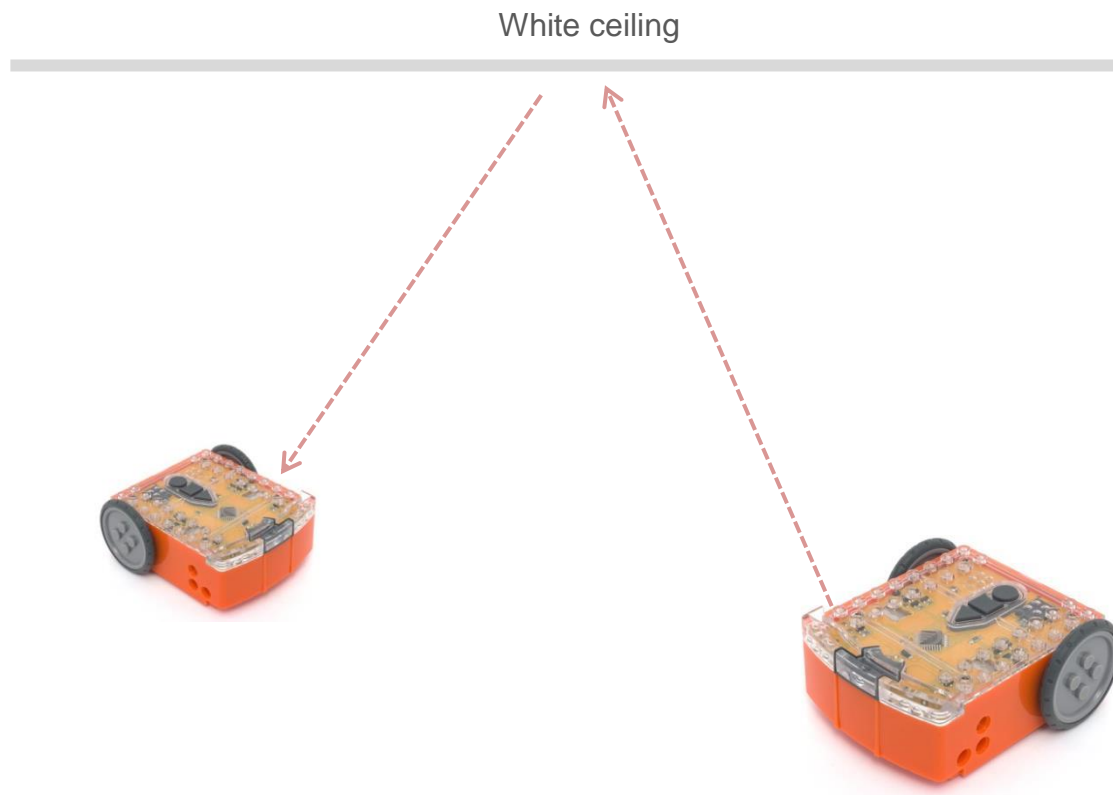# Edison Infrared Communication Protocol (Advanced information)

Summary

Two or more Edison robots are able to communicate via infrared (IR) light. Each Edison has both a transmitter (2 x IR LEDs) and a received (IR receiver module). The IR LEDs and receiver module are the same components found inside a TV remote control and the TV itself.

The IR light is transmitted from Edison both forwards and upwards through the front lens. The incoming IR signal is received from both the top of Edison and from in front through the lens.

IR communication between two Edison robots takes advantage of a white ceiling. A white ceiling reflects IR light very well and allows two Edisons that are not in line of sight of each other to communicate.

White ceiling

Technical details

Edison's IR communication protocol is closely based on the 'Sony Infrared Remote Control' (SIRC) protocol.

Parts of the signal

Each IR transmission is made up of pulses of IR light. There are two parts to the transmitted signal, the carrier frequency and the bit data.

Carrier frequency

The carrier frequency is the rate at which the IR LED is turned on and off. For Edison, and for most TV and DVD remotes, the carrier frequency is 38kHz.

Bit data (frames)

The bit data (1 or 0) is relative to how long a burst of 38kHz lasts for.
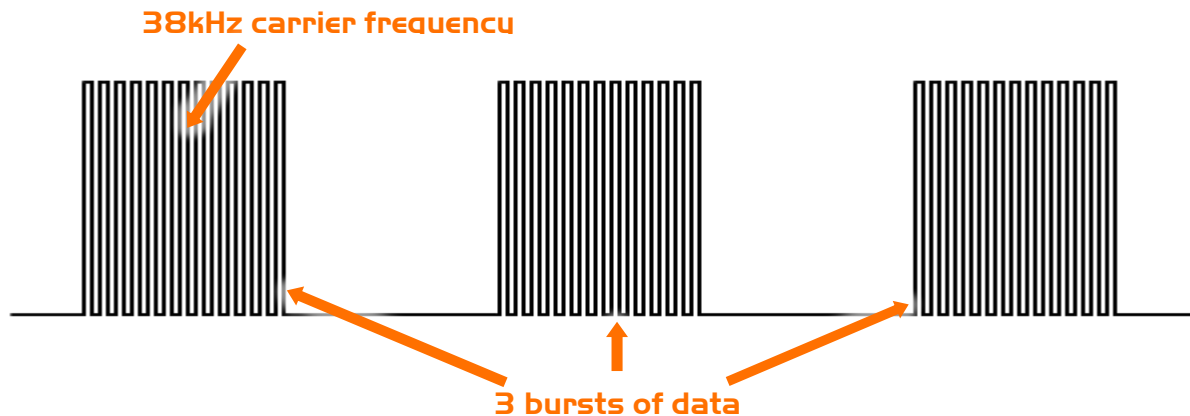
Complete data transmission

Each transmission of IR data from Edison has three parts, a start bit (S), 8 bits of inverted data (ID) and 8 bits of non-inverted data (D). Each square below represents a single bit of data.

S	ID	ID	ID	ID	ID	ID	ID	ID	D	D	D	D	D	D	D	D

Time framing

Time framing is used to determine the type of bit (i.e start, 1 or 0). Edison's time framing is based on multiples of 600uS called 'T' (T = 600uS).

A data transmission always begins with a 5,000uS start pulse followed by a 1T space.

A 0 bit is a 1T pulse with a 1T space (2T).

A 1 bit is a 2T pulse with a 1T space (3T).

Putting it all together

This is how the complete data looks for transmitting a number 3 (binary 00000011).

| S | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |