WEB CAM SECURITY USING BEAGLE BONE BLACK

FINAL PROJECT

Vivekananda Reddy Sappidi
G01380849
vsappidi@gmu.edu

Mahaveera Sai Teja Veluduti
G10354854
mveludut@gmu.edu

PROJECT OVERVIEW

- Introduction:. Doorbell cameras, often known as video doorbells or security door cameras, are becoming increasingly popular as an essential component of modern security systems. These gadgets offer real-time surveillance and remote access.
- GPIO (General Purpose Input/Output) Pins: The GPIO (General Purpose Input/Output) pins provide control of hardware components and sensors, making it versatile for webcam integration.
- Using the Beagle Bone Black in webcam security applications can give numerous benefits:
- Authentication: It can impose strict authentication rules to prevent unauthorized webcam access.
- Encryption: To safeguard video feeds and preserve data privacy, data transmission might be encrypted.

HARDWARE COMPONENTS:

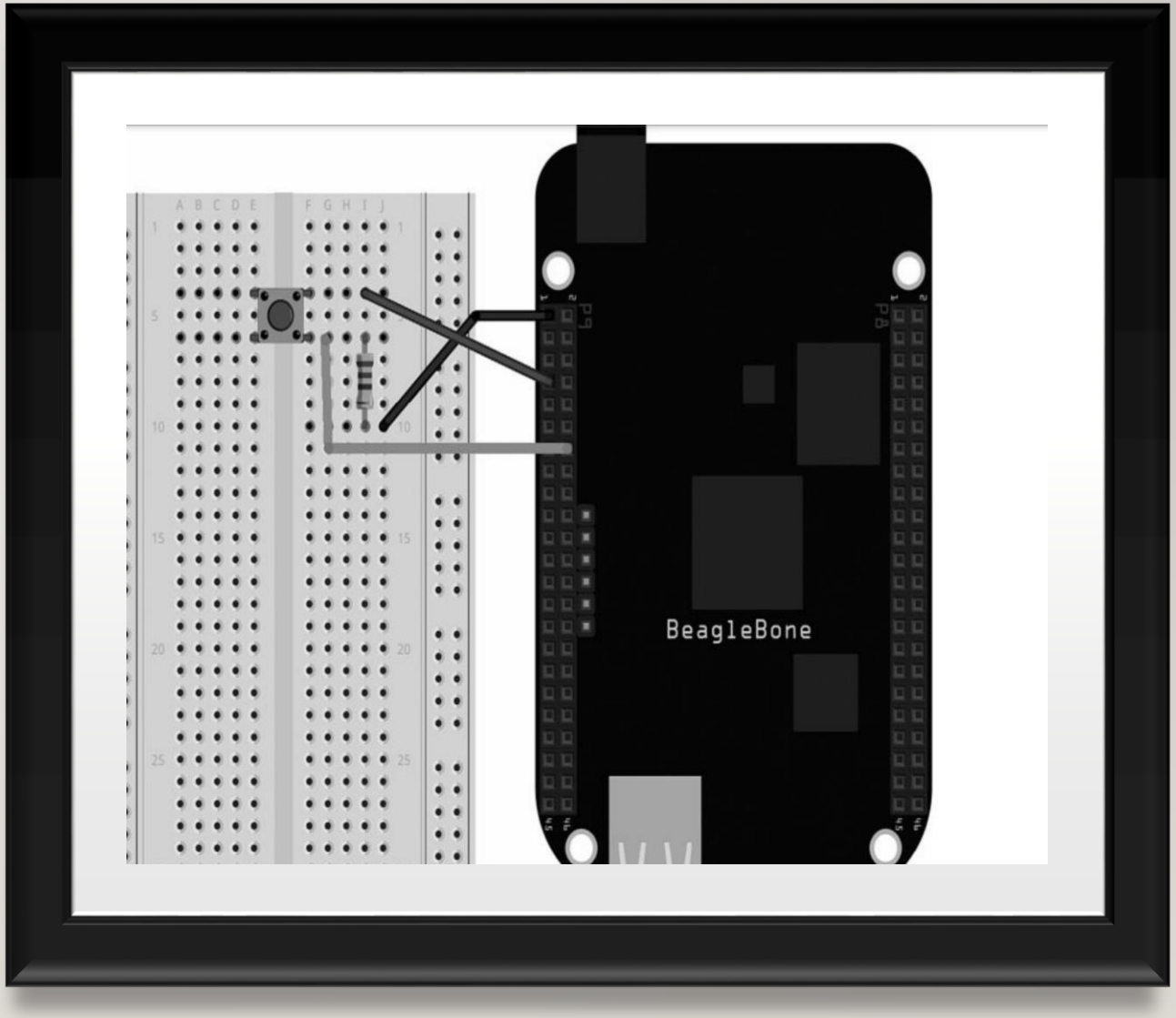
Description
Beagle Bone Black
Resistor
Wires
Switch
Web Camera

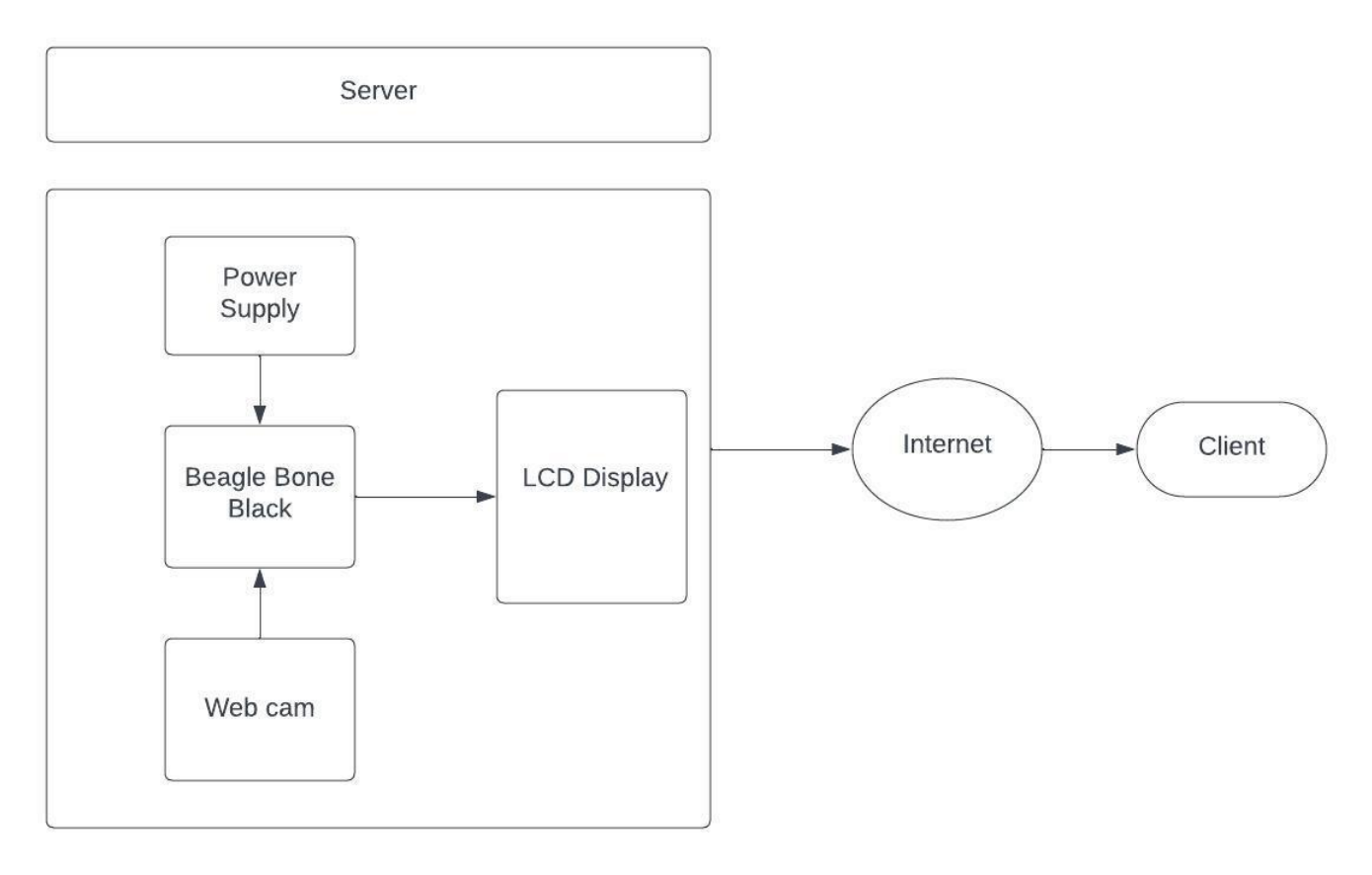
HARDWARE COMPONENTS

- In this project we use the webcam as the security cam feed so we can capture an image.
- This webcam is powered directly from the Beagle Bone Black. Also, you can power the web cam through a USB Hub.
- Always Connect USB devices before Booting the Beagle Bone Black.
- The layout diagram is given as follows:

HARDWARE DESIGN SETUP:

- In this picture we can say that a switch has been connected to the bread board
- There is a resistor connected to the bread board
- We can see the wires connecting from the board to the beagle bone black.





PLANNED SOFTWARE ARCHITECTURE:

- Firstly, we need to install API.
- In order to use the web camera we need a streaming program that handles the video output for us.

PLANNED SOFTWARE INSTALLATION

- We are going to use mjpg – streamer, which takes JPG images from Linux compatible webcams.
- Streams them as an M-JPEG by using an HTTP Web browser. This is to view the stream over the Internet or local network . To install mjpg streamer , type the following onto command line.
- Git clone git://github.com/makerspaceuk/
- mjpg-streamer.git
- Cd mjpg-streamer
- Make
- Sudo make install

PLANNED SOFTWARE INSTALLATION:

- Now that we have installed the mjpg-streamer, lets run a quick test just to make sure everything is working as it should be. In the same one , type the following:
- Sudo ./mjpg_streamer –I ‘./input_uvc.so”.
- -o “./output_http.so –p 8090 –w ./www”
- Depending on the webcam, the program will output the messages in the Terminal Window for configuration. Go to browser and type http://192.168.7.2:8090.
- We will see the mjpg-streamer web page with a view from our webcam.

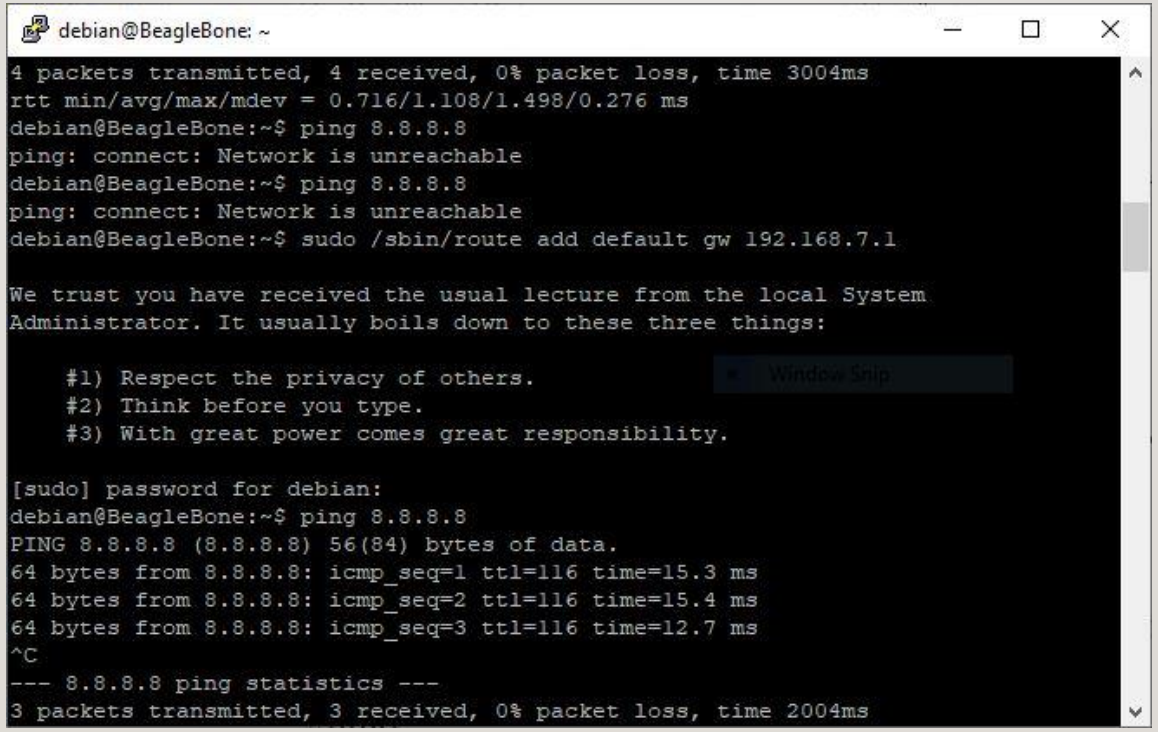
OPERATING SYSTEMS;

- Sensors: This may include USB Webcams, switch (acts as a vibrator). Using a switch is mandatory because it uses as vibrator and web cam will turn on.
- Security Features: Implementing Security features, including user authentication, data encryption. User authentication only allows authorized access.
- Remote Access: Determining the mechanisms remote access and control, whether through web interfaces, mobile apps, or both. It is flexible for the customers.
- Operating Systems: We have selected the "OS" that the beagle bone black will run. Which include Linux. Linux distributions are well suited for embedded systems due to compatibility and tools .

ACTUAL PROJECT INSTALLATION:

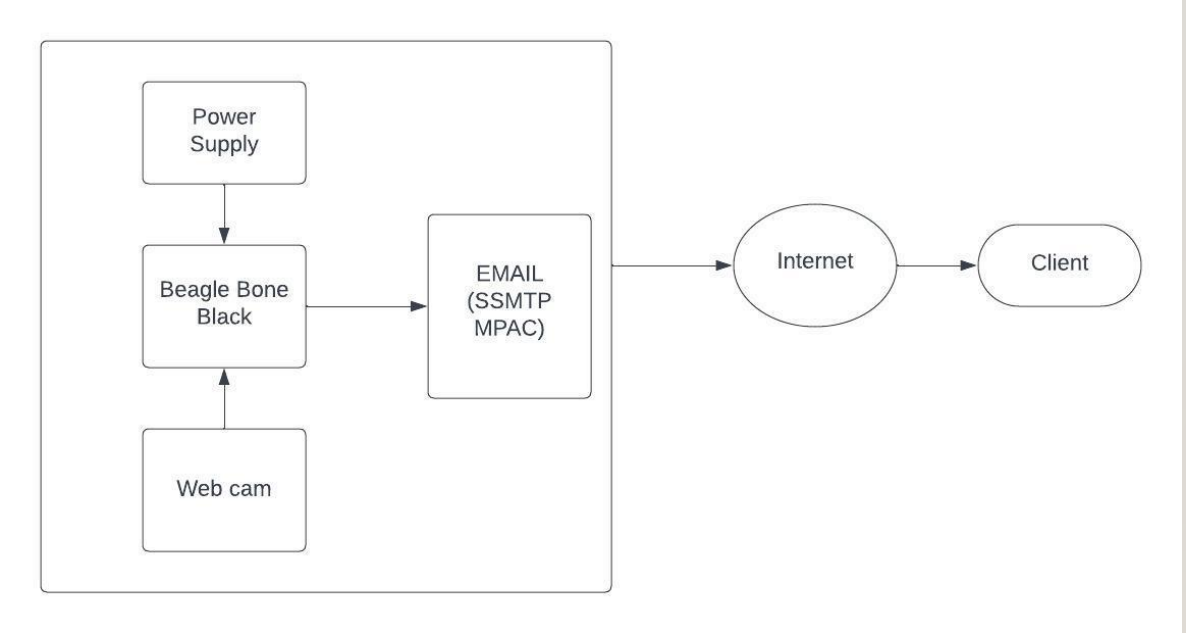
- Connect BeagleBoneBlack to Internet on Windows OS Via USB Port
- We need share the internet network of our computer with beagle bone black . once the network is shared we need to set the default gateway by using below command.
- Below link helps to setup up the internet on the beagle bone black.
- https://www.digikey.com/en/maker/blogs/how-to-connect-a-beaglebone-black-to-the-internet-using-usb
- debian@BeagleBone:~$ ping 8.8.8.8
- ping: connect: Network is unreachable
- debian@BeagleBone:~$ sudo /sbin/route add default gw 192.168.7.1

ACTUAL PROJECT INSTALLATION:

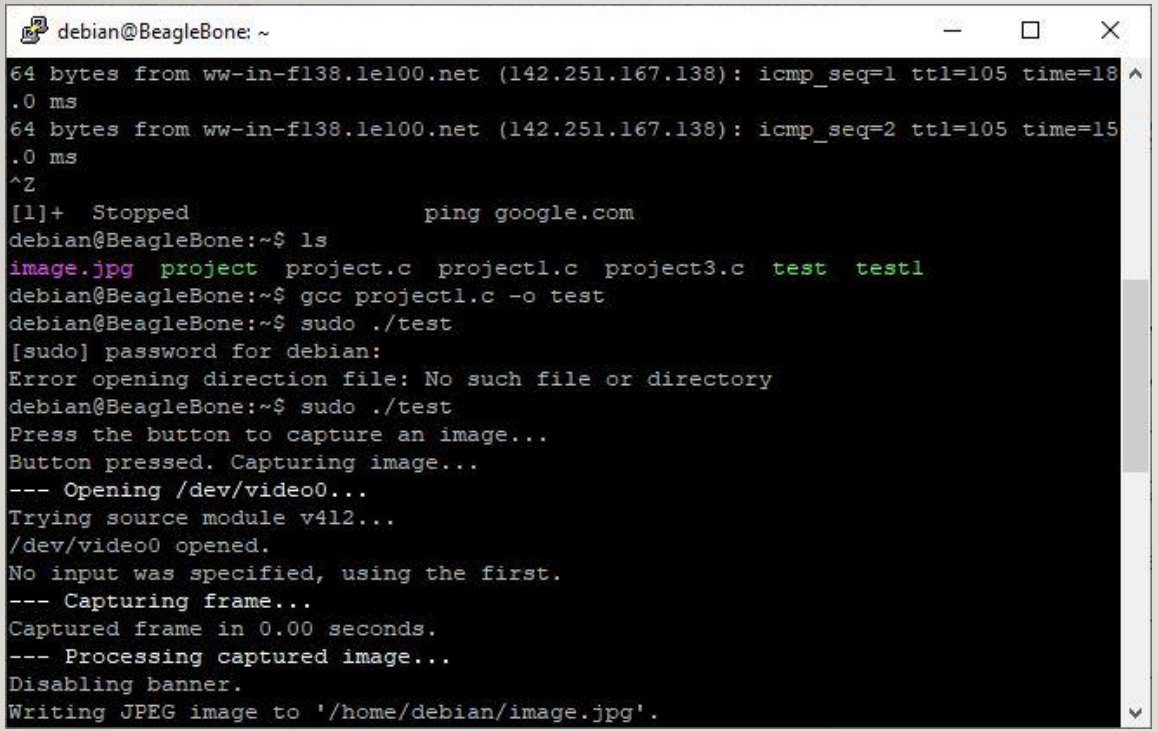


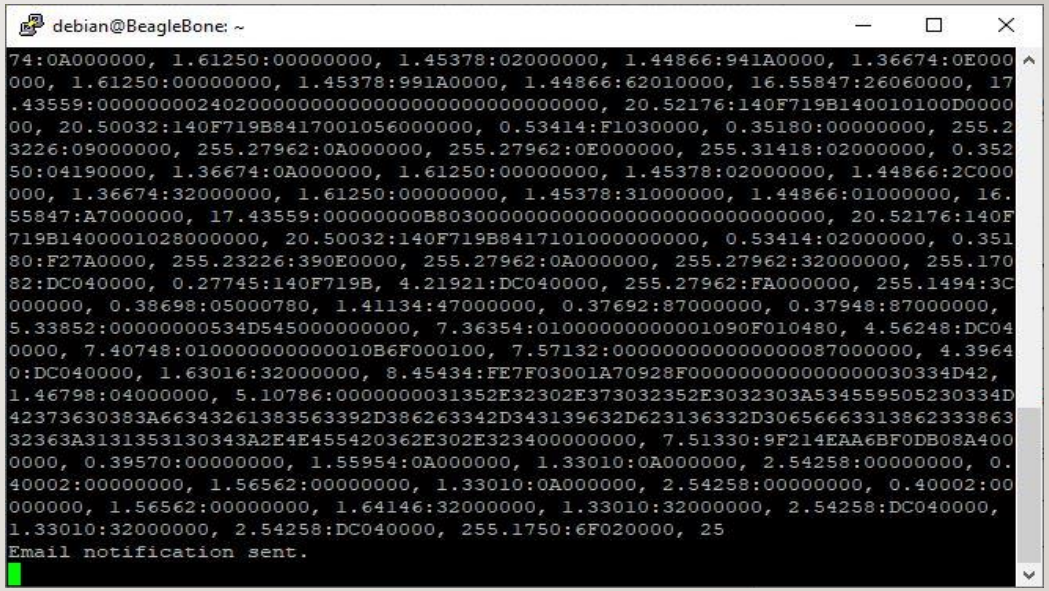
OS /ARCHITECTURE

- debian@BeagleBone:~$ uname -a
  - Linux BeagleBone 5.10.168-ti-rt72 #1bullseye SMP PREEMPT Sat Sep 30 03:37:21 UTC 2023 armv7l GNU/Linux

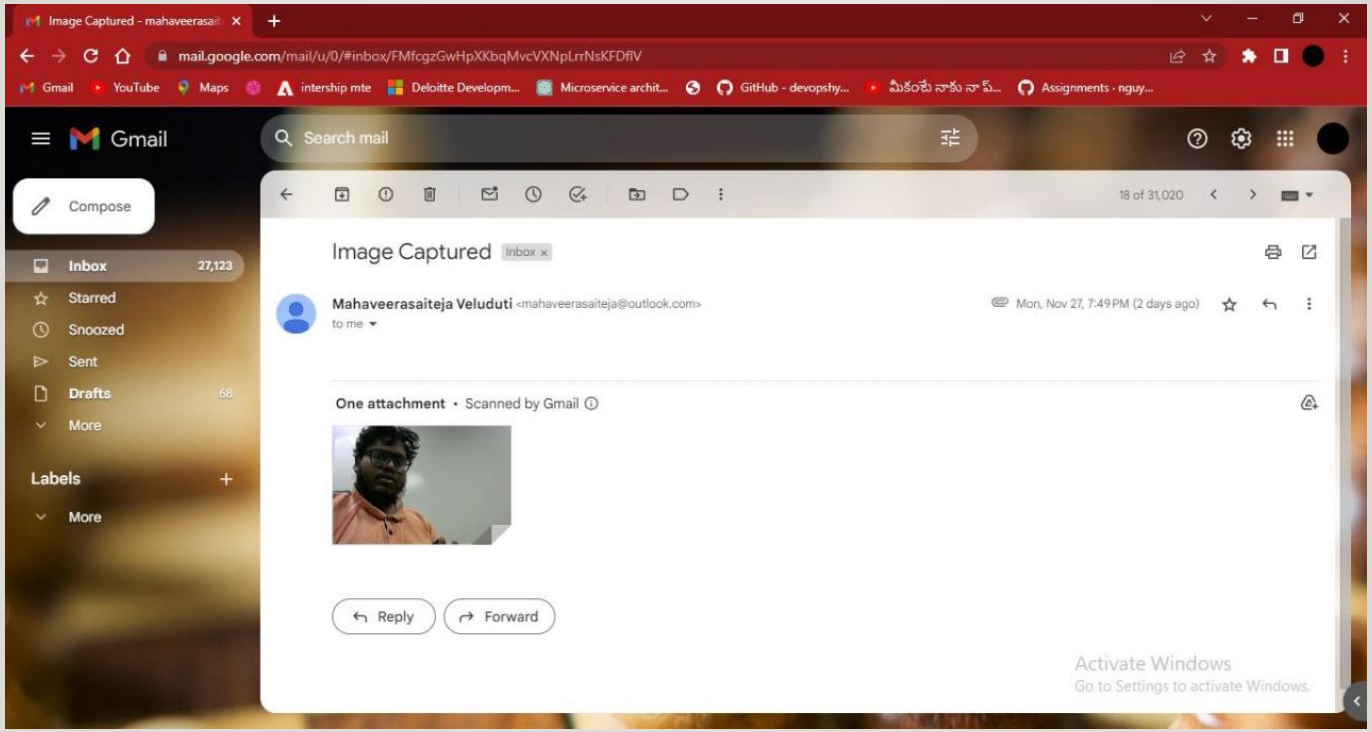


RESULTS


debian@BeagleBone: ~
64 bytes from ww-in-f138.1e100.net (142.251.167.138): icmp_seq=1 ttl=105 time=18
.0 ms
64 bytes from ww-in-f138.1e100.net (142.251.167.138): icmp_seq=2 ttl=105 time=15
.0 ms
^Z
[1]+ Stopped ping google.com
debian@BeagleBone:~$ ls
image.jpg project project.c project1.c project3.c test test1
debian@BeagleBone:~$ gcc project1.c -o test
debian@BeagleBone:~$ sudo ./test
[sudo] password for debian:
Error opening direction file: No such file or directory
debian@BeagleBone:~$ sudo ./test
Press the button to capture an image...
Button pressed. Capturing image...
--- Opening /dev/video0...
Trying source module v4l2...
/dev/video0 opened.
No input was specified, using the first.
--- Capturing frame...
Captured frame in 0.00 seconds.
--- Processing captured image...
Disabling banner.
Writing JPEG image to '/home/debian/image.jpg'.


debian@BeagleBone: ~
74:0A000000, 1.61250:00000000, 1.45378:02000000, 1.44866:941A0000, 1.36674:0E000
000, 1.61250:00000000, 1.45378:991A0000, 1.44866:62010000, 16.55847:26060000, 17
.43559:00000002402000000000000000000000000000000000, 20.52176:140F719B140010100D0000
00, 20.50032:140F719B8417001056000000, 0.53414:F1030000, 0.35180:00000000, 255.2
3226:09000000, 255.27962:0A000000, 255.27962:0E000000, 255.31418:02000000, 0.352
50:04190000, 1.36674:0A000000, 1.61250:00000000, 1.45378:02000000, 1.44866:2C000
000, 1.36674:32000000, 1.61250:00000000, 1.45378:31000000, 1.44866:01000000, 16.
55847:A7000000, 17.43559:00000000B80300000000000000000000000000000000, 20.52176:140F
719B1400001028000000, 20.50032:140F719B8417101000000000, 0.53414:02000000, 0.351
80:F27A0000, 255.23226:390E0000, 255.27962:0A000000, 255.27962:32000000, 255.170
82:DC040000, 0.27745:140F719B, 4.21921:DC040000, 255.27962:FA000000, 255.1494:3C
000000, 0.38698:05000780, 1.41134:47000000, 0.37692:87000000, 0.37948:87000000,
5.33852:000000000534D545000000000, 7.36354:0100000000000001090F010480, 4.56248:DC04
0000, 7.40748:010000000000010B6F000100, 7.57132:00000000000000000087000000, 4.3964
0:DC040000, 1.63016:32000000, 8.45434:FE7F03001A70928F00000000000000000030334D42,
1.46798:04000000, 5.10786:0000000031352E32302E373032352E3032303A5345595052303 34D
42373630383A6634326138356339 2D386263342D343139632D623136332D306566633138623338 63
32363A3131353130343A2E4E455420362E302E323400000000, 7.51330:9F214EAA6BF0DB08A400
0000, 0.39570:00000000, 1.55954:0A000000, 1.33010:0A000000, 2.54258:00000000, 0.
40002:00000000, 1.56562:00000000, 1.33010:0A000000, 2.54258:00000000, 0.40002:00
000000, 1.56562:00000000, 1.64146:32000000, 1.33010:32000000, 2.54258:DC040000,
1.33010:32000000, 2.54258:DC040000, 255.1750:6F020000, 25
Email notification sent.

RESULTS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YouTube
Maps
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Deloitte Developm...
Microservice archit...
GitHub - devopshy...
Assignments - nguy...
Search mail
Compose
Inbox 27,123
Starred
Snoozed
Sent
Drafts 68
More
Labels
More
18 of 31,020
Image Captured
Inbox
Mahaveerasaiteja Veluduti <mahaveerasaiteja@outlook.com>
to me
Mon, Nov 27, 7:49 PM (2 days ago)
One attachment • Scanned by Gmail
Reply
Forward
Activate Windows
Go to Settings to activate Windows.

CONCLUSION

- Creating a security using a BeagleBone Black and a webcam involves integrating hardware and software components to monitor and respond to events at a door. Below is a sample conclusion for a project like this:
- In conclusion, the development of a Web Cam Security using the BeagleBone Black has resulted in a robust and efficient solution for enhancing the security of a door or entrance. The project successfully integrates a webcam with the BeagleBone Black, leveraging its GPIO capabilities and the flexibility of the Linux environment.