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# Secured Universal Remote Control System for Home Electrical Appliances Using Point-n-Press

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*Abstract: With different related contraptions and machines, the robotization of Home Electrical Appliances is one of the prospering area of Internet of Things (IoT). As the multifaceted idea of contraptions/machines increase, different gets (from time to time modest bunches) are moved toward the remote controller in electrical spaces paying little respect to whether a couple of them are once in a while used. A customer may be confused for the controller paying little heed to whether he or she just plans to play out a fundamental undertaking. This confusion moreover prompts a higher probability of mal-exercises. In addition, home electrical gadgets/appliances for correspondence between remote controllers and related contraptions, for instance, extensible Markup Language (XML) messages, are ordinarily exchange speed damaging. This as well as the security is one of the principle issue with XML information exchange. To address these issues, a computerization of comprehensive safely point based control structure for electrical devices named Secured based Point-n-Press is derived. Directionality feature is very critical feature in Point-n-Press, which empowers essential and regular control by showing the objective gadget to exhibit the objective's user action interface of the mobile application as remote controller. By building up the state information of electrical gadget undertakings, this is the valuable information to perform the future action on the gadgets. Two veritable models are completed to affirm the credibility of the proposed contrive. The first one is basic pont-n-press without any security where directionality feature is included and Face recognizes advances the security related issues, this is the enhancement to basic point-n-press.*

## **Introduction:**

This work introduces a keen general point based control framework for electrical machines using advance security option like face recognition for user and for admin it would be simple password based authentication. A propelled universal remote controller can be easily achieved using android phone which has with or without IR capabilities. This android phone equipped with required application related to general point based control framework

is called as PPRC (Point-n-Press Remote Controller), Alternative approach is Something unique, some IR across the board serial transport (USB) dongles that can give reinforce for Android errand structure are can be used[1], but in this option we cannot achieve the security criteria. Like this manner, we can use many open source based frameworks can be used to achieve this. At last, the system will be equipped with IR sensors can be used for execution of the Point-n-Press control box (PPCB). As appeared by the format of this part, as they say one device can be meanwhile directioned and perform action by the proposed control framework. Thusly, the general point based control framework for electrical machines always shows one user action interface (UI) of an electrical device. These purposes of intrigue assist us with accomplishing the explanations behind the sharp comprehensive remote control system for home electrical mechanical assemblies. Shows the objective's user action interface on the screen of the android mobile application or remote controller. By utilizing the state information of electrical gadget/apparatus tasks, just practical catches that are significant to the present setting are used. Two genuine models are executed to check the plausibility of the proposed conspire. The assessment comes about demonstrate that Point-n-Press Control Box and Point-n-Press Remote Controller.

Different issues with respect to computerization/automation of electrical devices and direct APKs have been demonstrated in various fields. For example, in the early experiments three-dimensional (3-D) user action interface is being developed. The three-dimensional (3-D) interface is very easy to use, clients can without a considerable amount of an expand control the objective gadget. Regardless, the highlights of the directionality features of the IR sensors and the current state conditions are not considered when performing the action on the electrical device. Like past examinations, a simple to-perform action interface is given an extremely technical interface for client electronic machines, in which an already populated menu should be readied and the user interfaces should be facilitated going before bring up of the control framework. Thusly, the framework for control system needs very agility.

Then again, with senseless, nonfunctional, and even futile points of confinement or gets show up on the screen of the controller, a higher likelihood of off course activities might be conveyed while controlling mechanical gatherings. Starting now and into the foreseeable future, the state conditions of the electrical machine actions are given. So that not related (that are unessential to the present state) are not showed up. For instance, when a ventilation system (may be Air conditioner or Air Cooler) is controlled off, the essential key (or utilitarian) get is the "Power-on" get. Precisely when the ventilation system works in de-humidification mode, the gets "Humidity Set" and "Air Swing" are sit out of gear (remote controller).

It is moreover observed that frustrated setups and limits used for controlling electrical machines may make huge sized exchange of information, like eXtensible Markup Language (XML) information. For these sort of control systems based on XML, the joining with Universal Point-n-press devices by an open Service Gateway Initiative (OSGi) Gateway and a comprehensive remote user action console are developed to grow the easiness of the splendid electrical user action structure [1]. This system provides a straightforward user interface yet does not give a natural user action interface. Based on the previous study, above arrangement eats up a bigger number of information exchange limit than the proposed (security based) Point-n-Press since XML-based information exchanges are involved. Additionally, a Radio Frequency for Customer Electronics (RF4CE) approach based simple to use and

instinctive User Interface is acquainted with lessen the bandwidth limit use [18]. In spite of the way that the RF4CE approach normally develops the protocol for transmission between a remote controller and electrical devices, described method may eat up high transmission limit than the proposed (security based) Point-n-Press user action system with Infra-Red directionality and the current state conditions of the device actions are not used.

The objective of this paper is to build up a keen widespread security based remote control framework for electrical apparatuses called Point-n-Press. The gadget/apparatus are naturally identified in Point-n-Press when a client focuses the controller at it. Likewise, a User Interface (UI) for performing action on this electrical gadget is quickly shown on the display of the remote controller. Just the relevant user actions (buttons) that are show up on the User Interface which are purely with respect to current state of the device. The User Interface gives actions (buttons) and easy to perform the actions, this empowers clients to just to perform the action on the devices among the inexorably complex functionalities of home electrical gadgets/devices in a shared big space for smart homes based on IoT. To show every single operational condition of a gadget and relations among these states a finite state machine (FSM) is utilized. To limit or reduce the bandwidth various bit strings or various simple alphabets are used to represent the current and future status of the electrical gadget/apparatus. To achieve the possibility of the proposed conspire, Two genuine model (POC) are developed in home automation: 1. Android mobile phone is used for **Point-n-Press Remote Controller** (PPRC); Client can perform the action on “bulb” by indicating an outer control box close to the “bulb”. In the experimental results section, the prototype actions are depicted where android mobile phone was acting like PPRC. 2. Outer Control box is called **Point-n-Press Control Box** (PPCB) which is near to the bulb. When user points PPRC to the PPCB of bulb, Now PPCB collects the status of the bulb which is in “off” state. So PPRC collects the information of future action and displays on PPRC which is “On” state. When user clicks on the “On” button, PPCB executes the action on the bulb. Bulb will be switched “On” and the next action “Off” will be displayed on the PPRC.

In proposed Secured UPnp Framework, first step is Face recognition: User’s or Client’s face must be identified to provide the security to private home appliances, this can be achieved by extracting the data of the user’s face to perform the further analysis and save the data for identification. The robust face identification algorithm is much needed to achieve robustness and security in the system. Based on the previous study, there are basically following robust methods for face identification: Correlation, Eigenfaces, Linear Subspace, Fisherfaces. Each methods performs differently in various circumstances [2].

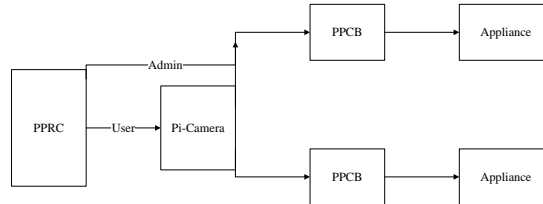
The “Correlation” based face recognition is easy and simple algorithm but problem is its performance efficiency go for toss due to high vulnerable for various light situation and it consumes lot of memory. “Linear Subspace” algorithm is robust to light condition, so better algorithm over Correlation. But problem with “Linear Subspace” is computationally costly. Next is method has less memory consumption, which is “Eigen face”, because this will not use extraction of geometry and reflectance characteristics of faces. But the problem with Eigen face is lower accuracy when it is compared with Correlation approach, so it is not robust algorithm. Last one is, “Fisherfaces algorithm” is better algorithm in terms of efficiency and accuracy when it compared with others [2].

In propped framework one of the main concern in IoT framework is resolved, which is real time processing and

efficient. This is achieved by combining the Eigen faces and Fisherfaces approaches we improve the performance of facial recognition module.

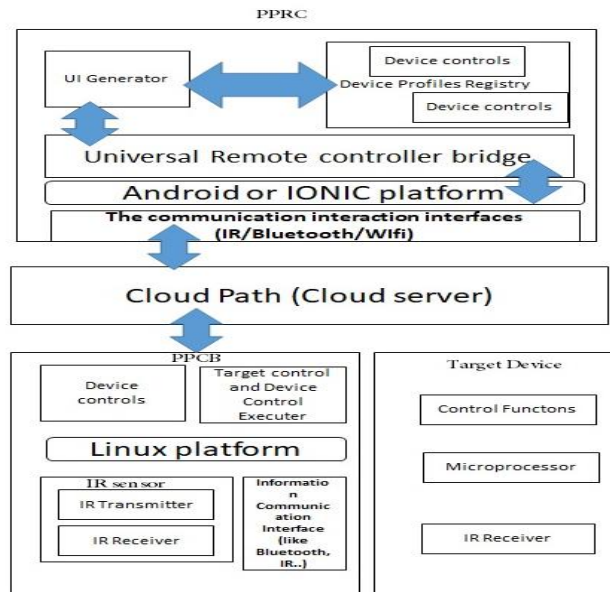
**Proposed Architecture:**

The framework of Point-n-Press consists of two parts: 1) the Secured universal remote controller for Point-n-Press (PPRC) and 2) The Point-n-Press control box (PPCB) for various electrical gadget/apparatus, as appeared in Fig. 1.



**Fig 1: System architecture for Secured UPnP Framework**

The detailed architectures of the Pont-n-Press Remote controller (PPRC) with Pont-n-Press Control Box (PPCB) are illustrated in Fig.2.



**Fig. 2. Various parts of Press Remote controller (PPRC) and Pont-n-Press Control Box (PPCB) and interactions with cloudpath**

Following are the various parts of PPRC:

- **UI Generator:** As per properties and depictions of the objective gadget and its present state, it prepares the User Interface
- **Device Profile Registry:** Currently pointed device’s status is saved in this registry and it also maintain the status relation between current and future of target device.
- **URC Bridge:** PPRC’s fundamental segment, its responsibility is getting Device Profile Registries from Currently pointed device. This breaks down the DC (Device Controls) and the present condition of the objective gadget to play out extra control activities.
- **Android platform / Ionic platform:** Which is Linux-based, where PPRC application will run.
- **The communication interaction interfaces:** This is the interaction interfaces between the PPRC and the objective gadgets, here there communication protocols can be used: IR, ZigBee, Wi-Fi, and Bluetooth.

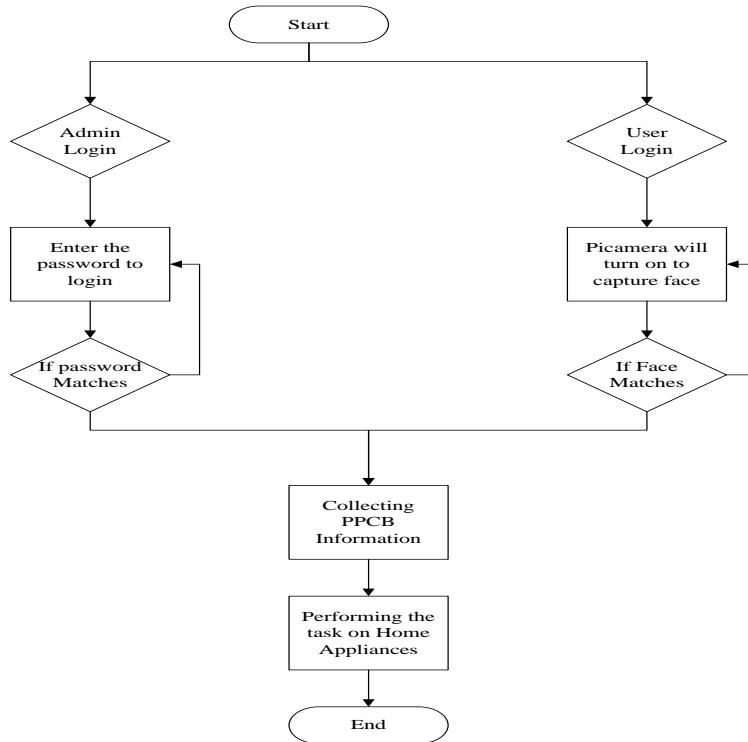
The target gadget, on which user action will be performed by the PPRC, is made out of following sections: (1) the Point-n-Press Control Box and (2) the electrical machine/device. Please observe that even a non-UPnP old machine with Infra-Red ability should be able to adjusted and perform user actions using the proposed control framework by

means of the PPCB instrument. The elements of the parts in the PPCB are:

- **Device Controls:** A file that specifies the properties and particular things of an objective gadget, this is basically a text file in cloud path to be updated.
- **Target Control and Device Control Executor:** This will creates Device Controls and exchanges respective Device Control Profiles to the Universal Remote Control of the PPRC. Device Control Executor speaks with the URC Bridge of the Point-n-Press Remote Controller and executes on the device [1].
- **Linux platform:** PPCB works on linux platform.
- **Information Communication Interface:** Information Communication Interface uses an Infra-Red sensors to get an identification motion from the PPRC. When the PPRC is pointed at the PPCB of target device. Here following protocols can be used: ZigBee, Wi-Fi, and Bluetooth

**Methodology:**

The working of proposed method is described in detailed manner in a flow chart given below fig 3.



**Fig 3: Flowchart of Proposed method**

With the mobile application in android mobile (PPRC), client has to be identified or recognized whether he/she is Admin user or other User. If the person is admin user, he can login to PPRC application using secured “admin password” and later person can perform the action using following sequences. If the person is normal user (apart from admin), user should be get authenticated based on the face recognition. This is achieved using previously captured user face characteristics using “Haarcascade” face recognition algorithm. After authentication, user can perform the following sequences:

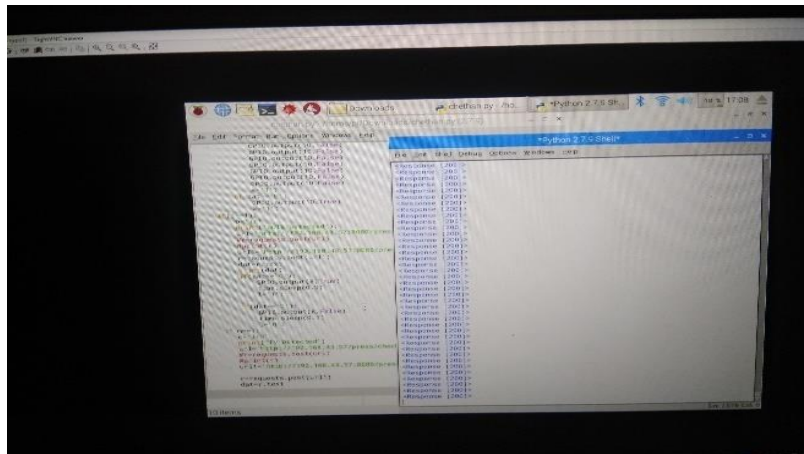
The framework should be able to distinguish that the PPRC has been distracted the IR sensors of PPCB which is located in target device/home electrical appliances. The PPRC at that point sends a "Be Ready with User flag" flag to the PPCB in the region by means of remote system. Now PPCB updates the currently targeted device’s

present status at cloud path, the PPRC will keep monitoring this status, based on the status at cloud path, the PPRC shows the future action on the device. This is achieved based on the DCP.

Once user performs / clicks on the action button on PPRC. The PPRC will update the current action at cloud path. Since cloud path is directly connected using different protocols (WIFI) with PPCB. PPCB should be able to execute the current user's action on the target device. Now PPCB will again update the current device's status at cloud path. Above procedure will continue in loop.

## RESULTS & DISCUSSIONS:

**This section depicts the results with respect to bulb as target device and user performing the actions on it.** Initially the PPRC is in off state indicating that the PPRC is not pointing any PPCB. So all PPCB devices are in off state which is indicating that it is not able to collect the status of the devices so it is not active and PPRC will also gets the empty information "Be Ready with User flag".



**Fig 4: PPCB is in off state**

When user points PPRC to the PPCB of bulb, Now PPCB collects the status of the bulb which is in off state. So PPRC collects the information of future action and displays on PPRC



**Fig 5: Bulb is off state and future option is ON**

Now user select the option visible in the PPRC, based on that itself, the target device is active and updated the future action to be performed in PPRC

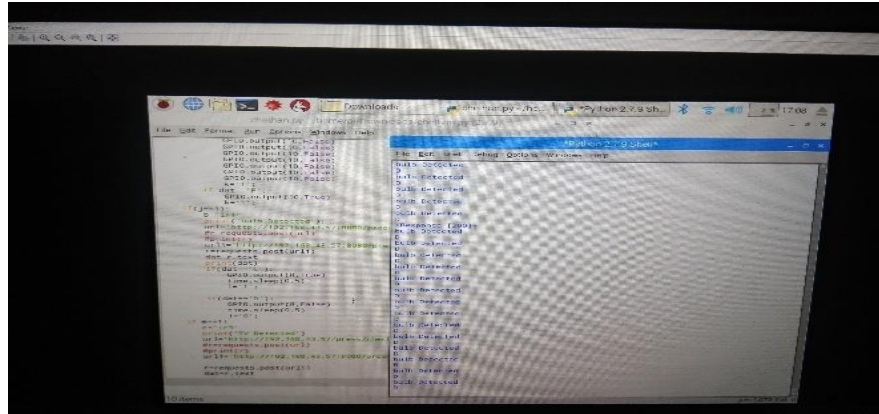


Fig 6. Logic for Electrical Appliances

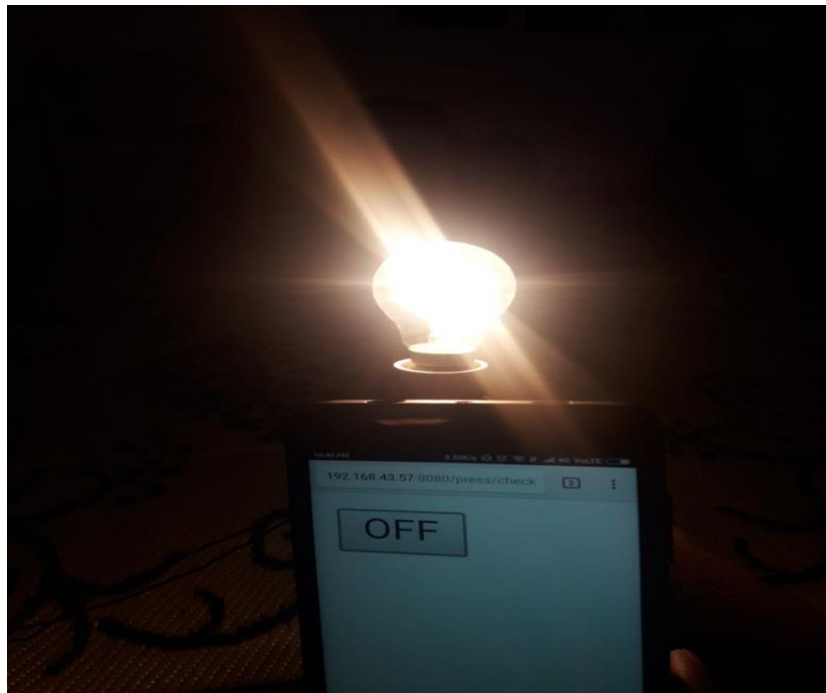


Fig 7: Bulb is ON state and future option is OFF

### CONCLUSION:

In propped framework one of the main concern in IoT framework is resolved, which is real time processing and efficient. This is achieved by combining the Eigen faces and Fisherfaces approaches we improve the performance of facial recognition module. Here we are using “Haarcascade” algorithm. This has provided us to achieve the security to home appliance and also here we have used simple user friendly straightforward control framework being developed to perform the action on home appliances called **Point-n-Press**, is proposed for controlling related

devices/devices in IoT-based mechanization for electrical devices. In this POC we have achieved: To point the specific device and control the operations devices (**directionality feature**), Single remote controller to operate all type of devices, Based on the current state of the device and user can perform the future operations using user friendly remote controller(UI) and Secured wireless communication throughout the device.

Also in eXtensible Markup Language (XML) sort of control systems, the joining with Universal Point-n-press devices by an open Service Gateway Initiative (OSGi) Gateway and a comprehensive remote user action console are developed to grow the easiness of the splendid electrical user action structure. This system provides a straightforward user interface yet does not give a natural user action interface. Based on the previous study, above arrangement eats up a bigger number of information exchange limit than the proposed (security based) Point-n-Press since XML-based information exchanges are involved. Additionally, a Radio Frequency for Customer Electronics (RF4CE) approach based simple to use and instinctive User Interface is acquainted with lessen the bandwidth limit use [18]. In spite of the way that the RF4CE approach normally develops the protocol for transmission between a remote controller and electrical devices, described method may eat up high transmission limit than the proposed (security based) Point-n-Press user action system with Infra-Red directionality and the current state conditions of the device actions are not used. So with the Secured Universal Pont-n-Press system we have also achieved the **less bandwidth consumption system**.

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