Android based Smart Home (SS7g-14)

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Project overview:
Prior to the 20th Century, home automation was a concept found only in science fiction. However, with the advent of information technology it has now become a reality. While the products of today continue to experiment with this technology, its true potential remains unexploited.

The main problem with current products are that they use a large number of communication protocols and many require intrusive installations which is quite cumbersome. Moreover, they are quite expensive causing users to be hesitant to fully embrace this technology.

Objective:
In light of the current problems, we decided to make a product which will be a simple to use, easy to install and universal. Our device is an L-shaped box which readily sticks besides any switch and is capable of remotely turning it on/off. This allows users to have universal control over their switches from just one device running a single communication protocol. The device contains a microcontroller with an embedded Bluetooth chip which can be remotely signaled through the user’s smartphone to physically flip the switch on/off.

Methodology:
This project consisted of three modules:
- **Embedded System:** Microcontroller receives commands from the user through an established BLE connection.
- **Mechanical System:** The servomotor in conjunction with the linear guide flips the switch with the help of a mechanical arm.
- **Android Application:** The application running on the user’s smartphone allows the user to control the device.

The diagram below illustrates our entire system including the different sensors and ICs we have used.

Results:
The device runs on a smart power saving mode which supplies 3V to the servo only when needed using an interrupt. In addition to that, it is capable of being controlled through doors and up to a distance of 30 meters through BLE to turn on or off the switch. The device is encased in an elegant 3D printed box and readily works with regular switches due to its smart mechanical design. The mechanical system is tested under constant scrutiny to ensure durability and achieve maximum efficiency. It also consists of a temperature sensor which provides accurate readings of indoor temperature to the user.

Conclusion:
The end product has met most of our initial goals which were determined at the start of the project: to be simple to use, easy to install and universal. We believe we are one step closer to developing a universal smart switch. However, the device has room for more improvement and in the future we hope reduce the form factor of the product and also reduce the cost of the device.