Home Automation through Single Microcontroller(V1)

We Love, Fast Company and this is the era of minds and automation and people desperately need automation so that they can utilize their time efficiently on other aspects. As long as we have a cell phone we are never alone, so we can operating any devices is just a click away or we can do the same by using our google assistant as if you requesting assistance from someone to do so, that simplified it is! But then the most intriguing question arises ”At what cost?”.

What if we can achieve this at a moderate price. We started our exploration of this idea, and we found a method where we can control every appliance of our house using a “Single Microcontroller”. With a total cost of rupees 4,000.

Project Inspiration: A single NodeMCU can be used to control nearly 112 appliances with the help of IC called **MCP23017**. “We are never stopped by our limits ” and break the analog pin limitation of NodeMCU with Multiplexer(**74HC4067**) to take multiple analog sensor data.

Brief about MCP23017: MCP23017 is a 3-Bit I^2C (Inter-Integrated Circuit) IC, which takes 2 data I/P lines from MCU(Micro-Controller-Unit) and 8 IC’s can be parallelly connected. Any 3-Bit I^2C IC can be connected to 128 devices(112 practically). Some slave serial devices automatically increment their internal address pointer after each byte is clocked by the master. This allows the master to sequentially access multiple registers without re-sending the write or read command. The MCP23017 family of devices has the ability to do either by configuring a control bit (IOCON.SEQOP). This allows maximum flexibility when accessing the registers.

Project Description: Here in Version1 of this project the switched can be controlled by Blynk App and also Google Assistant. Lights on stairs and veranda are controlled by LDR sensor ie: these lights are automated. The kitchen ventilator fan is automated using “Smoke Sensor(MQ2)”.

Getting into details: Rooms in a House: Hall, 2 x Bedrooms, Kitchen, Varanda, Stairs.

Mapping of utility per room are as follows:

Hall: 1. 2x Lights 2. 2x Fans 3. Bed light	Bedroom: 1. 1x Light 2. 1x Fans 3. Bed light
Kitchen: 1. Light 2. Ventilator Fans	Varanda & Stairs: 1. Light

Apparatus used:

1. NodeMCU	2. MCP23017	3. 16x1 Multiplexer(74HC4067)
4. Relay	5. Smoke Sensor	6. 2 Way switches
7. Jumpers	8. LDR	9. Temperature Sensor (HTD)
10. Bread Board	11. Blynk (Andriod Application)	12. IFTTT (Andriod Application)

Mapping of apparatus per utility are as follows:

Lights, Fans: 1. Relay	Ventilator Fans: 1. Smoke Sensor(MQ2) 2. DHT11
Stairs & Varanda Lights: 1. LDR	Bed Lights: 1. LDR or Timmer(Blynk)

Mapping of apparatus per room are as follows:

	Hall	Bedroom	Kitchen	Varanda	Stairs	Total
LDR	-	-	-	1	1	1
RELAY	4(2L+2F)	2(L+F) x 2	2(L+F)	1	3	14
Smoke(MQ2)	-	-	1	-	-	1
DHT11	-	-	1	-	-	1

Project cost details are in this Spread-Sheet: Project Cost
Codes: https://github.com/Abheshekh/Home-Automation

Additions to made (V2):

1. Door Unlocking System can be added with the help of RFID technology. Which needs RIFD Tags, RFID Reader, Digital Door Lock.
2. Switching On/Off of Lights and Fans with motion/human detection, which needs PIR & AK9750.