

# Lesson 8

# Actuators

# An actuator

- A device that takes the actions as per the input command, pulse, state (1 or 0), set of 1s and 0s or control signal
- An attached motor, speaker, LED or an output device converts electrical energy into physical action

# LED

- An actuator which emits light or infrared radiation
- Uses of different colour LEDs,
- Intensity variation of LED lights and colours, Graphic and text display

# LED Actions

- Controlled using the inputs: RGB LEDs.
- Pulse width modulated pulses control the LED light emission-intensity.
- Microcontroller generating PWM outputs

# Actuators

- Light sources
- LEDs
- Piezoelectric vibrators and sounders
- Speakers
- Solenoids
- Servomotor

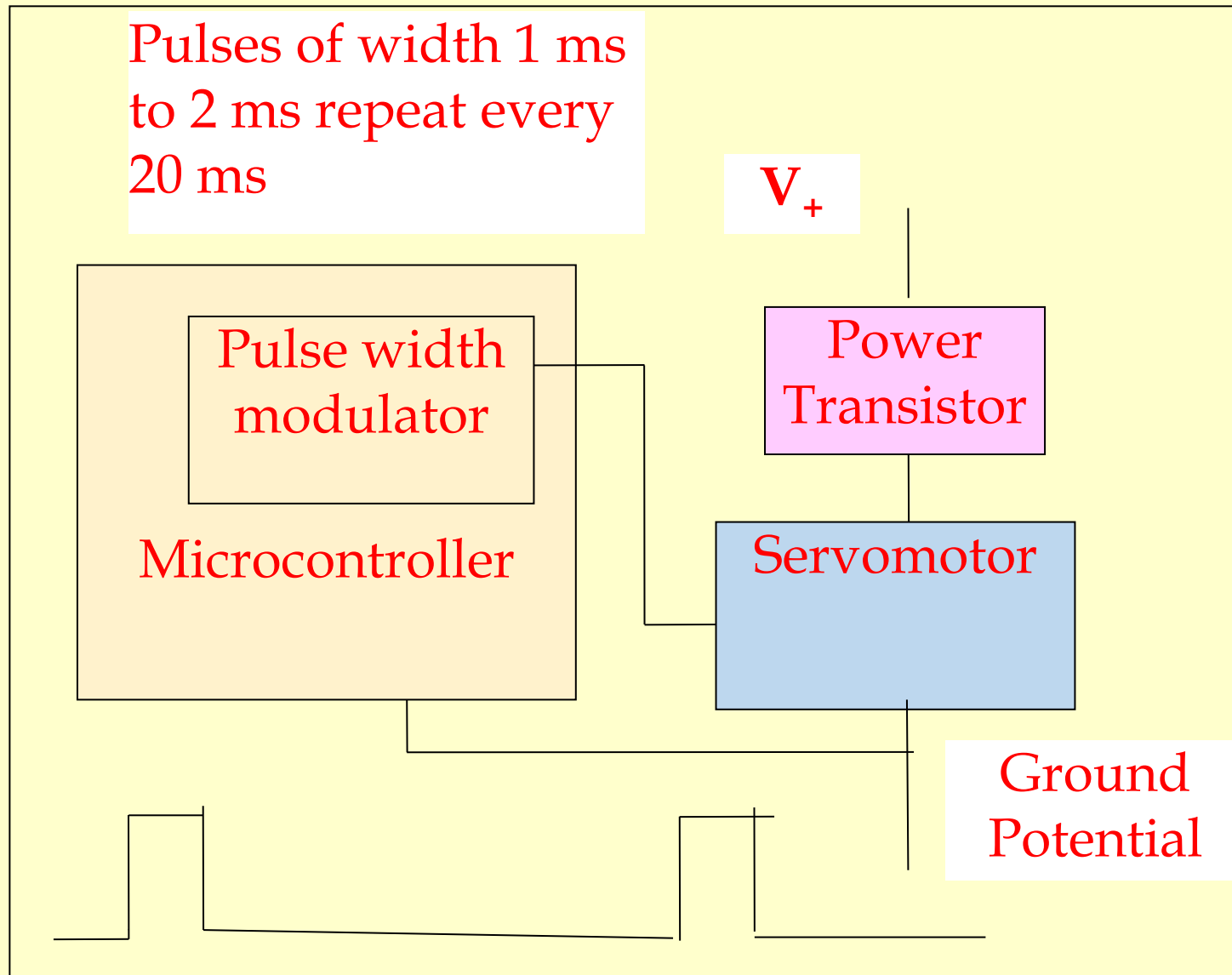


Fig. 7.12 Microcontroller electronic circuit for controlling servomotor angular position

# Actuators

- Relay switch
- Switching On a set of streetlights
- Application of brakes of a moving vehicle
- Ringing of alarm bell
- Switching Off or On the heater, air-conditioner, boiler current in a steam boiler in a thermal plant

# Piezoelectric Vibrator and Speaker

- Piezoelectric crystals when applied varying electric voltages at input generate vibrations
- Piezoelectric speaker enables synthesized music tunes and sounds
- The appropriately programmed pulses generate the music, sounds, buzzers and alarms



# Solenoid

- An actuator consisting of number of cylindrically wound coils
- The flow of current creates magnetic field in proportion to the number of turns in the solenoid and the current in it
- Can create sharp forward push, backward push, repeated to and fro motion of an assembly placed inside the solenoid

# Motor

- Can be DC (direct current controlled) or AC (alternating current controlled)
- IO modules readily available to receive the control digital inputs of 1s and 0s and deliver high currents.
- The dc or ac rotates the motor
- A cam converts rotator motion into linear motion when it motor rotates

# Relay Switch

- An electronic switch can be controlled by input 1 or 0 from the port pin of a microcontroller
- A relay switch makes mechanical contact when input circuit magnetizes with a control circuit and pulls a lever to make the contact

# Summary

We learnt

- Actuator
- LED
- Piezoelectric speaker
- Motor
- Servomotor
- Pulse width modulation for light intensity, motor and servomotor control

# End of Lesson 8 on Actuators