Group 10

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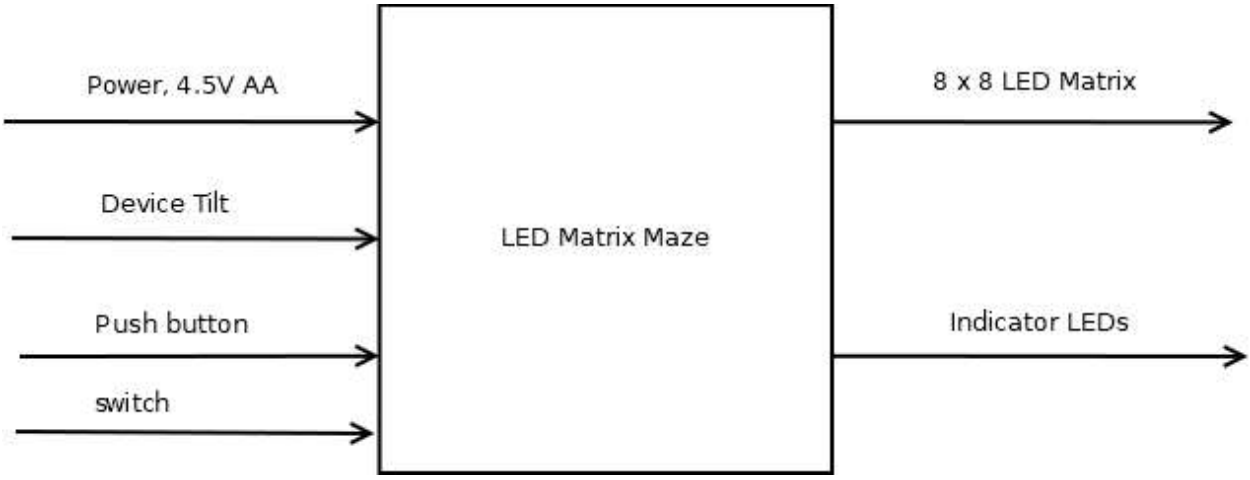
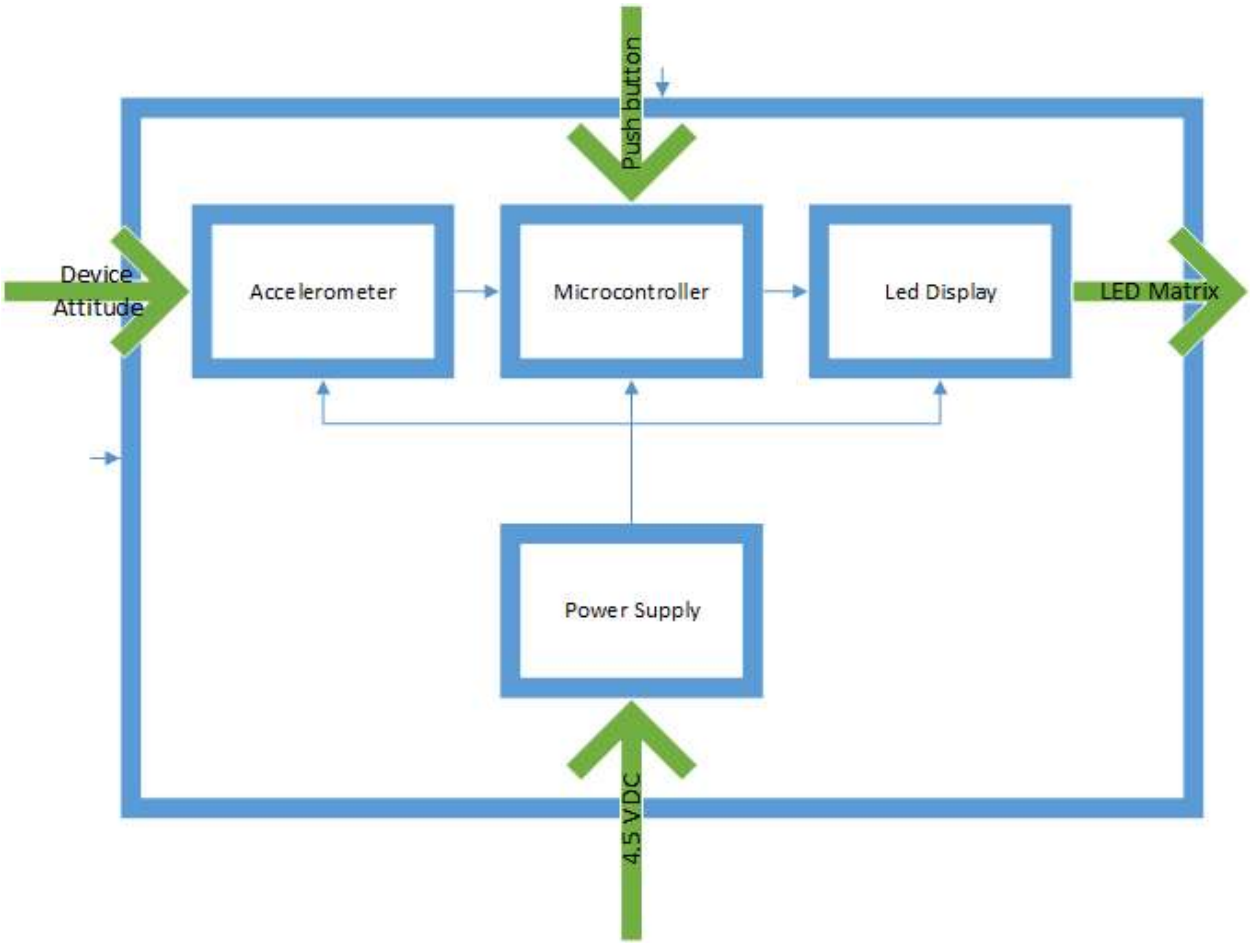
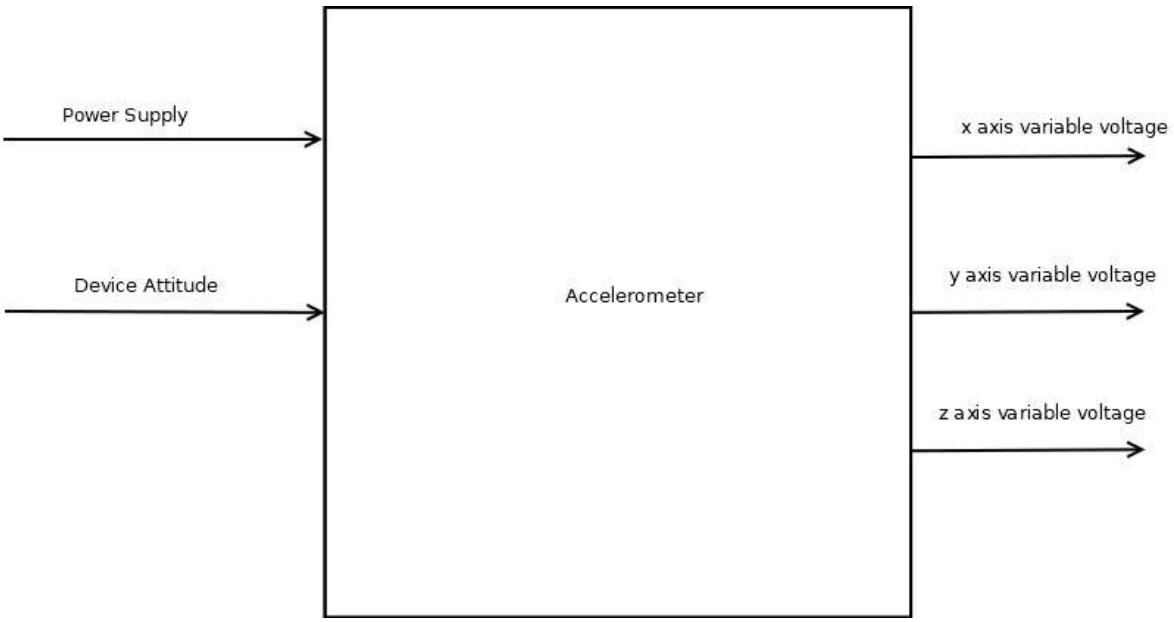


Level 0 Matrix Maze Functional diagram

Module	LED Matrix Maze - Tilting Control Game
Inputs	Power switch: Power control Start/Reset Button: To self-generate the maze that is displayed on LED Matrix Accelerometer: To measure the proper acceleration, tilting angle based on 3D dimension (x,y,z-axis)
Outputs	Indicator LED: Display as the Start/Reset Button is pushed. LED Matrix: Display a random maze as Start/Reset Button was pushed. Entry Point: Move as the accelerometer sensor is being tilted.
Functionality	Handheld device to display a maze game on an LED matrix. Progress through the maze should be made by changing the position or attitude of the device. Device should be powered by batteries.

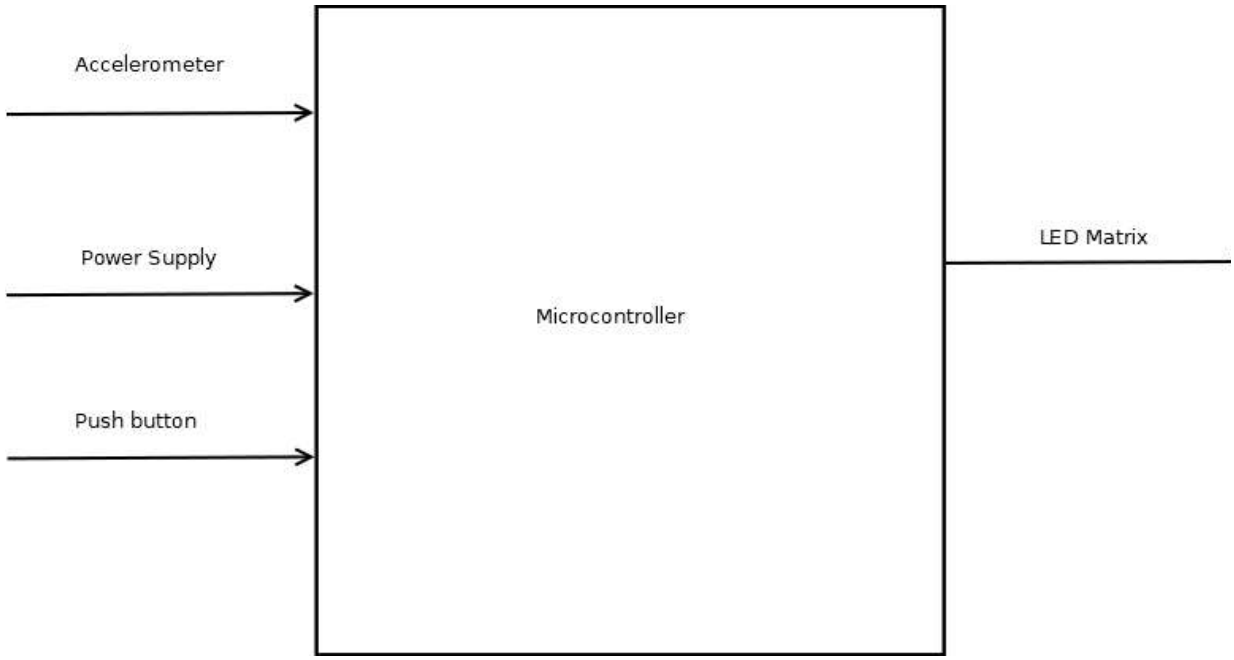


Level 1 device design diagram



Accelerometer level 1 functional diagram

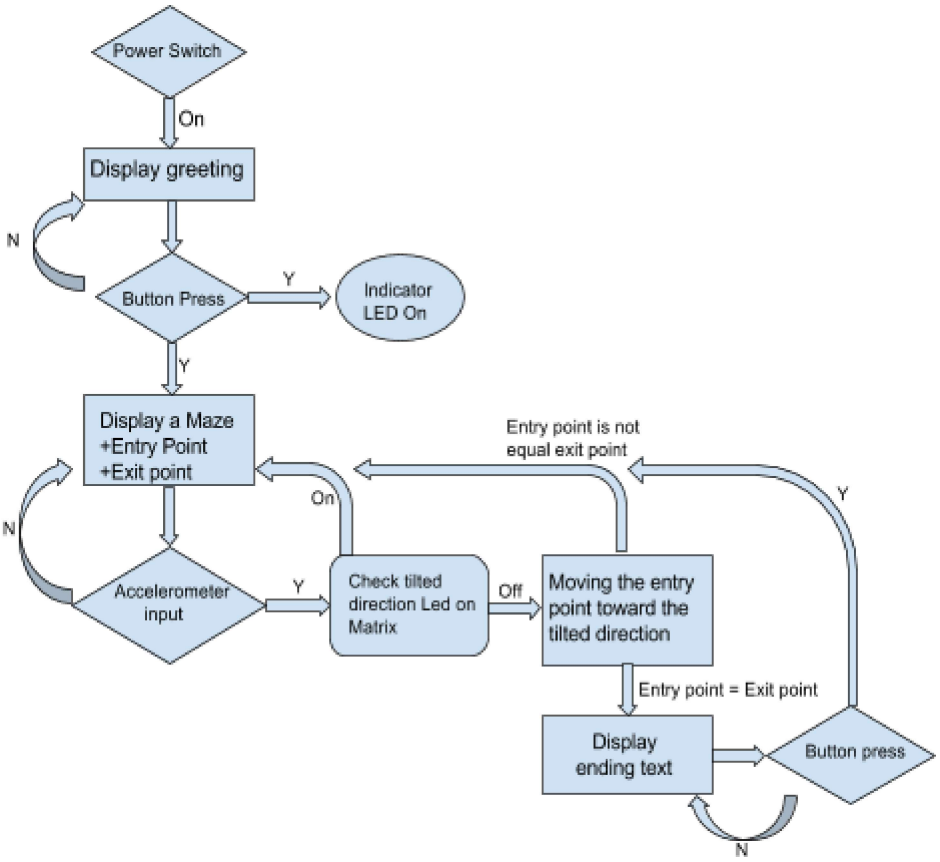
Module	Accelerometer
Inputs	- Power: 3.3V - Attitude: orientation of device - System Test: system test pin - Sensitivity: g-select pin
Outputs	Analog voltage signal representing forces detected on - x axis - y axis - z axis
Functionality	Senses acceleration along x-axis, y-axis, and z-axis and outputs an analog signal representing the intensity of the g force on the device in each axis. The signal is to be used to represent the attitude of the device



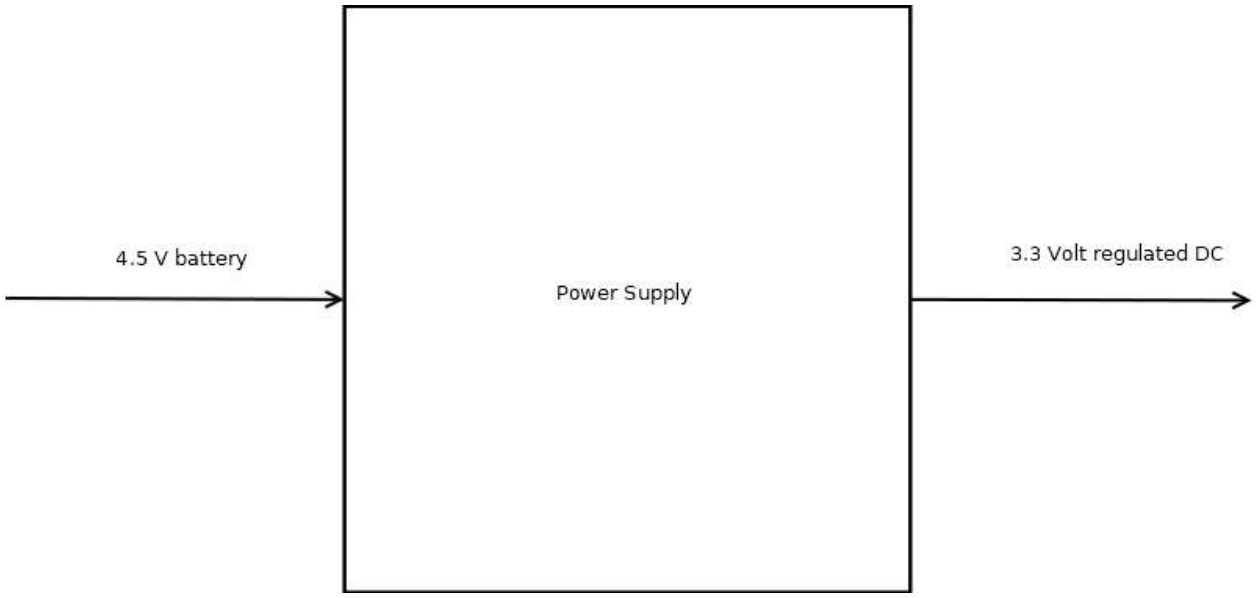
Microcontroller level 1 functional diagram

Module	Atmega328P Microcontroller
Inputs	➢ Accelerometer ➢ Power Supply ➢ Push Button
Outputs	➢ Indicator LED ➢ LED Matrix that is driven by 2 shift registers

Functionality	➢ Outputs to turn on indicator led when button is pressed, also displays a maze with a blinking entry point on LED Matrix ➢ Takes in input from accelerometer to control the entry point on the Maze ➢ Takes in power input, display output as greeting text on Matrix.

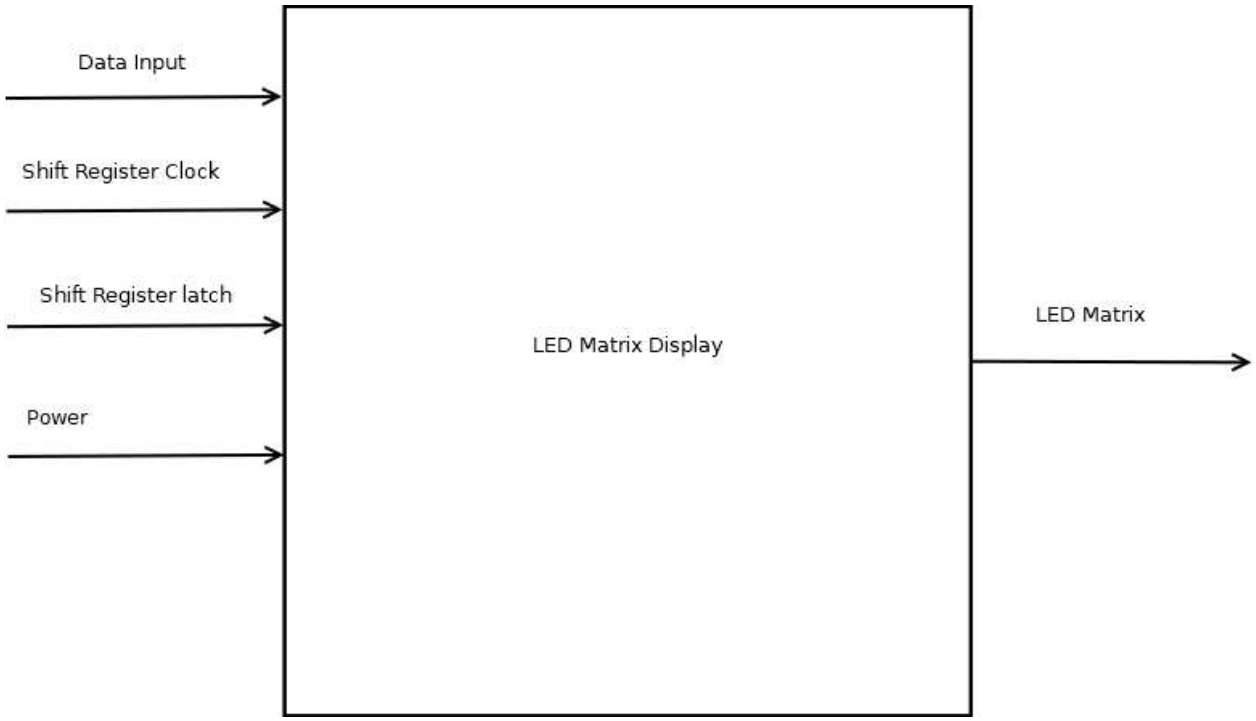


Microcontroller Control Data Flow diagram



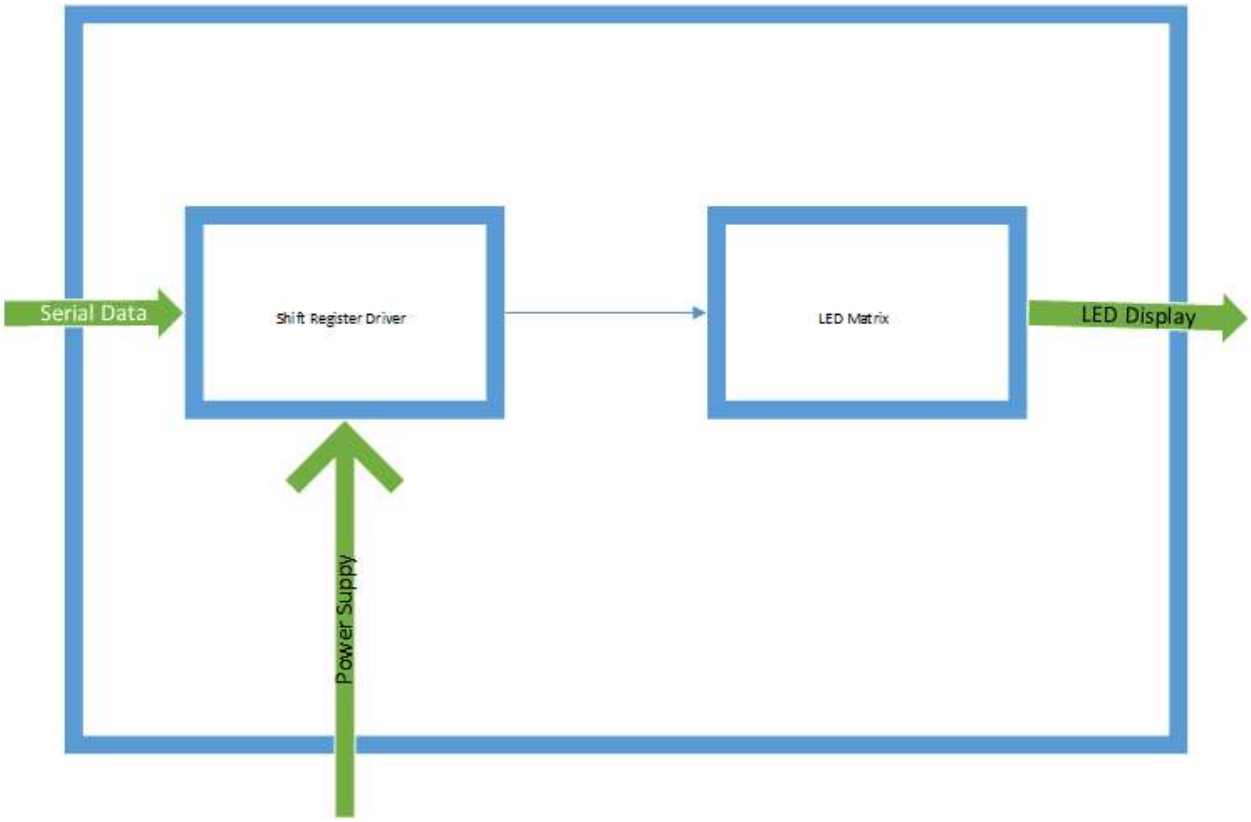
Power Supply level 1 functional diagram

Module	Power Supply
Inputs	4.5 V from 3 AA batteries
Outputs	3.3 V regulated
Functionality	voltage regulator component takes input from batteries and outputs 3.3V +- 2%

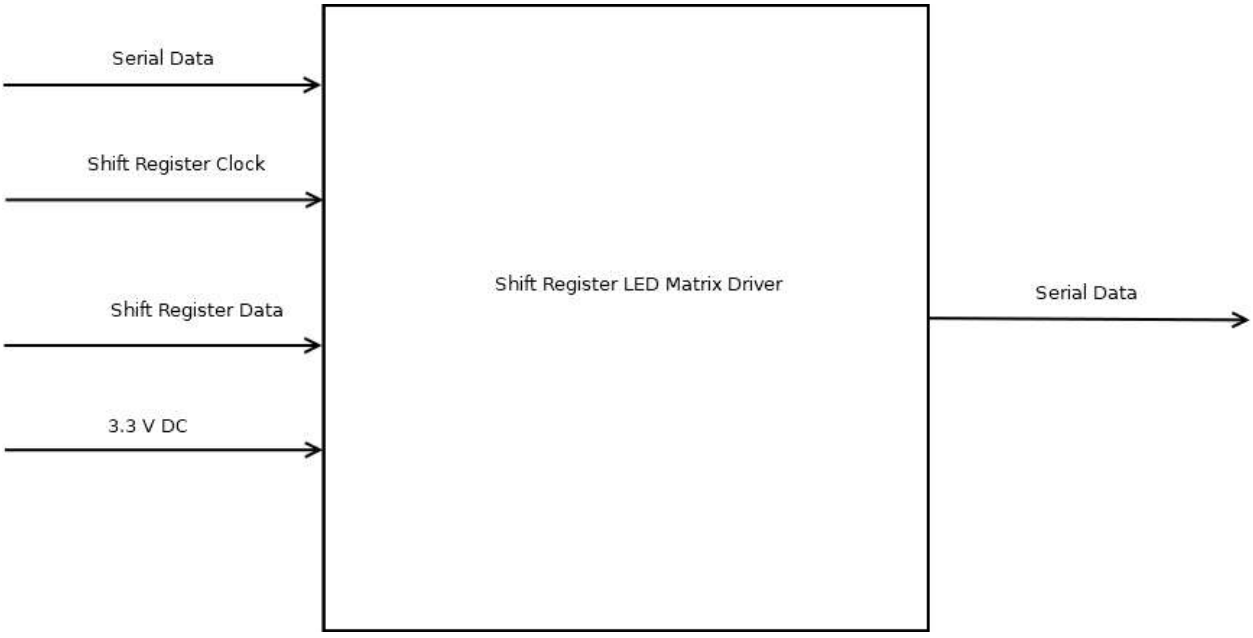


LED matrix level functional diagram.

Module	LED Matrix display
Inputs	- Serial data from Microcontroller - Shift register clock from Microcontroller - Shift register latch from Microcontroller - 3.3V from power supply
Outputs	LED Matrix
Functionality	Takes serial data from Microcontroller and converts to LED matrix display. Must be able to drive LED matrix by giving at least 15 mA to each row of LEDs.



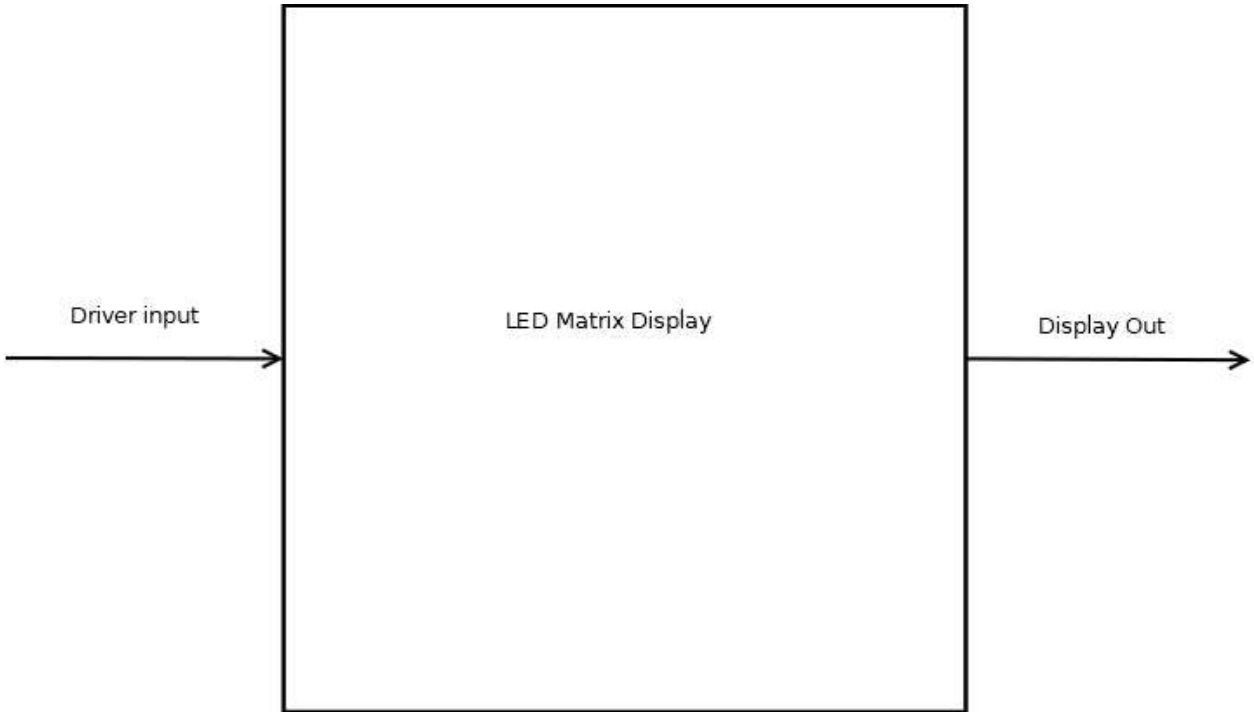
LED Matrix display level 1 design.



Shift Register Display Driver level 2 Functional Diagram

Module	LED Matrix Display Driver (Shift Register)

Inputs	- Serial data out from Microcontroller - Shift Register Clock from Microcontroller - Shift Register Latch from Microcontroller - 3.3 V from power supply
Outputs	LED Matrix
Functionality	Takes serial data from microcontroller up to number needed to activate all pins of LED matrix. Sends data out to matrix when latched by microcontroller.



LED Matrix Display level 2 design

Module	LED matrix display
Inputs	Shift register driver
Outputs	LED matrix display
Functionality	Take inputs from shift register display driver and turn on LEDs in matrix