

**INDEX NUMBER FULL NAME**

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**THE**

**FORE RUNNERS**

Believe everything is possible

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Gruha Pathi 1.0 - A new frontier in HOME Automation

House Lord 1.0

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# Background

The idea chosen for this project is Home Automation, I named the project as Gruha Pathi (GP) meaning House Lord. Gruha Pathi grants convenience, security and freedom for people to manage their house more efficiently.

All electrical equipment, water supply and house protection acts as a unified system that can automatically take decisions based on the information gathered from numerous sensors placed in the house. Electricity usage and total control over all the electrical appliance plugged into the system can be remotely controlled or let the system take decisions based on the information available.

Water flow management is one of the crucial factors that we fail to address in a house for the simple reason that we have plenty of water available in the country 24/7 but that doesn’t mean pure water is forever available in every part of the country. 80% of water used in the kitchen and in cloth washing machines can be filtered and used in toilets with the help of Gruha Pathi.

*“Don’t let a single drop of rain water flow into the sea.”* – King Parakramabahu the Great.

Simply having a CCTV camera system never helps to protect a house from unwanted parties because after a crime has been committed there is very less reason with having only evidence but an automated system that can protect your house from unwanted parties is an ideal solution, with Gruha Pathi this is possible.

Time is a precious commodity that must not be wasted so instead of manually controlling appliances and knowing the usage it is better to be informed by an automatic system. The main key stakeholders of Gruha Pathi are the house owners.

# Scope of the Project

Gruha Pathi is a collection of small independent systems that work together as a unified system.

## Water System

Manages everything related to water storing and water flow of the house. This is system is a collection of two systems. Each water tank is 500 litres minimum.

### Rain Water Reservoir

A separate water tank is reserved for collecting rain water. The lid of the tank opens when the system detects rain and is collected for the purpose of watering the garden and vehicle cleaning.

### Used Water Reservoir

Water used in the kitchen and washing machine are stored in a separate tank for the purpose of reusing it in the toilet, this water is filtered.

## Protection System

Manages everything related to house door, window and gate locking and unlocking. Also contains a system that prevents unwanted people from entering the house premises. The main purpose of this system is to protect people lives and then gives priority to valuables inside the house.

* If threat detected and confirmed, then a call is placed to the nearest police station automatically. This is done after careful analysis of the situation by the system.
* If a window or a door is opened forcibly then a security mechanism is activated to prevent the intruder from entering the house using non-lethal electricity.
* If electricity is disconnected from the house, a backup power is activated in order to supplement the security features of the house.
* Ability to remotely control the system from a far and then take decision of the house.
* Finger print based Door Locking and Unlocking system.

## Electricity System

Manages everything related to electrical appliance usages to normal lights.

* Measures the electrical usage from each power socket, switch and then calculate the total usage of the appliances.
* Ability to control the appliances remotely.
* Ability to use alternate power systems for electricity appliances in case of a power failure.

# Software Requirements Specification

All components can act as independent units or work as a whole system when needed.

## Functional Requirements

The Needed Functionality of the Information System.

1. Monitor Power Socket Electrical Usage.
2. Switch ON/OFF Power Socket Remotely or Manually.
3. Monitor Light Electrical Usage.
4. Switch ON/OFF Light Remotely or Manually.
5. LOCK/UNLOCK Door, Window and Gate Remotely or Manually.
6. Monitor Door, Window and Gate Status Remotely.
7. Monitor Water Usage Remotely.
8. Switch ON/OFF Water Supply.
9. Limit Water Usage.
10. Communication between electronic appliances are encrypted using ever changing primes.
11. Encryption keys change every 30 minutes.
12. Switch ON/OFF security mechanism of the house Remotely or Manually.
13. Voice activated commands and tasks.

## Non-Functional Requirements

The Additional Functionality of the Information System.

1. User Friendly GUI (Graphical User Interface)
2. Android App for Mobile.
3. Windows App for Desktop.
4. Less power consumption for the system.
5. High Speed Communication between appliances.
6. Powerful changing encryption (Keys change every 30 minutes) that uses RSA encryption.
7. Easy configurable system (Hardware and software).
8. Obtain Reports of House Status (Electricity, Water and Protection).

# Technologies

This project will be accomplished by combining electronics and softwares.

* Hardware Framework will be designed and developed by **Arduino, Micro-Controllers** and **Electronics.**
* Software Framework will be designed and developed by **Android**, **C#** and **C.**

* Mechanical Framework will be designed and developed by **Servos**, **Various Sensors**, and **Motors**.

# Assumptions

* All the functionality of the system can be achieved with an initial investment of minimum of Rs.10000/= and a Maximum of Rs.30000/=
* Electricity Bill can be reduced by 2%. (depends upon previous usage details)
* Water Bill can be reduced by 30%. (depends upon previous usage details)
* 1% Increase in Internet Usage. (Voice Recognition API)

# Risks

* **Present Electrical Wire System**

Using the current electrical wire system without having to make major modifications or additions. For an instance: To automate a light switch we need to get four separate wires (two power wires, two switch wires)

* **Present Plumbing System**

Using the current plumbing system without having to make major modifications or additions. For an instance: To connect **Used Water Reservoir** to the toilet, a new plumbing line must be connected.