Electronics

David Smith

Introduction

- Electronic systems have 3 parts
- Input
- Process
- Output
- There are 2 types of systems:
- Analogue
- Digital

Output Devices

These turn E_E into some other form

Analogue

Motor, Bulb, Loudspeaker

Digital

LED, Relay, Solenoid

Input Devices

- 2 main types
- Change the size of the input voltage
- Switch, Capacitor,
- LDR, Thermistor
- and

Input Devices

- Energy Changers

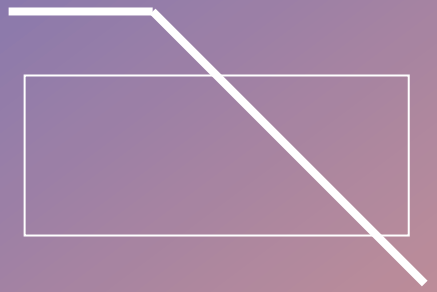
- Thermocouple, Microphone
- Solar Cell

LDR

- As Light Intensity Increases Resistance Decreases

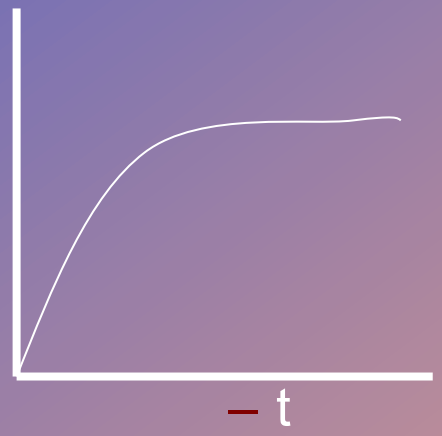
Thermistor

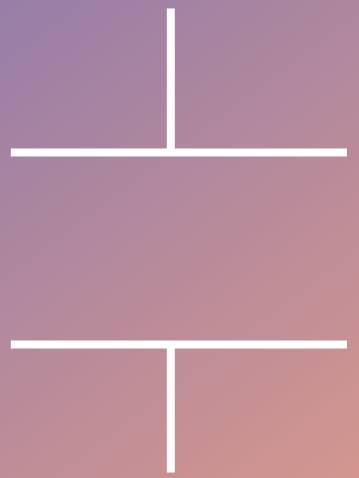
- As Temperature increases the resistance decreases



Capacitors

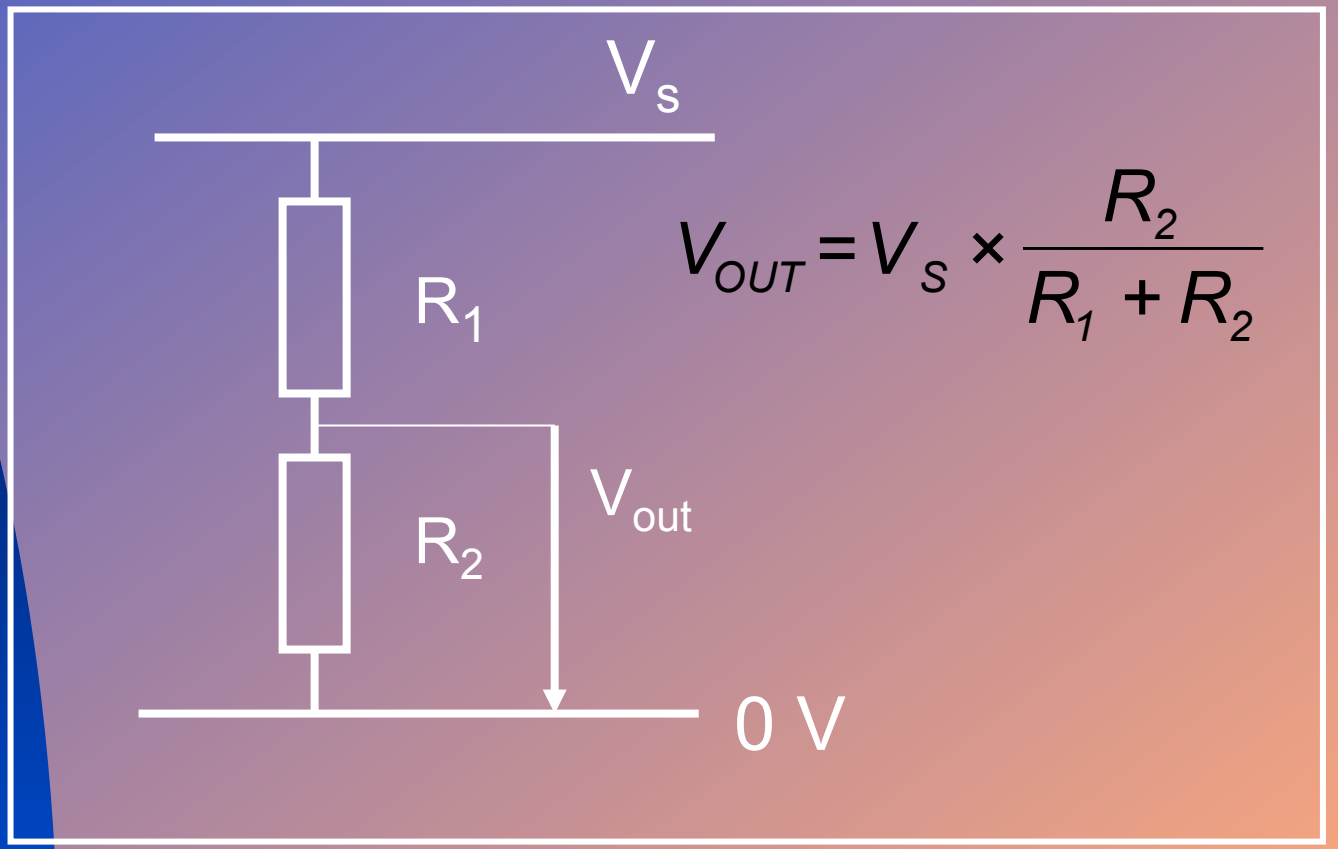
- Store Charge
- V





- Provide timing delays

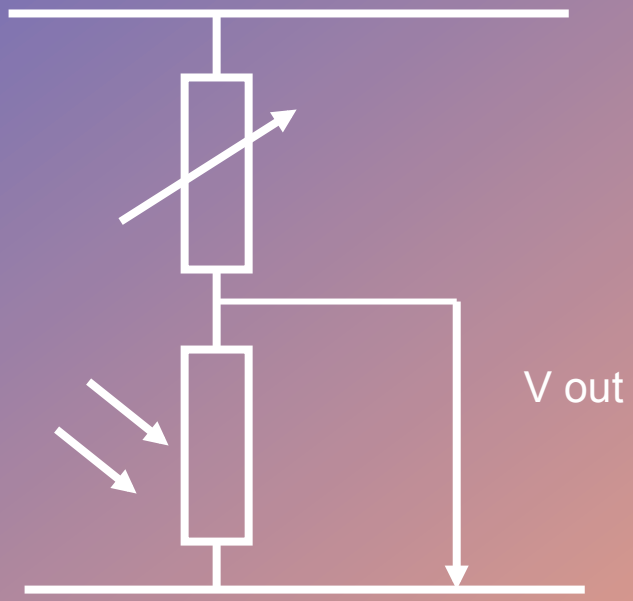
Voltage Dividers



$$V_{OUT} = V_S \times \frac{R_2}{R_1 + R_2}$$

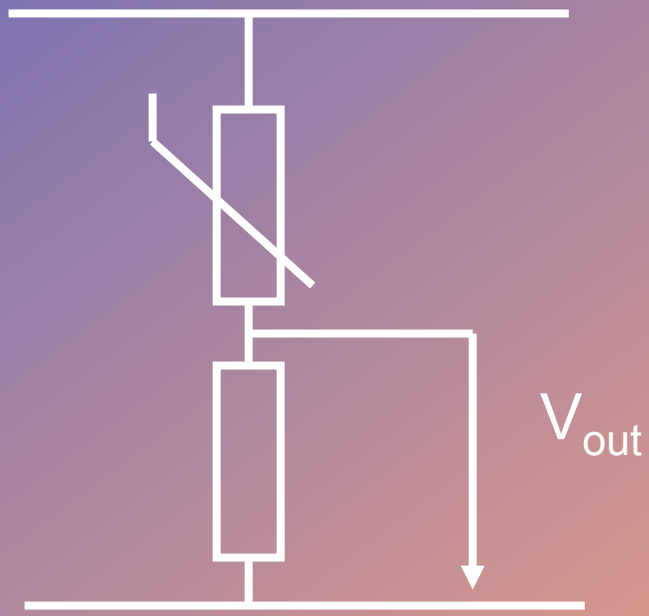
LDR in Voltage Divider

- As light increases, resistance of LDR decreases, voltage across it decreases,



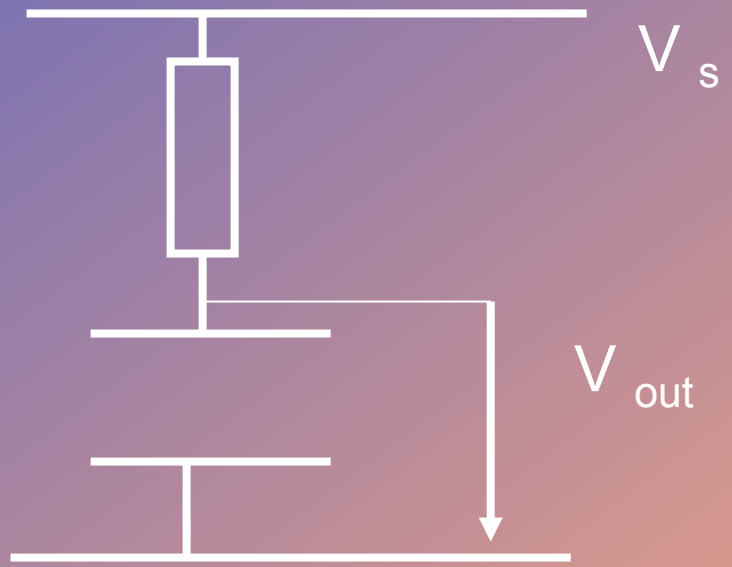
Thermistor

- As temperature decreases, resistance of thermistor increases,voltage across thermistor increases, V_{out} decreases



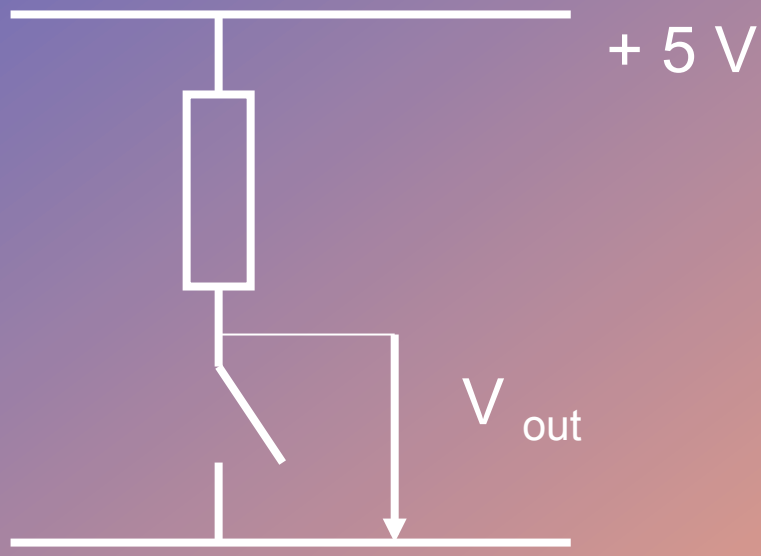
Capacitor

- Capacitor charges up
- V_{out} increases



Switches

- When switch is closed
- V_{out} is low

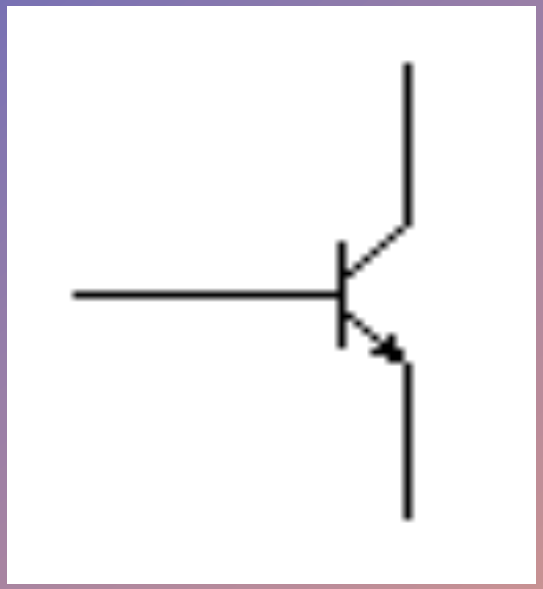


Process Devices

- Analogue : Amplifier
- Digital : Transistor

NPN Transistor

- $V_{be} > 0.7$ V
- Transistor is switched on

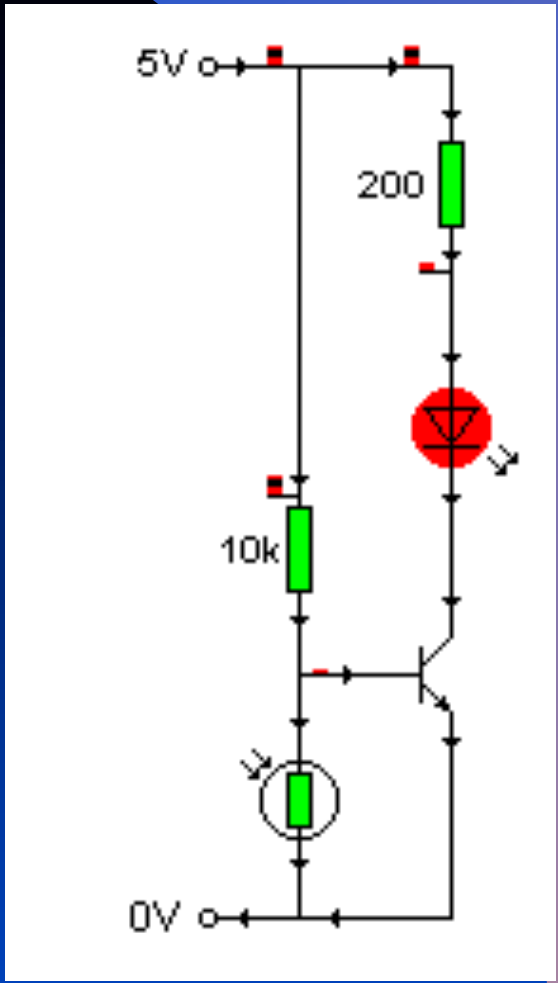


Collector

Base

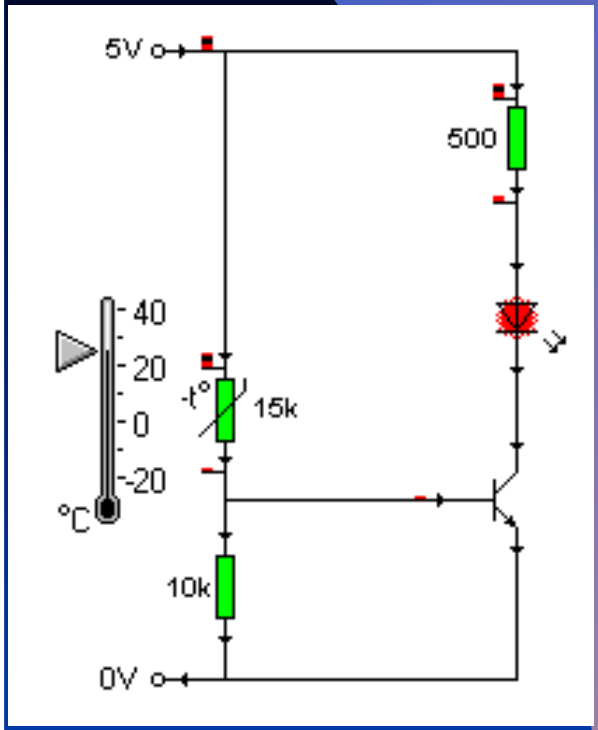
Emitter

Alarm Circuits



- Light Intensity decreases
- R_{ldr} increases
- V_{ldr} increases
- V_{be} increases
- $V_{be} > 0.7$ V
- Transistor switches on
- Current flows through LED

Alarm Circuits



- Temperature increases
- $R_{thermistor}$ decreases
- $V_{thermistor}$ decreases
- $V_{resistor}$ increases
- V_{be} increases
- $V_{be} > 0.7$ V
- Transistor switches on
- Current flows through LED