Analog Controller Issues

Analog Controller Issues

- Calibrating Analog Controllers
- Adjusting Analog Controller Sensitivity
- Making a Digital Pad or Joystick Act Like an Analog Controller

Calibrating Analog Controllers

- Finding Range of Motion
- Finding The “Idle” Position

Calibrating Analog Controllers

- Finding Range of Motion
  - Ask the user to move the controller as far as possible in all directions.
    - Throughout the entire calibration process, constantly record the minimum and maximum position values returned by the controller.
    - Don’t record minimum or maximum values only at specific points in the process, such as when asking the user to move a joystick to the top left extreme, for example.
    - Warn the user not to use excessive pressure that could cause the controller to break.

Calibrating Analog Controllers

- Finding Range of Motion

Calibrating Analog Controllers

- Finding Range of Motion
  - Allow tolerance of +/- 4 steps at recorded extremes
    - Current temperature & humidity can affect analog circuitry and values returned.
  - Once you have the complete range of motion recorded, need to find the “centered” or “idle” position.

Calibrating Analog Controllers

- Finding The “Idle” Position
  - Ask user to allow controller to return to the “Idle” position.
    - Normally the center position for a joystick or steering wheel
    - Released position for brake / accelerator controller or pressure-sensitive button.

Calibrating Analog Controllers

- Finding The “Idle” Position

Calibrating Analog Controllers

- Finding The “Idle” Position
  - Record the “Idle” or “Centered” position.
  - Allow movement of +/- 8 steps from idle position before movement generates a game response.

Calibrating Analog Controllers

- Exactly What Is The “Center” Position?
  - May not be exactly halfway between minimum and maximum values returned by controller.
  - Programs must be able to deal with non-linear response.

Adjusting Analog Controller Sensitivity

- Don’t use controller values directly
  - It’s tempting to use analog controller values to directly indicate direction, sprite positions, & other information. But don’t do it.
  - Use lookup tables to convert controller values into game-specific information such as brake pressure, acceleration pressure, etc.

Adjusting Analog Controller Sensitivity

- Don’t use controller values directly
  - Use lookup tables to convert controller values into game-specific information such as brake pressure, acceleration pressure, etc.

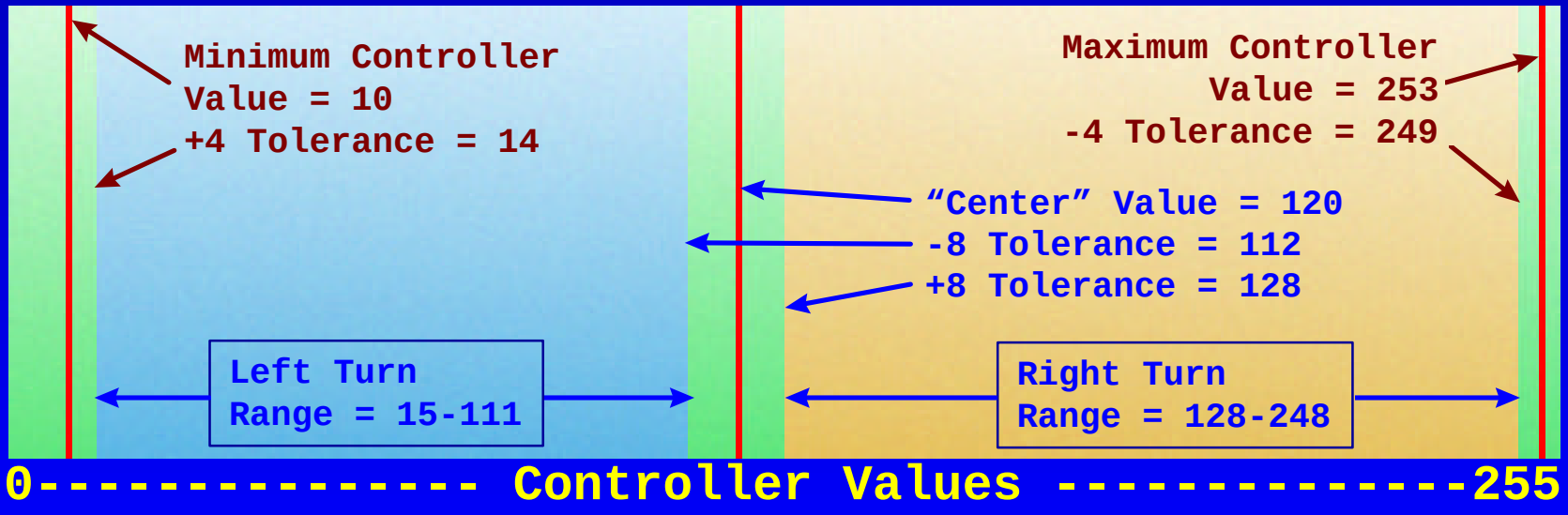
```
#define MIN_BRAKE (0)
#define MAX_BRAKE (100)

char brake_translation[255];     /* Contains values in */
                                 /* range of 0-100 which */
...                              /* are set by calibration */

/* Get analog controller input */
brake_value = brake_translation[analog_controller_value];
```

Adjusting Analog Controller Sensitivity

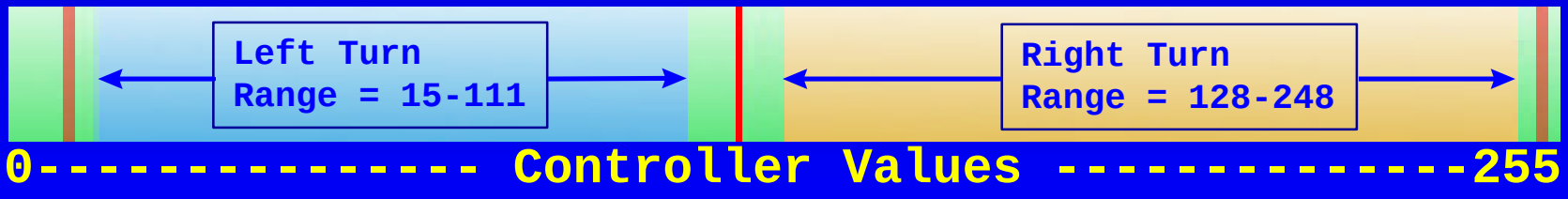
Values	Size of Range	Performs what action?
0-14	15	Maximum Turn Left
15-111	97	Intermediate Turn Left
112-128	17	Center position, no turn
129-248	120	Intermediate Turn Right
249-255	7	Maximum Turn Right



Adjusting Analog Controller Sensitivity

```
#define MIN_TURN (0)
#define MAX_TURN (10000)

int min_lturn = 111, max_lturn = 15, num_lturn_steps = 97;
int min_rturn = 128, max_rturn = 248, num_rturn_steps = 120;
int controller_lr_translation[255];
int trans;
for( i = min_lturn; i >= max_lturn; i-- )
{
        trans = (MAX_TURN * (min_lturn - i)) / num_lturn_steps;
        controller_lr_translation[i] = trans;
}
for( i = min_rturn; i <= max_rturn; i++ )
{
        trans = (MAX_TURN * (i - min_rturn)) / num_rturn_steps;
        controller_lr_translation[i] = trans;
}
```



Making a Digital Pad or Joystick Act More Like an Analog Controller

- Provides more comfortable feel for driving and flying games.
- Can be configured to adjust sensitivity and response options

Making a Digital Pad or Joystick Act Like an Analog Controller

- How to manage the fact that it's not really an analog device?
  - Maintaining a position
    - Position maintained while holding down the pad
      - Allows auto-return to center position when released
    - Position maintained when pad released
      - Requires manual return to center
  - Analog controllers are usually spring loaded to return to center position when released.
    - Auto-return to center when pad released
    - Using another button to return to center

Making a Digital Pad or Joystick Act Like an Analog Controller

- Use D-Pad to set ‘virtual’ analog values
  - When get new D-Pad value, zero a VBLANK counter
    - Increment on each VBLANK with that D-Pad value
    - Use table of values used to increment / decrement virtual analog controller position.
      - The following table will take about 1 / 2 second to increment the virtual joystick position from 128 (center) to 255 (max) or decrement to 0 (min).
      - 1,1,1,1,2,2,2,2,3,**3**,3,3,4,4,4,4,5,5,5,5
      - On 10th VBLANK with that value, ‘virtual’ joystick value is incremented or decremented by **3** units.
      - Movement accelerates as D-Pad is held down, acceleration adjustable through table values.

The End