

What the Receiver Program does with the data that the micro:bit sends over:

When the calibration data is sent, the program uses the x and y values at each of the corners to set the position of the screen in the real world. It sets the first corner as the origin (0, 0) and then uses the bottom left corner to calculate the width and height of the actual screen the user has as follows:

```
width = x2 - x1
height = y2 - y1
```

After calibration is complete, the micro:bit will be sending *moving* information. When move data is sent from the forever loop, the program moves the mouse cursor to the coordinates on the screen. To do this, it first subtracts the x-value of the first calibration point from the current x-value received from the micro:bit. Next, it divides that by the distance of the two calibration points of the x values. The resulting value is the distance of the current coordinates from the origin by as a percentage of the screen dimension. Therefore, this resulting value is multiplied by the screen width in pixels to convert it into an actual pixel value on the screen. The same is done for the height. The move cursor formulas described above would be as follows:

```
x_target = (x - x1) / width * screen_width
y_target = (y - y1) / height * screen_height
```

About the algorithm used for movement:

Because a hand is constantly moving a little, the program does not simply set the location of the cursor to wherever the magic wand is pointing, as this causes the cursor to be jittery and jump around making the wand unusable. Instead, the cursor slowly and smoothly moves towards the target location set above. The algorithm used to control the movement of the cursor is a modified version of the Proportional-Integral-Derivative (PID) algorithm. You can learn more about this algorithm online.