

0.0.1 Depth estimation unit

Web Cam

(LAPCARE LAPCAM)



Figure 1: Web cam

1. 1280 x 720 pixels @ 720p resolution
2. Automatic low light correction
3. Plug and play linux compatible, High-Speed USB 2.0

0.0.2 Microprocessor

Microprocessor serves an important role in DAC application, data processing estimation and controlling the response hardware in real time.

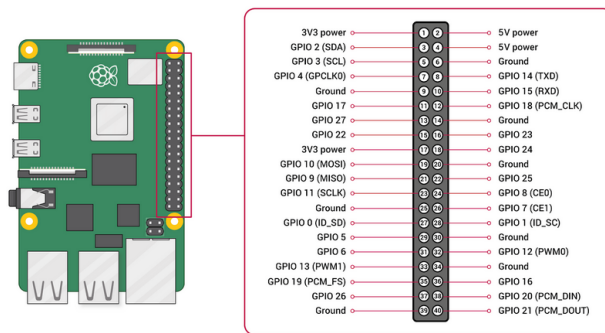


Figure 2: Microprocessor (Raspberry Pi 4B 4GB)

Raspberry Pi 4B 4GB RAM model comes packed with,

1. Quad core Cortex-A72 64-bit @ 1.5 GHz clock and uses ARM v8 architecture, with 4GB LPDDR4-3200 SDRAM.
2. 2.4 and 5 GHz IEEE 802.11ac wireless wifi hardware.
3. 2 Micro HDMI ports.
4. H.265 (4kp60 decode), H264 (1080p60 decode, 1080p30 encode).
5. OpenGL ES 3.0 graphics.
6. Micro-SD card slot for loading operating system and data storage.
7. 4 USB ports.
8. Software PWM on all pins and Hardware on GPIO12, GPIO13, GPIO18, GPIO19.
9. SPI
 - SPI0 : MOSI (GPIO10), MISO (GPIO09), SCLK (GPIO11), CE0 (GPIO08), CE1 (GPIO07)
 - SPI1 : MOSI (GPIO20), MISO (GPIO19), SCLK (GPIO21), CE0 (GPIO18), CE1 (GPIO17), CE2 (GPIO16).

0.0.3 Mechanical unit

Servo Motors

(SG90 Servo)

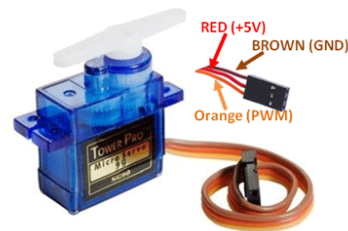


Figure 3: SG90 Servo

1. 180° rotation (90 in each direction).
2. Torque 2.5 kg-cm
3. Voltage 4.8-6 V
4. Speed 0.12 sec/60°

0.0.4 Audio processor unit

Audio Amplifier

(LM386N-1)

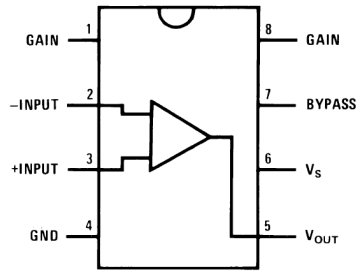


Figure 4: LM386N-1 pin-out

1. Operating Supply Voltage (V_s) 4 - 12 V
2. Voltage gain 20 - 200
3. Output power 325 mW

Digital Potentiometer

(MCP42010)

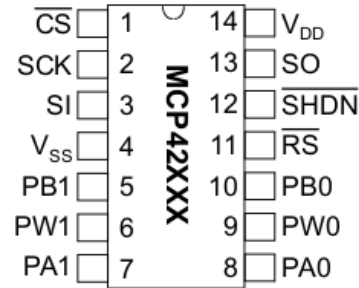


Figure 5: MCP42010 pin-out

1. Potentiometer values 10 k Ω
2. 256 taps for each potentiometer
3. 2 channel
4. SPI serial interface (mode 0, 0 and 1, 1)
5. Single power operation (2.7V - 5.5V)
6. Industrial temperature range: -40°C to +85°C
7. External temperature range: -40°C to +125°C

0.0.5 Speakers

The final component is the speakers, which are mounted on servos and dynamically controlled sound using Audio Processor. They have mounted on four corners of the room to form a four-channel audio system.

For this application, we are using 4 Ω speakers to deliver four-channel output.