DDU Smart Home

A DREAM HOME OF EVERYONE ...

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INTRODUCTION

INTRODUCTION

WHAT IS SMART HOME?

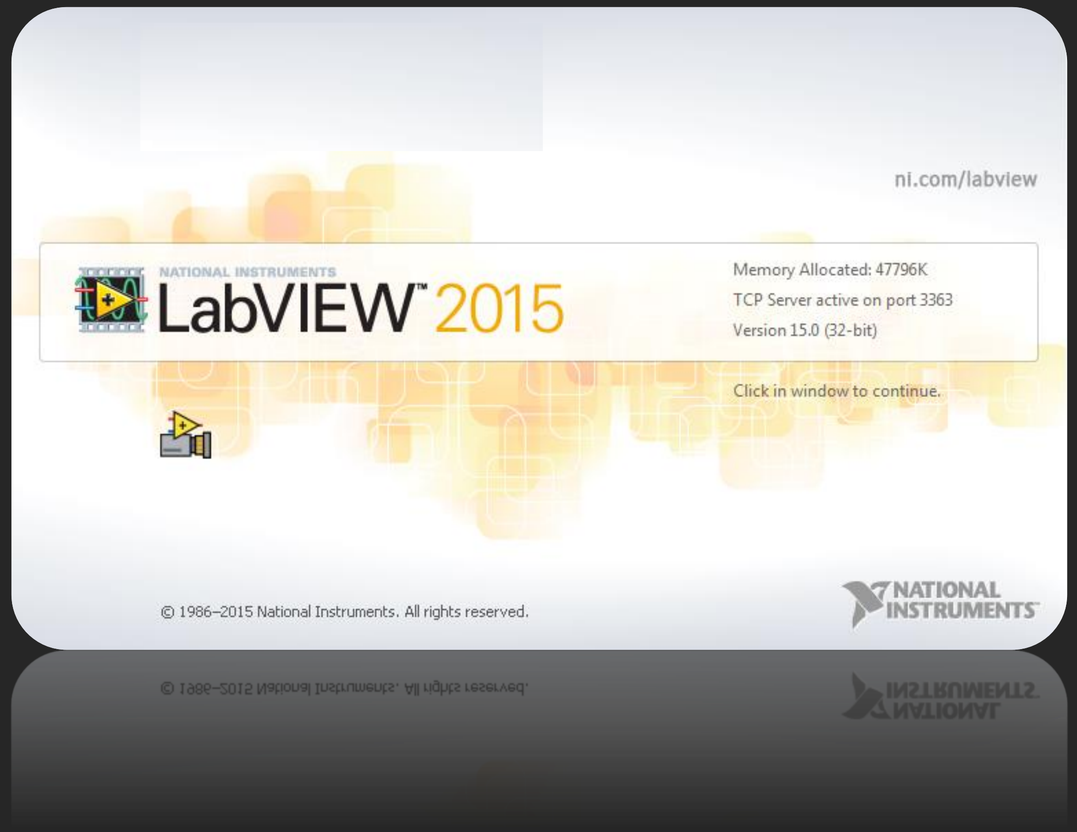
- According to UK Department of Trade And Industry, “A dwelling incorporating a communications network that connects the key electrical appliances and services, and allow then to be controlled remotely”.

- Smart Home uses “Home Automation” technologies to provide home owners with “intelligent” feedback and information by monitoring many aspects of a home. For example, a smart home’s lights may be able to detect presence of the human and gets Turn ON or Turn OFF automatically. Or the appliances may be voice controlled.

SOFTWARES

SOFTWARES

NI LABVIEW

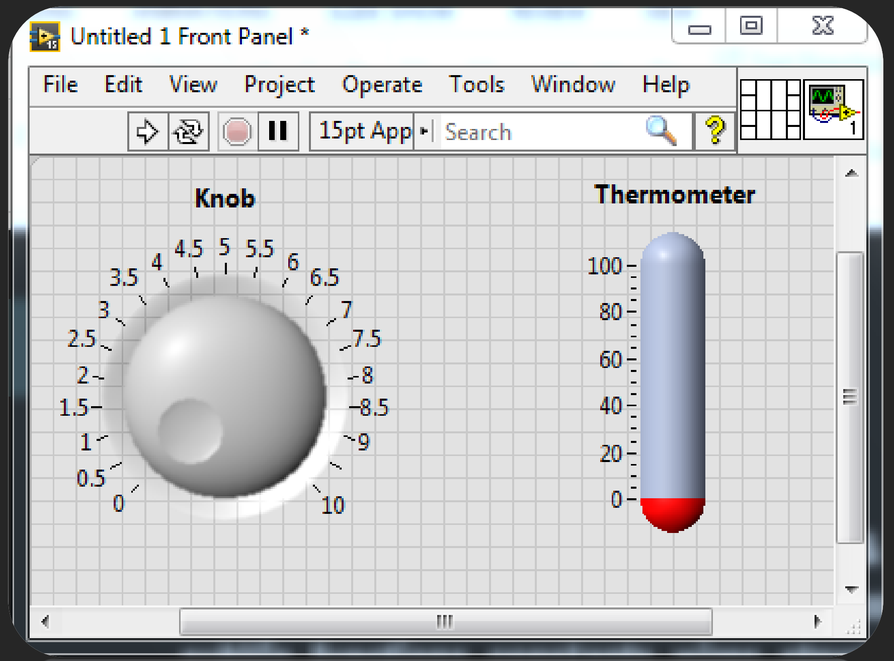


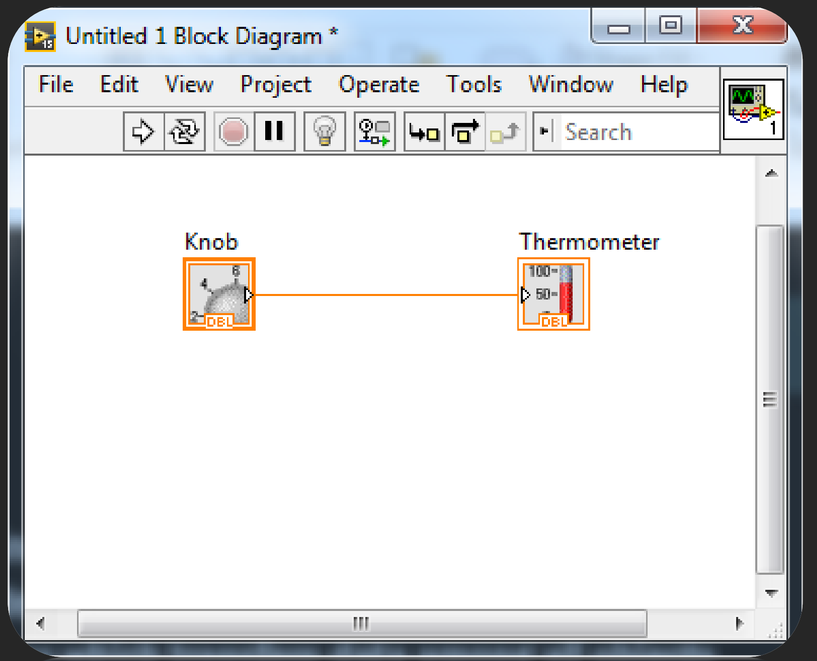
- LabVIEW (Laboratory Virtual Instrument Engineering Workbench), created by NI (National Instruments) is a “Graphical Programming” Language that uses icons instead of lines of text to create applications.
- LabVIEW is used for Data Acquisition, Signal Processing & Hardware Control.
- LabVIEW programs are called as ‘Virtual Instruments’ (VIs).

SOFTWARES

NI LABVIEW

- LabVIEW is consist of :
  - ✓ Front Panel : Contains controls (inputs) & indicators (outputs) for the application.
  - ✓ Block Diagram : Contains the graphical code to control front panel objects. It includes subVis, functions, constants, wires, structures which transfers data among all objects.





SOFTWARES

WHY LABVIEW ?

LabVIEW increases the efficiency of programming because it provides “GRAPHICAL PROGRAMMING” interface.

SIMPLIFY COMPLEXITY

01

02

CUSTOM USER INTERFACES

DESCRIPTION

You don’t have to be expert in parallel programming to take advantage of all your computer resources.

POWERFUL MULTITHREADED EXEC.

03

04

EXPANSIVE HARDWARE INTEG.

With LabVIEW we can use all of our measurement and control instruments. It offers seamless integration across multiple type of insts, sensors, buses.

LabVIEW Tools Network provides access to certified, third party add-ons to expand the power of NI LabVIEW.

TOOLS(ADD-ON) AVAILABILY

05

SOFTWARES

ARDUINO

- Arduino is an open-source electronics platform based on easy-to-use hardware and software. It's intended for anyone making interactive projects.

- We can tell the board what to do by sending a set of instruction to the microcontroller on the board. To do so we have to use "Arduino Programming Language" and "Arduino Software(IDE)".

SOFTWARES

WHY ARDUINO ?

INEXPENSIVE

01

Arduino boards are relatively inexpensive compared to other microcontrollers platforms.

CROSS - PLATFORM

02

Arduino Software (IDE) runs on Windows, Macintosh OSX & Linux Operating Systems.

OPEN - SOURCE

03

You don’t have to be expert in parallel programming to take advantage of all your computer resources.

EXTENSIBLE SOFTWARE & HARDWARE

04

The programming language can be expanded using “C++ libraries”. Extra hardware (modules/shields) can be attached to Arduino to expand its functionality.

ONLINE COMMUNITY SUPPORT

05

Arduino is supported by online community, that’s why lots of source codes are already available. We can learn from that. We can ask for any support too.

SOFTWARES

LIFA

LabVIEW MakerHub

- “LabVIEW Interface For Arduino (LIFA)” is a free downloadable toolkit made by LabVIEW MakerHub (A community driven by LabVIEW users and created by NI). Which allows developers to acquire data from Arduino, process it in LabVIEW and generate output accordingly on Arduino.

- A firmware called “LIFA Base” needs to be installed in Arduino. It creates communication link between LabVIEW and Arduino.

SOFTWARES

NI VISION

- NI Vision offers to distinct software packages.
  - ✓ NI Vision Acquisition Software : Contains necessary driver softwares.
  - ✓ NI Vision Development Module : Contains hundreds of image processing functions.

- NI Vision Acquisition Software is basically the driver package for various cameras. It is the basic software we need to create Vision Application. After installing this package it allows developer to capture images & videos using any camera (in our case webcam).

SOFTWARES

CHROME REMOTE DESKTOP

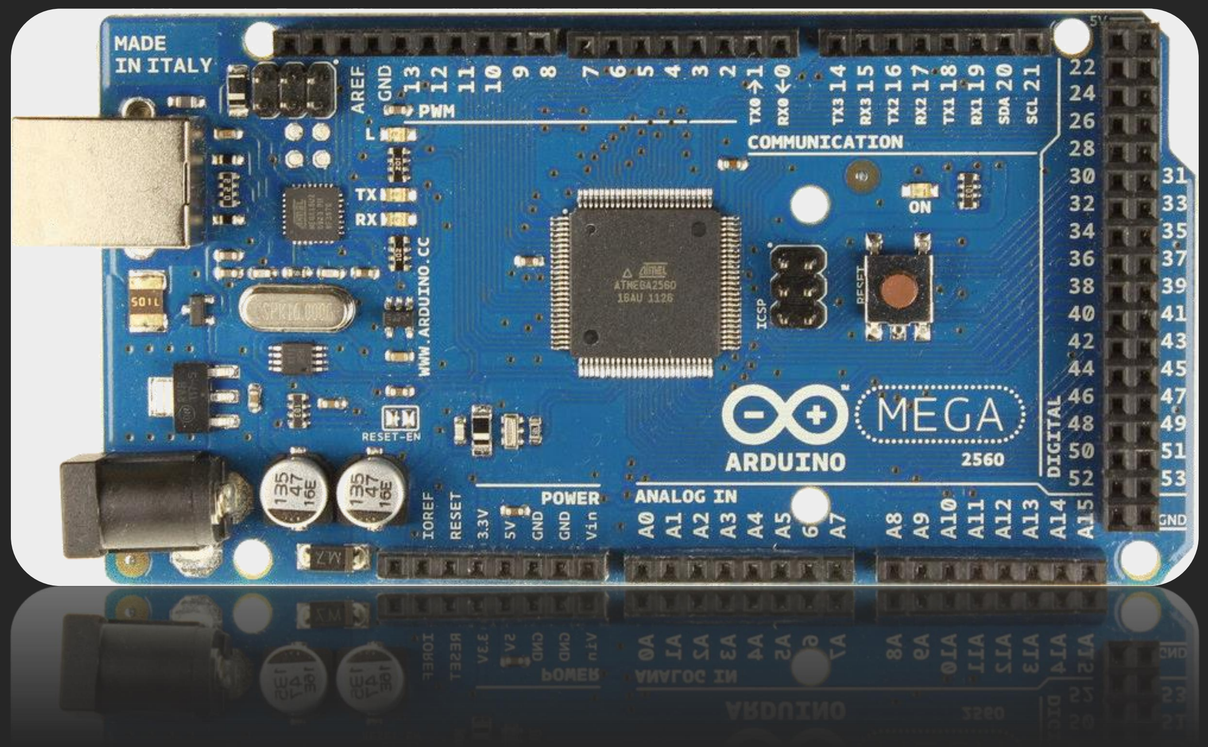
- Chrome Remote Desktop allows users to remotely access another computer through “Chrome Browser”. Remote access of another computer requires a PIN as an authentication so its is totally secured.

- Chrome Remote Desktop supports Windows, Macintosh OSX, Linux, Android, iOS. Hence we can say it is “System Independent”.

HARDWARES

HARDWARES

ARDUINO MEGA 2560



- The MEGA 2560 is a microcontroller board based on Atmega2560.
- The MEGA 2560 is designed for more complex projects. With 54 digital I/O pins, 16 Analog Inputs and a larger space for the sketch. It is recommended board for 3D printers and robotics projects.

HARDWARES

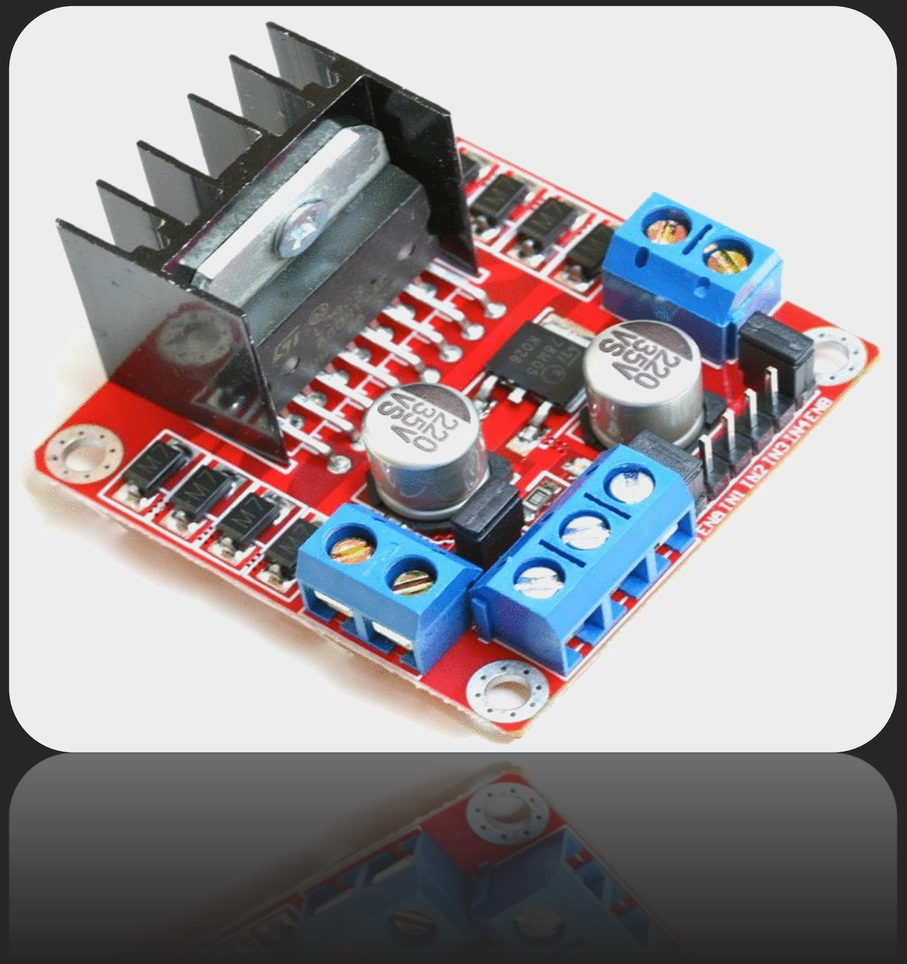
1Sheeld

- 1Sheeld is a rapid prototyping tool which turns smartphone into a re-configurable Arduino shield.

- Basically 1Sheeld consist of two parts.
  - ✓ 1Shield H/W : It is physically connected to the Arduino & acts as a wireless middle-man, piping data between Smartphone & Arduino.
  - ✓ 1Sheeld App : It is the software platform on smartphone that manages the communication between 1Shield and the Smartphone and allows us to choose between different available shields.

HARDWARES

L298N MOTOR DRIVER

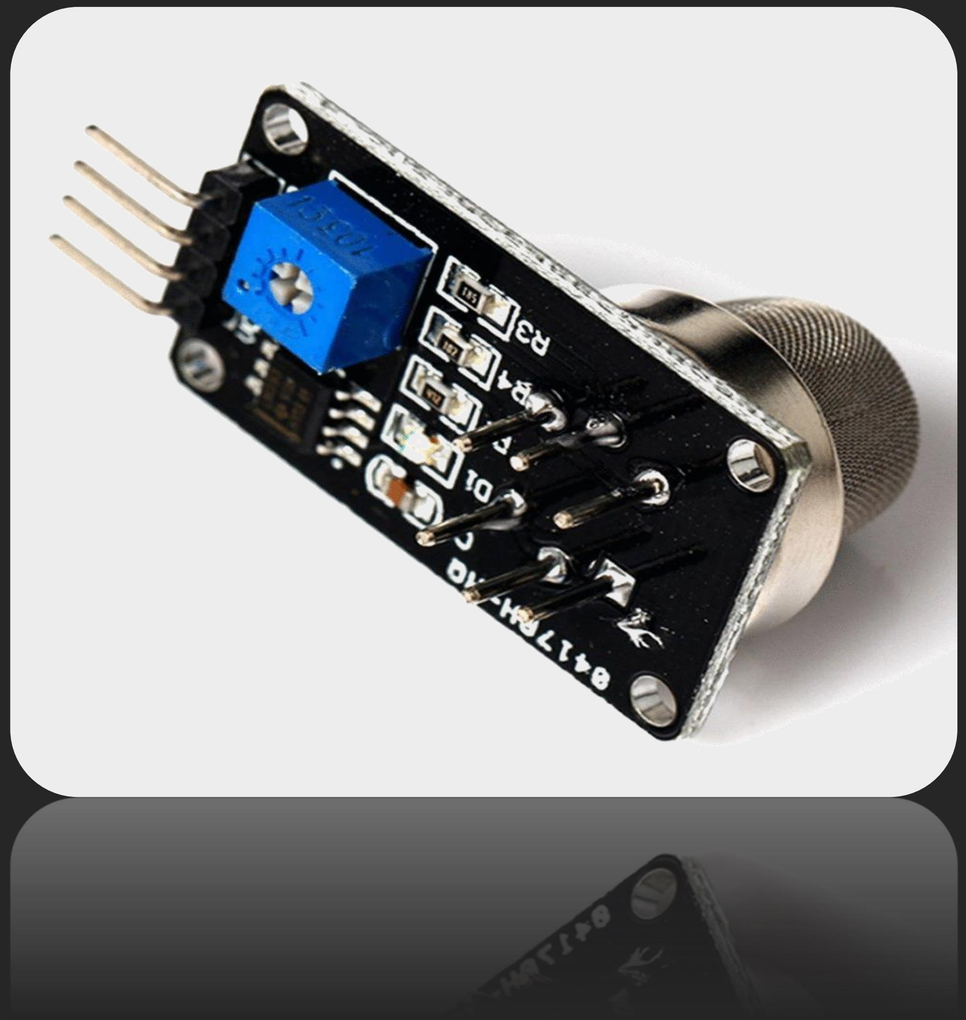


- L298N is a “Dual H-Bridge Motor Driver”. It allows you to control speed and direction of two DC motor or one bipolar stepper motor.

- Features :
  - ✓ Operating supply voltage up to 46V.
  - ✓ Total DC current up to 4A.
  - ✓ Over temperature protection.
  - ✓ High Noise Immunity (Logical ‘0’ input voltage up to ‘1.5V’).

HARDWARES

MQ135 AIR QUALITY SENSOR

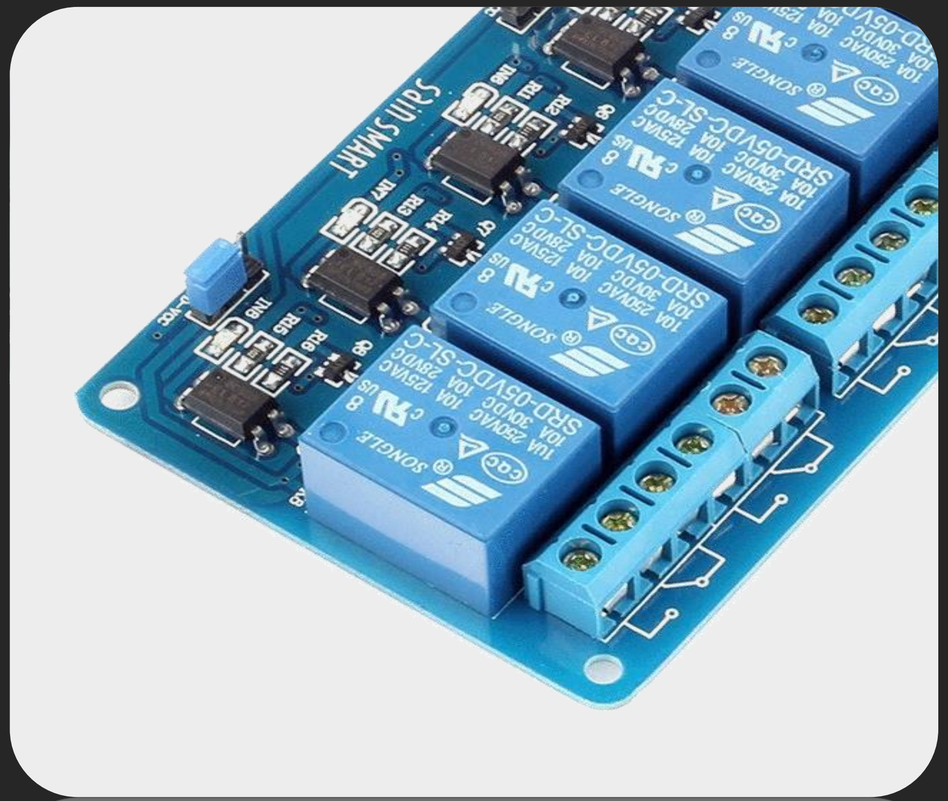


- MQ135 is a air quality sensor. SnO2 is the sensing element used in this sensor. It is sensitive to Benzene, Alcohol, Ammonia, Smoke and other harmful gases.

- SnO2 has lower conductivity in clean air, and its conductivity rises with the rise in concentration of harmful gases.

HARDWARES

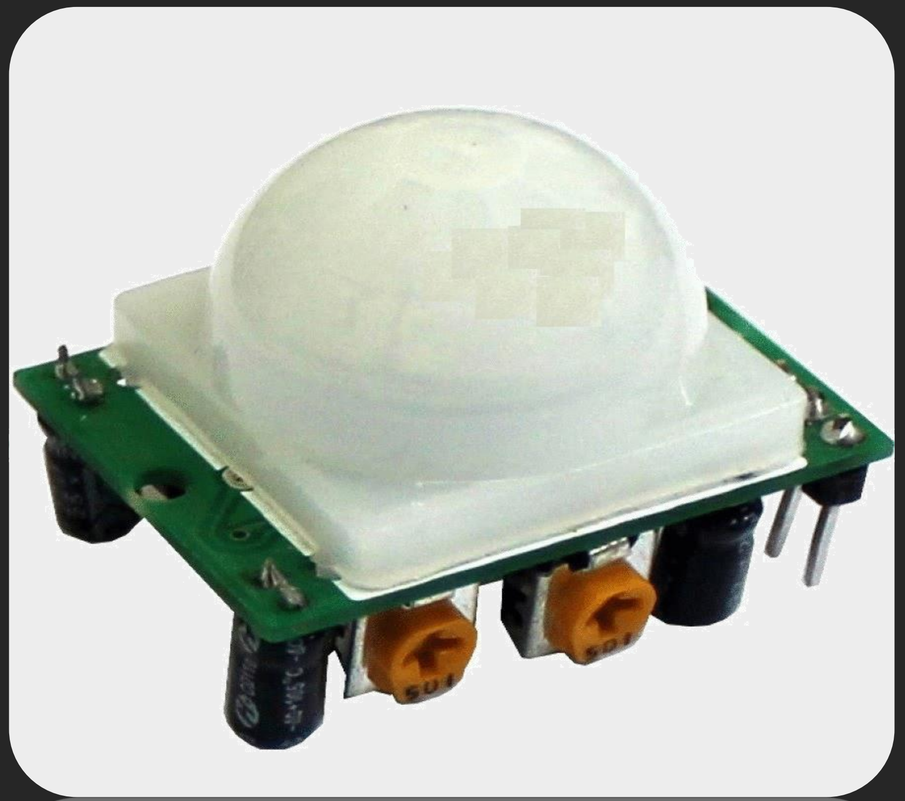
RELAY MODULE



- 8 Channel Relay Board is a simple and convenient way to interface 8 relays for switching applications.
- Input voltage level supports TTL as well as CMOS hence its easy to interface it with microcontroller based projects.
- Relay driver is optically isolated hence ensures maximum safety at the controller side.
- LED are provided on each channel which indicates relay’s status.

HARDWARES

PIR SENSORS



- The Passive Infra-Red (PIR) sensor is a poly-electric device that detects motion by measuring changes in infra-red levels emitted by surrounding objects.

- PIR sensors have elements made of crystalline material, that generates an electric charge when exposed to infra-red radiation. Fresnel lens is used to focus the infra-red signals on to the element.

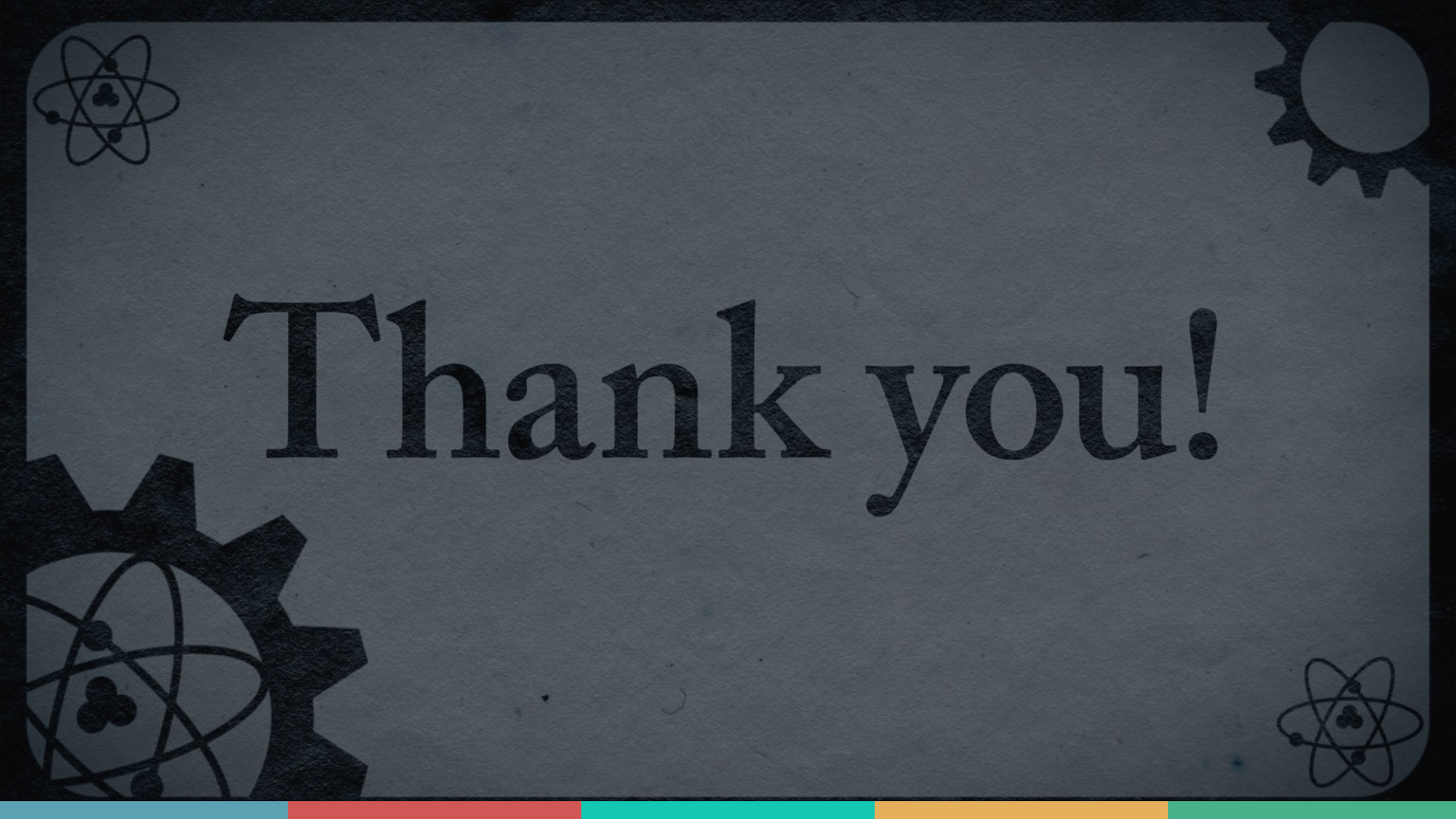
PROGRAMMING & IMPLEMENTATION

PROG. & IMPLEMENTATION

SUBVI

- Within LabVIEW, program modularity means creating smaller sections of code known as SubVIs. SubVI are the same as Vis. They contains front panels and block diagram, but you call them from within a VI. SubVI is similar to a subroutine in text-based programming languages.

- We have used many SubVIs in our main VI. Name of some SubVIs are as follow.
  - ✓ Email : Code written in this VI helps us to send the SMTP mail.
  - ✓ Integer NOT Gate : This SubVI acts as NOT gate for integer numbers.
  - ✓ Password Condition : Code written in this VI decides whether the entered password is ‘Wrong’ or ‘Right’.
  - ✓ Date Time : This SubVI gives current date & time in string format. It is used to name the Intruder Photos.


Thank you!