Deliverable 1

The Automators

Smart Home Automation Project

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Project Background and Description

1. <u>Project goals and final vision</u>.

        Our Project goal is to make a complete Smart home system, which consists of multiple hardware applications in one model. From our android app, the user can control and check the status of the sensors and devices. The main objective of the system is to improve the quality of life and convenience in the home. Further goals are greater security and more efficient use of energy, along with remotely-controllable devices. This product saves time by streamlining device control and also provides energy-efficient solutions. This cost-efficient system could also be adapted for commercial and industrial settings.

2. <u>Software and Hardware Description</u>.

Software - The purpose of the software portion of the project will be to provide a clean and user-friendly interface to the system. It will communicate with the system via Firebase, allowing the user to view the status of and send control commands to the various devices. The software will be developed using Android Studio, written in Java. The software will be dynamic, allowing the user to have a "hands-free" experience, and if desired, also have granular control over the system.

Hardware - Several electronic components, as well as sensors will be used in this project.

- Raspberry Pi 4 - Broadcom BCM2711, Quad core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5GHz. 4GB RAM, 2.4 GHz and 5.0 GHz IEEE 802.11ac wireless, Bluetooth 5.0. 2 USB 3.0 ports; 2 USB 2.0 ports. Raspberry Pi standard 40 pin GPIO header (fully backwards compatible with previous boards).

- PIR Motion sensor - allows to sense motion. It is used to detect motion of a human body within the sensor's range.It is often referred to using "PIR", "Pyroelectric", "Passive Infrared" and "IR Motion" sensors.

- RFID Sensor - RC522 RFID is a simple add-on we can connect to a Raspberry Pi to read cards. This is used to identify a person without them pressing buttons or operating switches.

- SmokeSensor - MQ2 sensor is a sensor that is sensitive to smoke as well as flammable gas. It reports smoke by the voltage outputs. The more smoke there is, the greater the voltage that it outputs.

- Servo Motor - It is used to operate a door lock or a latch that enables to remotely

lock and unlock a door or a gate.

3. Screen Flow

Landing Screen - If the user is not logged in, a login dialog appears. A "Remember me" option will be provided with the login. Once the user is logged in, or if the user selected the "remember me" option previously, the landing page will provide a general status of the system's sensors and devices, show the username of the current user, and display any warning messages.
Bedroom - displays temperature, humidity and lights status. Control to turn ON/OFF the lights.
Living Room - shows the status of the main door, lights and control over the readings of the motion sensor.
Kitchen - displays the smoke alarm status and lights controls.
Settings - From the settings page, the user will be able to log out of the current session, add user RFID access, view current known RFID users, change the font size of the app, change notification settings including time and temp ranges, and toggle dark mode.

4. Satisfying read/write to database requirement

The sensor readings obtained by the raspberry pi will be written to the database, which will make the data accessible for the phone app to read. The primary key of the database will be the timestamps associated with each sensor reading sent. The writing portion will be only for control, which includes boolean values for the lights and door, and integer values for the light intensity and colour values.

Project Scope

The Smart Home Automation system will provide a user access via login credentials to sensor data and device control in the home.

The user will be able to view the temperature, humidity, motion, and smoke sensor readings from the landing page. The individual room pages will provide controls for the lights in each room along with sensor readings for that specified room. The living room will also include control for the front door via the servo motor.

The kitchen smoke sensor will trigger a notification when smoke is detected. The temperature sensor in the bedroom will trigger a notification when the temperature rises above or below a threshold range. The motion sensor in the living room will trigger a notification if there is motion within a user specified time range.

The user account on the phone app will be considered the "Admin" account. Unknown RFID events will prompt the admin on the phone app to add as a permanent new or temporary guest user, or dismiss (disallow) access to the home. This access will only allow physical access and not access to the sensor data or control of the system.

Project will be complete when the phone app can successfully send commands to the lights and servo motor, the raspberry pi can successfully read the status of the sensors, the raspberry pi can successfully write the data to the database, the phone app can read the data from the database, and the phone app has a clean and easy to use UI and the screens are all functioning as described earlier in this document.

<u>Theme</u>
Provide access to data from and control to smart home devices
<u>Epics</u>
- Provided control for devices
- Trigger notifications

<u>Stories</u>
- Provided control for devices
    - Lights on/off
    - Turning sensors on/off
    - Renaming device names

- Trigger notifications
    - Smoke alarm notification
    - Overheating notification if temp goes above a certain degrees
    - Motion sensor notification if lights were turned off automatically

Team Contract

CENG-322 TEAM PROJECT

Team Name: The Automators

Project Name: Smart Home Automation Project

Please negotiate, sign, scan and include as the first section in your Deliverable 1.

Team Member Names (Please Print)	Signatures	Student ID
Project Leader: Naveen Kumar	*Naveen*	N01355935
Gaganajeet Singh Hanny	*(signature)*	N01350705
James Ricci	*@Singh*	N00411900
Sukhmanpreet Kaur	*Sukhmanpreet Kaur*	N01355022

Please note that if cheating is discovered in a group assignment each member will be charged with a cheating offense regardless of their involvement in the offense. Each member will receive the appropriate sanction based on their individual academic honesty history.

Please ensure that you understand the importance of academic honesty. Each member of the group is responsible to ensure the academic integrity of all of the submitted work, not just their own part. Placing your name on a submission indicates that you take responsibility for its content.

Team Contract CENG-322

For further information read Academic Honesty Policy on https://humber.ca/legal-and-risk-management/policies/search-by-students.html.

By signing this contract, we acknowledge having read the Humber Academic Honesty Policy as per the link below.

https://academic-regulations.humber.ca/2018-2019/17.0-ACADEMIC-MISCONDUCT

Responsibilities of the Project Leader include:

- Assigning tasks to other team members, including self, in a fair and equitable manner.
- Ensuring work is completed with accuracy, completeness and timeliness.
- Planning for task completion to ensure timelines are met
- Any other duties as deemed necessary for project completion

What we will do if . . .

Scenario	Accepted initials	We agree to do the following
Team member does not deliver component on time due to severe illness or extreme personal problem	JR GH NK SK	a) Team absorbs workload temporarily <u>X</u> b) Team seeks advice from professor __ c) Team shifts target date if possible __ d) Other:
Team member cannot deliver component on time due to lack of ability	JR GH NK	a) Team reassigns component __ b) Team helps member <u>X</u>

	SK	c) Team member must ask professor for reference material __ d) Other:
Team member does not deliver component on time due to lack of effort	JR GH NK SK	a) Team absorbs workload __ b) Team "fires" team member by not permitting his/her name on submission <u>X</u> c) Other:
Team member does not attend team meeting	JR GH NK SK	a) Team proceeds without him/her and will assign work to the absent member <u>X</u> b) Team doesn't proceed and records team member's absence __ c) Team proceeds for that meeting but "fires" member after __ occurrences __

An unforeseen constraint occurs after the deliverable has been allocated and	JR GH NK	a) Team meets and reschedules deliverable __ b) Team will cope with constraint <u>X</u>

scheduled (a surprise test or assignment)	SK	c) Other:
Team cannot achieve consensus leaving one member feeling "railroaded", "ignored", or "frustrated" with a decision which affects all parties	JR GH NK SK	a) Team agrees to abide by majority vote <u>X</u> b) Team flips coin __ c) Other:
Team members do not share expectations for grade desired	JR GH NK SK	a) Team will elect one person as "standards-bearer" who has the right to ask that work be redone __ b) Team votes on each submission's quality <u>X</u> c) Team will ask for individual marking and will identify sections by author __ d) Other:

Team member behaves in an unprofessional manner by being rude or uncooperative	JR GH NK SK	a) Team attempts to resolve the issue by airing the problem at team meeting <u>X</u> b) Team requests meeting with professor to problem-solve __ c) Team ignores behaviour __

		d) Team agrees to avoid use of all vocabulary inappropriate to the business setting __
Team member assumes or requests that his/her name be signed to a submission but has not participated in production of the deliverable	JR G.H NK SK	a) Team agrees that this is cheating and is unethical __ b) Friends are friends and should help each other __ c) Team will submit with signature but will advise professor who will take action <u>X</u>

There is a dominant team member who is content to make all decisions on the team's behalf leaving some team members feeling like subordinates rather than equal members	JR GH NK SK	a) Team will actively solicit consensus on all decisions which affect project direction by asking for each member's decision and vote <u>X</u> b) Team will express subordination feelings and attempt to resolve issue __ c) Other:
Team has a member who refuses to participate in decision making but complains to others that s/he wasn't consulted	JR GH NK SK	a) Team forces decision sharing by routinely voting on all issues <u>X</u> b) Team routinely checks with each other about perceived roles __ c) Team discusses the matter at team meeting __