# Angry Bee

*Angry Bee* is a whimsical kit in the shape of a bee that's sensitive to light and reacts when triggered. It uses a mixture of conventional through-hole soldered components as well as components soldered in a pseudo surface-mount style.

## Construction

Identify the resistors by the coloured stripes on the body then solder them to the pads on the back side of the circuit board such that they fit within their symbols (R1 to R5). Clip their legs close to the solder joints. They can be fitted either way around. See image below.

Bend the legs of the chip socket outwards at right angles then solder it to the back side of the board matching the notch in the socket to the notch in the symbol (IC1). Solder one corner pin first, check the alignment then solder the other pins. Care should be taken when soldering this component to avoid solder bridges between the pins. It is not recommended that the chip is soldered directly to the board.

Bend the legs of the variable resistor outwards by 90 degrees so that it can sit flat then solder it within the symbol VR1 on the back of the board.

Fit the supercapacitor to the board within its symbol (C1) and solder the shorter leg to the pad with the – sign. Solder the other leg to the other pad then clip both legs. The shorter leg also has minus signs on the side of the body.

Solder the ceramic capacitor (C2) to the back of the board either way around.

Solder the transistor (TR1) to the back of the board with the flat face of the transistor sitting flat on the board.

Fit the LEDs (LED1 and LED2) to the front side of the board in the conventional manner matching the shorter leg to the hole with the line. Bend the legs away from each other and solder them to the back of the board. Clip the legs short.

Fit the light-dependent resistor (LDR1) either way around to the front of the board and solder it to the back. Be careful not to apply too much heat as it may damage the component.

Fit the speaker (SPEAKER) to the front of the board and solder it on the back. Remove any film cover from the top of the speaker.

Don't fit the chip into its socket until you have thoroughly checked your construction. Double check that you have the polarity of the supercapacitor correct. Then carefully bend the legs of the chip inwards a little with your fingers and fit it into its socket matching the small notch in the chip to the notch in the socket.

Push the thumbwheel firmly into the variable resistor.

Plug the PCB USB plug at the top of the wing into a USB type-A socket. Check the orientation so that the metal fingers of the plug connect to the pins within the USB socket. You might need to apply a little pressure to ensure a good connection depending on how tight a fit the plug makes with the socket.

It will take a few minutes for an initial charge to build up in the supercapacitor and once it has reached sufficient voltage *Angry Bee* will beep and the LEDs flash twice.

The supercapacitor should reach full charge in 10 minutes or so.

The small hole in the circuit board on the left wing can be used with the clip and pin to attach the kit to clothing. The pin can be soldered in place if you wish.

Alternatively the other pair of holes on the wings can be used with a string or cord to suspend the kit from a support.

## How to Use

The LDR reacts to changes in light level and acts as a simple light or motion sensor. When *Angry Bee* is triggered it flashes its eyes and plays a sound effect.

The variable resistor sets the sensitivity (clockwise = more sensitive). The extreme anticlockwise position puts *Angry Bee* into a sleep mode where it doesn't react at all (this is a power-saving mode). To wake from sleep typically takes a few seconds.


+ USB-A -
Angry Bee
v1.0
www.madlab.org
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C1
R1
R2
R3
R4
TR1
Sensitivity
PIHER SPAIN
VR1
104
C2
IC1
R5

## Component List

Resistors

| | |
|---|---|
| R1 | 100k (brown, black, yellow, gold) |
| R2, R3 | 100R (brown, black, brown, gold) |
| R4, R5 | 220R (red, red, brown, gold) |
| VR1 | 47k variable resistor + thumbwheel |

Capacitors

| | |
|---|---|
| C1 | 5F supercapacitor (blue) |
| C2 | 100nF ceramic (brown, marked ‘104’) |

Semiconductors

| | |
|---|---|
| TR1 | BC547B transistor (black) |
| IC1 | PIC12F1840 microcontroller + 8-pin socket |
| LED1, LED2 | 3mm LED (red) |

Miscellaneous

| | |
|---|---|
| LDR1 | light-dependent resistor |
| SPEAKER | miniature enclosed speaker |
| | butterfly clip + pin |

PCB



Email: info@madlab.org

Web: www.madlab.org

Social: @clubmadlab