IIT MADRAS

INTERNET OF THINGS
SMART HOME DEVICES

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PROBLEM STATEMENT

PROBLEM STATEMENT REQUIRED US TO COME UP WITH A PROTOTYPE OF A PRODUCT THAT LEVERAGES THE POWER OF THE INTERNET TO ENHANCE THE FUNCTIONALITY OF ANY ORDINARY EVERYDAY DEVICE

SOLUTION TO THE PROBLEM STATEMENT

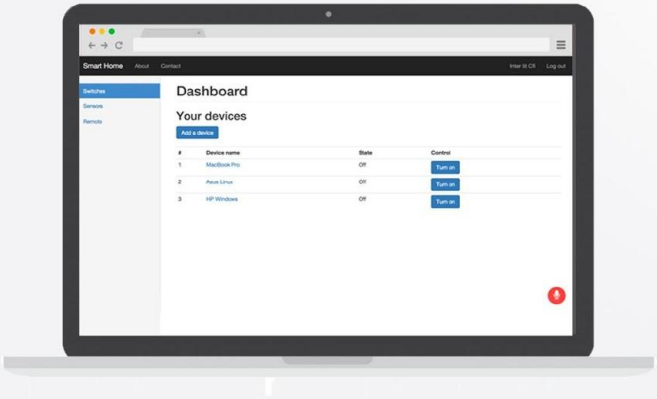
- SMART SWITCHES WITH INTEGRATED WEB APP
  - SUPPORT FOR 3 DEVICE CONNECTIVITY
  - FAMILY BASED LOGIN SYSTEM - ONE PROCESSOR FOR ONE FAMILY
  - ONE ADMIN PROVIDES PERMISSION TO OTHER USERS FOR DEVICES
  - VIEWS FOR SENSOR DATA
  - INTELLIGENT PERSONAL ASSISTANT
  - SUPPORT FOR LAPTOP BATTERY MONITORING
- UNIVERSAL REMOTE MODULE
  - CAN BE TRAINED FOR ANY DEVICE
- FACIAL RECOGNITION APP - CAN BE INTEGRATED WITH A LOCK
- SENSOR BOARD FOR MONITORING HOME CLIMATE

SMART SWITCH MODULE

SIMPLE PLUG AND PLAY

ACCESSIBLE FROM ANYWHERE AROUND THE

VOICE ENABLED ACTUATION



WEBAPP MADE IN RUBY ON RAILS

CLOUD HOSTING & PROCESSING

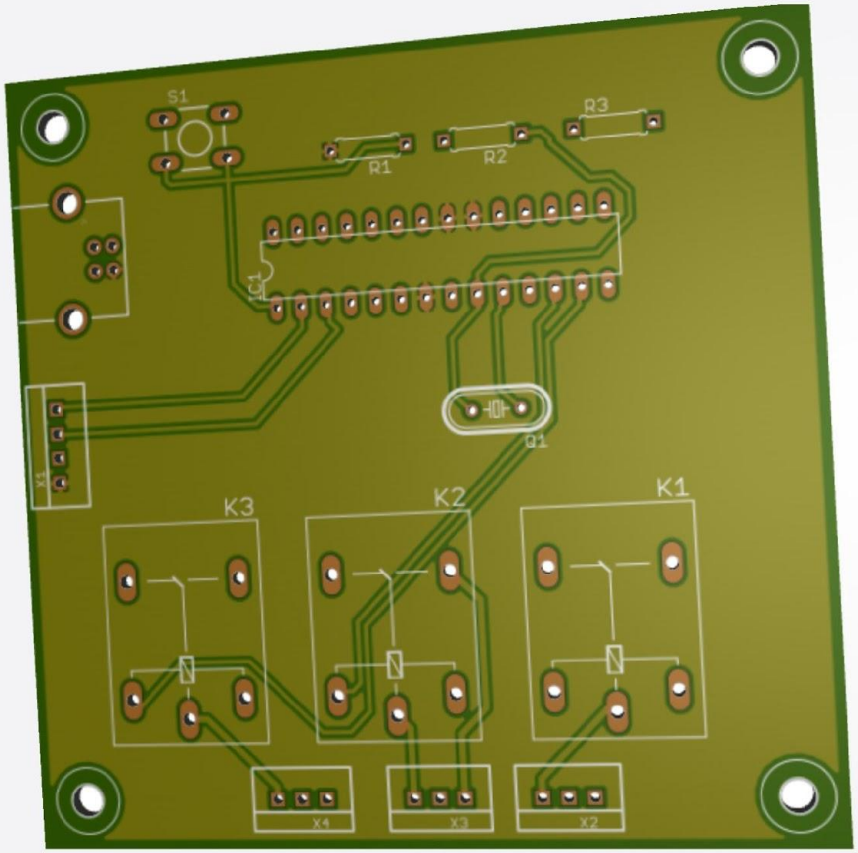
IN BUILT INTELLIGENT VOICE ENABLED PERSONAL ASSISTANT - SIMON

HARDWARE MODULE - SMART SWITCHES

SALIENT FEATURES:

- CUSTOM DESIGNED 3D PRINTED CASE
- SUPPORT FOR 3 SWITCH PLUGS
- SUPPORT FOR 2 USB PLUBS
- EASY PLUG AND PLAY EXTENSION CORD
- SUPPORTS FOR HOLDING CUSTOM MADE PCBs

ELECTRONIC MODULE - SMART SWITCH



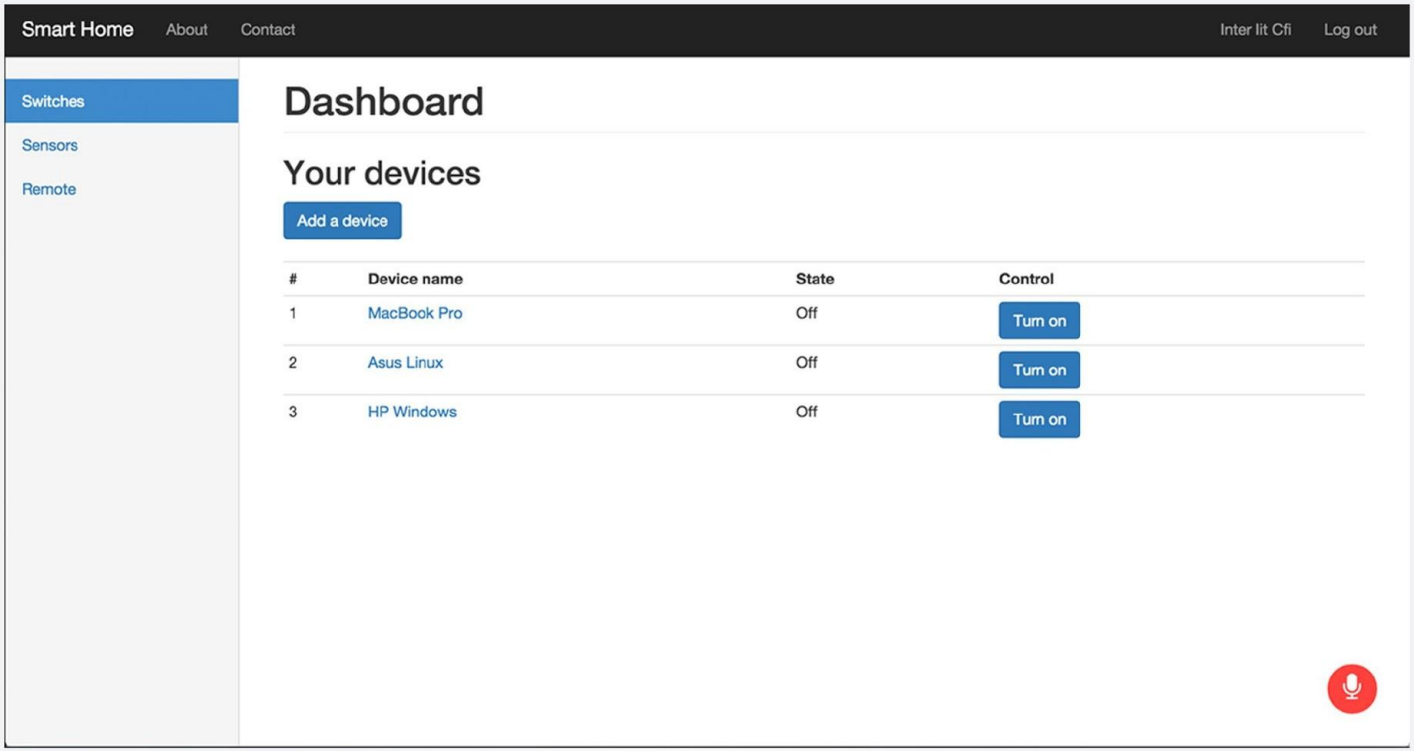
SALIENT FEATURES:

CUSTOM DESIGNED PCBs

- 5V RELAYS
- ATMEL AVR BASED MICROCONTROLLER (ATMEGA 328P)
- 16 MHz OSCILLATOR CRYSTAL
- 10K OHM RESISTOR
- 22 PF CAPACITORS
- 4 PIN RMCs
- POWER SUPPLY
- SCREW TERMINALS

HC 05 BLUETOOTH MODULES

SOFTWARE MODULE - SWITCH MODULE

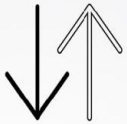


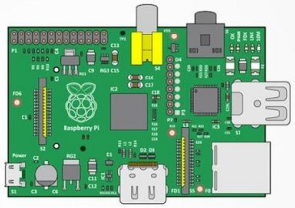
SALIENT FEATURES:

- WEBAPP IN RUBY ON RAILS FRAMEWORK
- RESPONSIVE DESIGN COMPATIBILE WITH TABLETS, LAPTOPS AND PHONES
- INTELLIGENT PERSONAL ASSISTANT NAMED SIMON
- PERSONALISED FAMILY LOGIN

COMMUNICATION FLOW FOR SMART SWITCH

WEBAPP ON THE CLOUD





CENTRAL PROCESSOR
(RASPBERRY PI)

MULTIPLE SWTICHES

CONTROL OF EVERYDAY DEVICES

UNIVERSAL REMOTE MODULE

SALIENT FEATURES :

EASY TO SETUP PLUG AND PLAY MODEL

DEVICE INDEPENDENT REMOTE

CAN SUPPORT ANY REMOTE OPERATED DEVICE
EX: TV , AC , OVENS , RADIO SETS

A SINGLE APP BASED REMOTE TO CONTROL ALL DEVICES OF THE HOUSE

EXTREMELY CHEAP TO BUILD

UNIVERSAL REMOTE MODULE

COMPONENTS USED

- TSOP SENSOR IR RECEIVER
- IR LEDS
- NPN TRANSISTORS
- 3D PRINTED CASE

TSOP SENSOR

IR TRANSMITTER

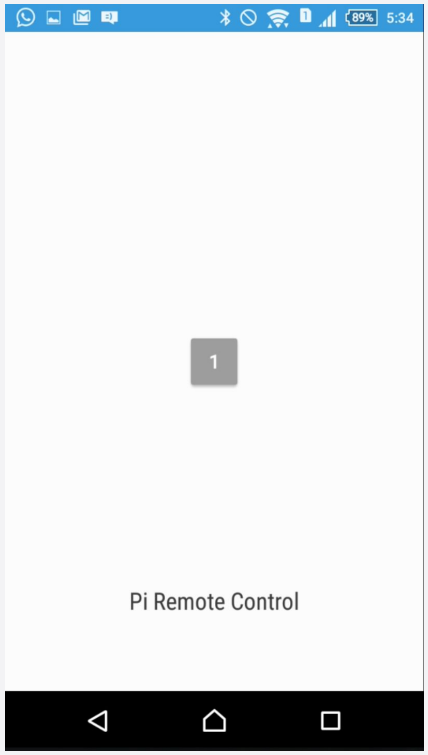
HOW IT WORKS

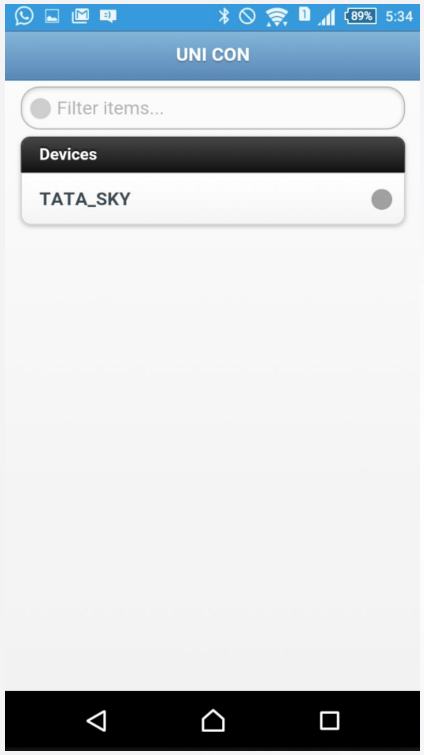
MAKES USE OF LIRC (LINUX IR CONTROL)

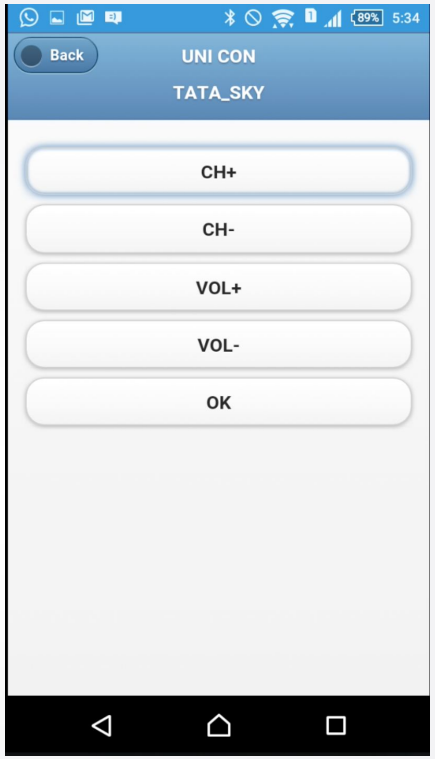
STEPS REQUIRED IN MAKING THE REMOTE WORK

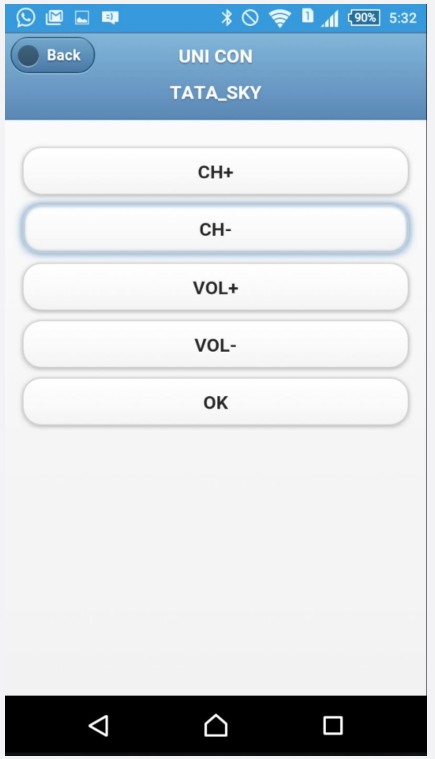
- TRAINING OF THE REMOTE THE TSOP SENSOR RECORDS THE CODES OF TRANSMITTED BY THE DEVICE
- REMOTE IS TRAINED BY PRESSING RANDOM BUTTONS TO RECORD THE CHARACTERISTIC OF THE PULSES
- PRE DEFINED BUTTONS ARE BUILT BY RECORDING THE BUTTON WITH THE CORRESPONDING BUTTON NAMES
- PYTHON APP TO DEFINE THE VIEWS OF THE BUTTONS AND CONTROLLERS ARE WRITTEN WITH THE HELP OF LIRC LIBRARY
- IR LED TRANSMITS THE CORRESPONDING SIGNAL TO THE RECEIVER IN THE DEVICE

Universal remote module









Login to the App

Select one of the pre-configured remote.

SENSOR BOARD MODULE

USAGE :

CLIMATE CONTROL SYSTEM FOR THE HOME

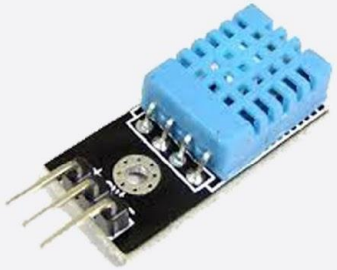
MONITORING THE LPG AND CO2 LEVELS OF HOUSE

ROBUST METHOD TO PREVENT FIRE HAZARDS

SENSORS USED :

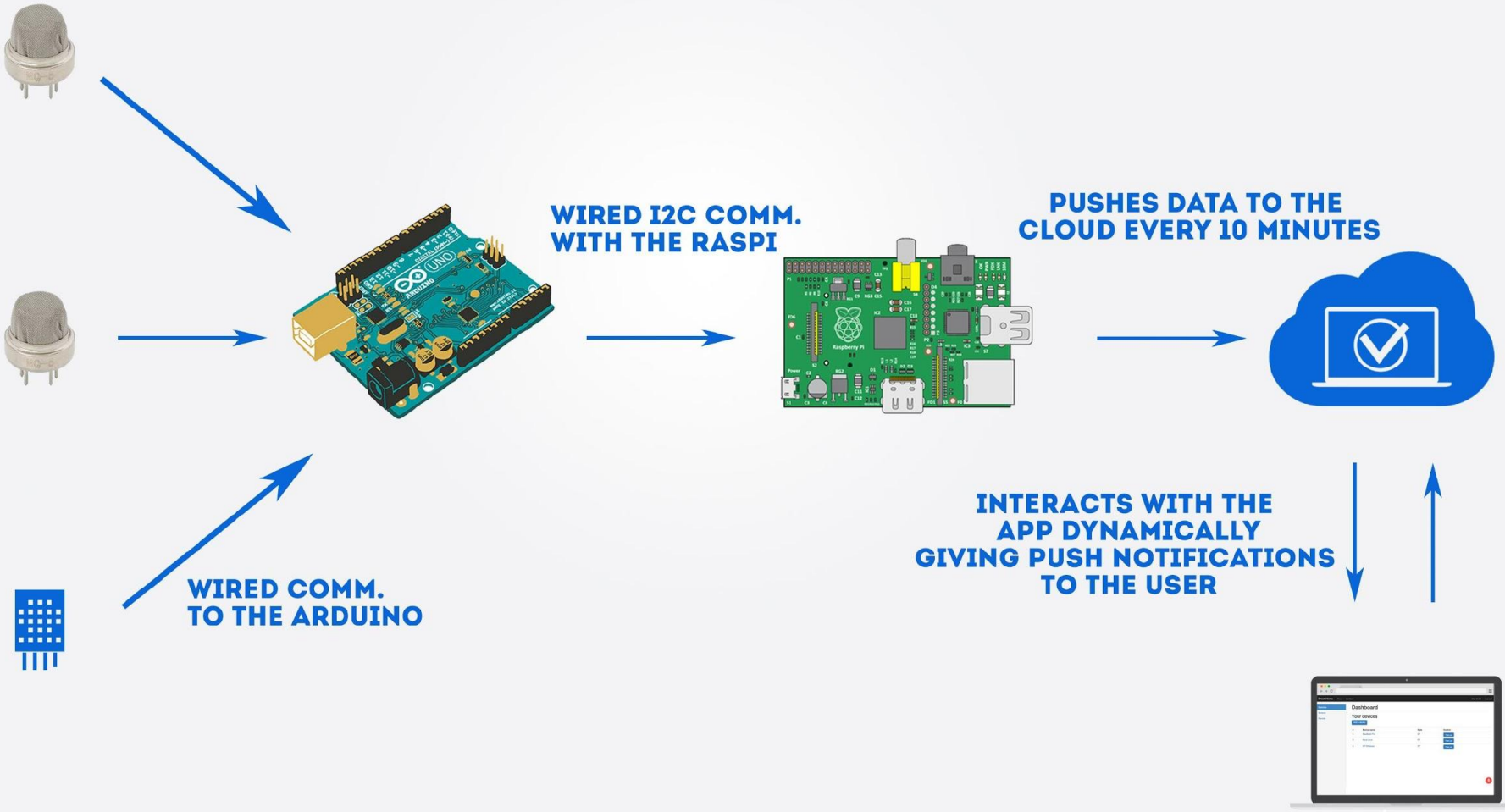
CO2 SENSOR

LPG SENSOR



TEMPERATURE & HUMIDITY SENSOR

SENSOR BOARD COMMUNICATION FLOW



FUTURE PROSPECTS OF THE PRODUCT

- Security system for houses
- Lighting automation
- Power monitoring system along with the a regulated bill monitoring system
- Notification system equipped with real time feedback
- automation systems integrated with real time presence detection system
- Link between devices (Direct m2m communication)
- A more robust end to end application

Costing of the product

Module	Material Used	Cost
Smart Switch Board (Chronos)	Raspberry Pi (Central Processor)	Rs.2500
	Custom Designed PCBs	Rs.800
	ATMEL AT-MEGA 328p ICs	Rs.250
	Relay Switches (Cost of 3)	Rs.75
	Resistors, Capacitors & Crystals	Rs.15
	Miscellaneous Cost	Rs.100
Subtotal		Rs.3640
Universal Remote Module	TSOP Sensors (IR Receivers)	Rs.75
	IR LED (IR Transmitters)	Rs.25
	Miscellaneous Cost	Rs.50
Subtotal		Rs. 150

Costing of the product

Module	Material Used	cost
Sensor Board Module	Mq6 – lpg sensor	Rs.350
	Mq135 – co2 sensor	Rs.275
	Dth sensor (combined temperature and humidity sensor)	Rs.300
	microcontroller	Rs.200
SUBTOTAL		Rs.1125
Total		Rs.4915

The entire end to end application will cost near Rs.5000 which is “way cheaper” than all the high end Home Automation System available in the market today.

Our Product v/s the Market

- In the market today there exist many home automation products made by many different companies.
- But order to get maximum profit ,these modules come as individual parts which lack a common protocol.
- A full fledged end to end home automation system is difficult to install and requires huge investments starting from the baseline of around Rs.7000