the symbol in the middle is  $a \leq (less than or equal to)$ .

Step 54: Change the second 0 to 345.





**Step 55:** Go to BASIC and add a **Show LEDS** block inside the empty **If True Then** block. Use the LED buttons to make an arrow pointing right.



This is the completed code. Now all there is to do is connect your Micro:bit, download the code to it, and test it out!