

**Program: ESE 4009**

**INSTRUCTOR:** Prof**.** Mike Aleshams

# Group# 10

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**FINAL DRAFT**

**Project Title:**

# IOT based Letterbox

**Description of the latest similar system:**

The communication by letter was a one of the most preferred way before the presence of electronic mail but still in present days people use to send and receive documents like some legal documents form government and offices in same way. Specially government use this way of communication for providing and receiving information.

But because of the busy schedule some people don’t have time to check the letterbox regularly. For the people living in apartments, they have to go down from their floor to letterbox area just for checking if there any letter or not, sometimes because of the bad weather situation people avoid to get out of the home and if the person is out of the town. To solve this problem, in market we already have the electronic letterbox, which only blink led (mounted outside the box) when a latter is received in it. There is some pair of sensors, op amplifier and a NOR gate in the letterbox which detects the motion of letterbox and turn off the led when sensor detects objects.

**Limitations of the latest similar system:**

1. **Limited approach of information –** this letterbox has electronic circuit but it is not that much helpful because it is limited to only one led blink facility, now to see if the Led is on or off you have to go close the letterbox or if you are at work you have no idea about new letter until you saw the led. There is also a possibility that if led is faulty or damaged then people have no other options left. For people working out of the town can still miss their important documents.
2. **No data of quantity –** it does not give information about the number of letters in the box.
3. Missing **Microcontroller|** in this circuit so we cannot interface more devices with this circuit like camera, GSM etc. in short, lack of flexibility.
4. Instead of light dependent resistors we will use the Distance sensors because it can work accurately in dark area.

**Final Solution (after presentation):**

By introducing microcontroller in the present circuit, we increased the compatibility of present circuit. The distance sensors will be attached on the letter hole of the box so when a letter will be put in to box it will send the signal to beagle bone, then BBB store the data and send information to attached three devices concurrently. The cloud service, GSM service and an display mounted on the box will show the presence of letter in the box. The person will get information from all three sources at the same time. The circuit also have reset button. We can now use a segment display or Led or cloud service or GSM service or all the theses devices together.

* **Block Diagram**

POWER SUPPLY

5v, 2A

CLOUD

(Thing speak)

WIFI MODULE

802.11b/g/n

BEAGLE BONE BLACK

REV C

DISTANCE SENSORS

(HC-SR04)

4-DIGIT

7-SEGMENT DISPLAY

MOBILE PHONE

GSM MODULE

(Adafruit fona -808)

# References

*adafruit.com*. (n.d.). Retrieved from USB WiFi (802.11b/g/n) Module: https://www.adafruit.com/product/1012

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*adafruit.com*. (n.d.). Retrieved from Adafruit FONA 808 - Mini Cellular GSM + GPS Breakout: https://www.adafruit.com/product/2542

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*elctronicshub.org*. (n.d.). Retrieved from Electronic Letter Box Project Circuit: https://www.electronicshub.org/electronic-letter-box-project-circuit/

Iqbal, H. (n.d.). *appuals*. Retrieved from Making An Electronic Letter Box Circuit: https://appuals.com/making-an-electronic-letter-box-circuit/

*technoman117.* (2013, april 30). Retrieved from Using a Beaglebone with an HC-SR04 sonar: https://teknoman117.wordpress.com/2013/04/30/using-a-beaglebone-with-an-hc-sr04-sonar/

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* **Features**
* The real data will be recorded in a microcontroller, will give information about the time and date of delivery.
* Less number of wires because of UART (Rx, Tx) interface between GSM module and microcontroller.
* The use of cooperative scheduling because of the multitasking for all three modules.
* It is easy to connect, remove and replace Wi-fi module because of the USB interface of BBB and Wi-fi module.
* Use of low-cost 4 digit 7- segment display connected to BBB by simple I2C interface, providing information about the number of letters in the box.
* Ultrasonic sensors will provide more accuracy in dark area and will get power supply from Beagle bone black.
* The all the modules and microcontroller work with same, dc 5v, up to 2amp so only one supply is required.
* By taking the advantage of no moving parts in this project the direct power supply from main power socket is used rather than batteries.
* Thing Speak cloud service is user-friendly to use and has all the required resources for beagle bone and sensors.
* All equipment will be enclosed in box, so less handling and less damage.
* Website is accessible at remote location if GSM service is not available and vice -versa.
* The number of free pins will be available on Microcontroller for adding more devices like Camera, buzzer etc.
* **Hardware and Software Requirement**
* Adafruit Wi Fi Module 802.11b/g/n
* Adafruit GSM Module (Adafruit FONA 808 - Mini Cellular GSM + GPS Breakout)
* Beagle Bone Black REV C
* Thing speak an IOT platform
* 2 Distance Sensors (Ultrasonic HC-SR04)
* 4 Digit 7-Segment display (Adafruit 4-digit 7segment w/i2c backpack)
* Jumper wires
* Main Power supply of 5V,2A (no use of batteries for this stationary project)
* 2 Bread Boards
* Linux operating System
* Eclipse IDE
* C programming language
* Easy EDA software for schematics
* GCC compiler for C language.

MILESTONE

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| **WEEK** | **TASKS** | **DATE** | **STUDENT** |
| **1.** | Finalizing hardware requirements & getting hardware. | 19 June – 25 June | Surjeet Singh |
| **2.** | Preparing platform and designing the schematics on software and testing | 25 June – 2 July | Bindu |
| **3.** | Interfacing of Wi-fi, Cloud service and ultrasonic sensors with beagle bone.  Preparing c codes for all modules. | 2 July- 16 July | Surjeet Singh |
| **4.** | Display interfacing with beagle bone black, writing codes for it. | 16 July -30 July | Bindu |
| **5.** | Interfacing GSM module with beagle bone and preparing C codes for it. | 30 July -13 Aug | Surjeet Singh |
| **6.** | Designing PCB and finalizing project Report. | 13 Aug – 21 Aug | Bindu |

**Instructor’s Remarks:**

# References

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