Capstone Project

Story

This System is designed to check Whether the room temperature has crossed threshold or not, if the room temperature has crossed threshold then it send you an alert on telegram And if the room temperature is between the specified limit for more than 2 Minutes (Here it is 2 minutes, you can change the time limit) it sends you an alert on telergram And it also sends an alert if there is any anomaly like if the temperature suddenly increases or decreases.

Things used in this project

Hardware components

	Connecting wires x 3 (Male to Female)	× 1	
	Temperature Sensor	× 1	
	Bolt IoT Bolt WiFi Module	× 1	
	USB-A to Mini-USB Cable	× 1	

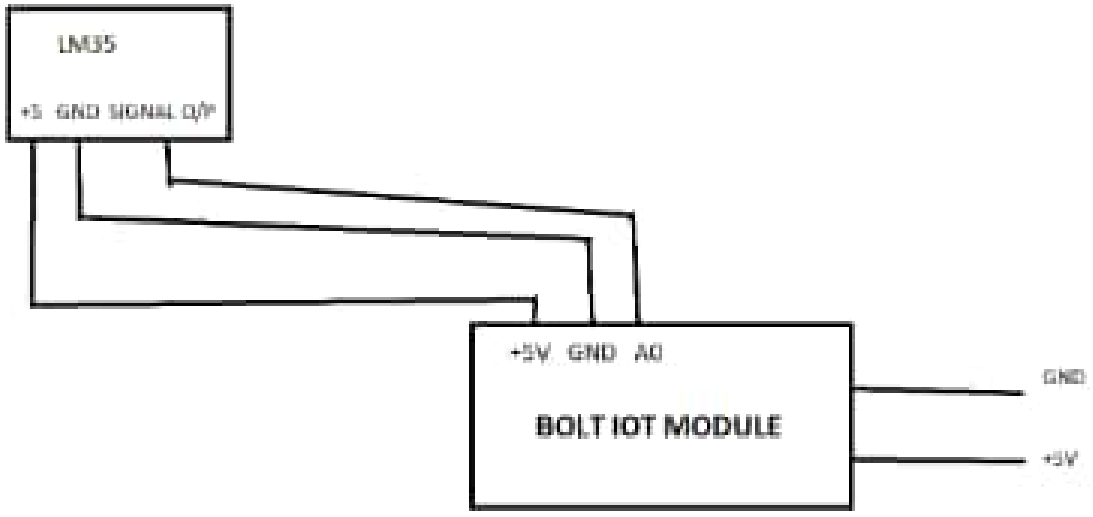
Software apps and online services

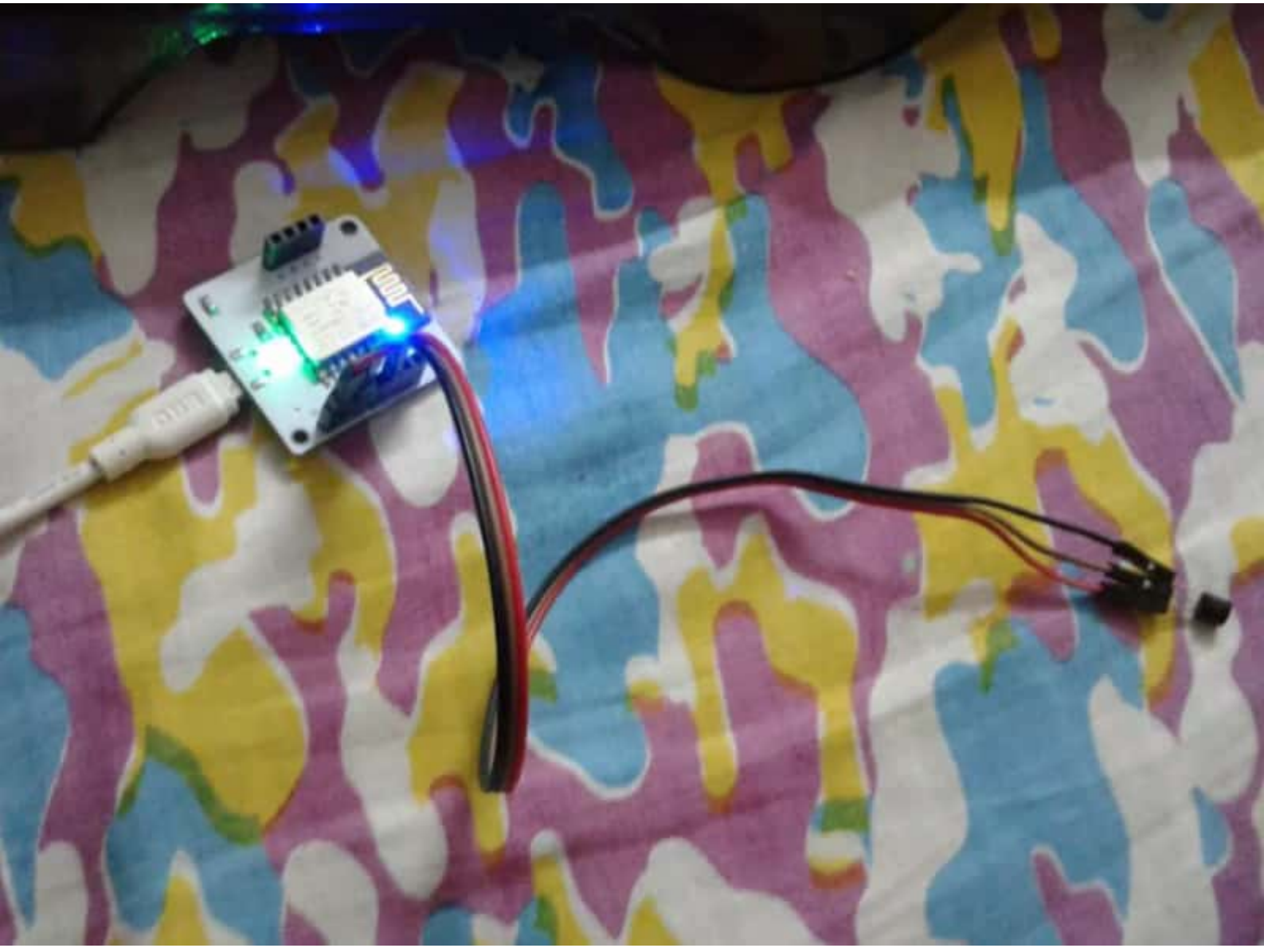
	Snappy Ubuntu Core	
	Android Telegram	

Schematics

CIRCUIT DIAGRAM

BASIC BLOCK DIAGRAM OF THE PROJECT





Flow of the Code :

- The system does Z-Score Analysis on the first Ten values taken by the Sensor
- This Z-values are used to check if there is anomaly or not
- After this, the system starts printing values and if it crosses threshold then it send an alert on telegram
- The timer is started from the start of the execution process
- After Two minutes, if the temperature is between the specified range then it send you alert on telegram
- During the execution if the temperature suddenly increases or decreases then it is an anomaly and hence it should be detected, for this the system sends an alert on telegram to notify about it

Code

Select code file or paste code below

```
"""Configurations for telegram_alert.py"""
bolt_api_key = "This is your Bolt Cloud API Key"
device_id = "This is the device ID and will be similar to BOLTXXXX where XXXX is some numbers"
telegram_chat_id = "This is the channel ID of the created Telegram channel. Paste after @ "
telegram_bot_id = "# This is the bot ID of the created Telegram Bot. Paste after bot "
threshold = "Threshold beyond which the alert should be sent "
FRAME_SIZE = 10 #You can set the FRAME_SIZE to 10, and the MUL_FACTOR to 6 for now
MUL_FACTOR = 6
```

Code

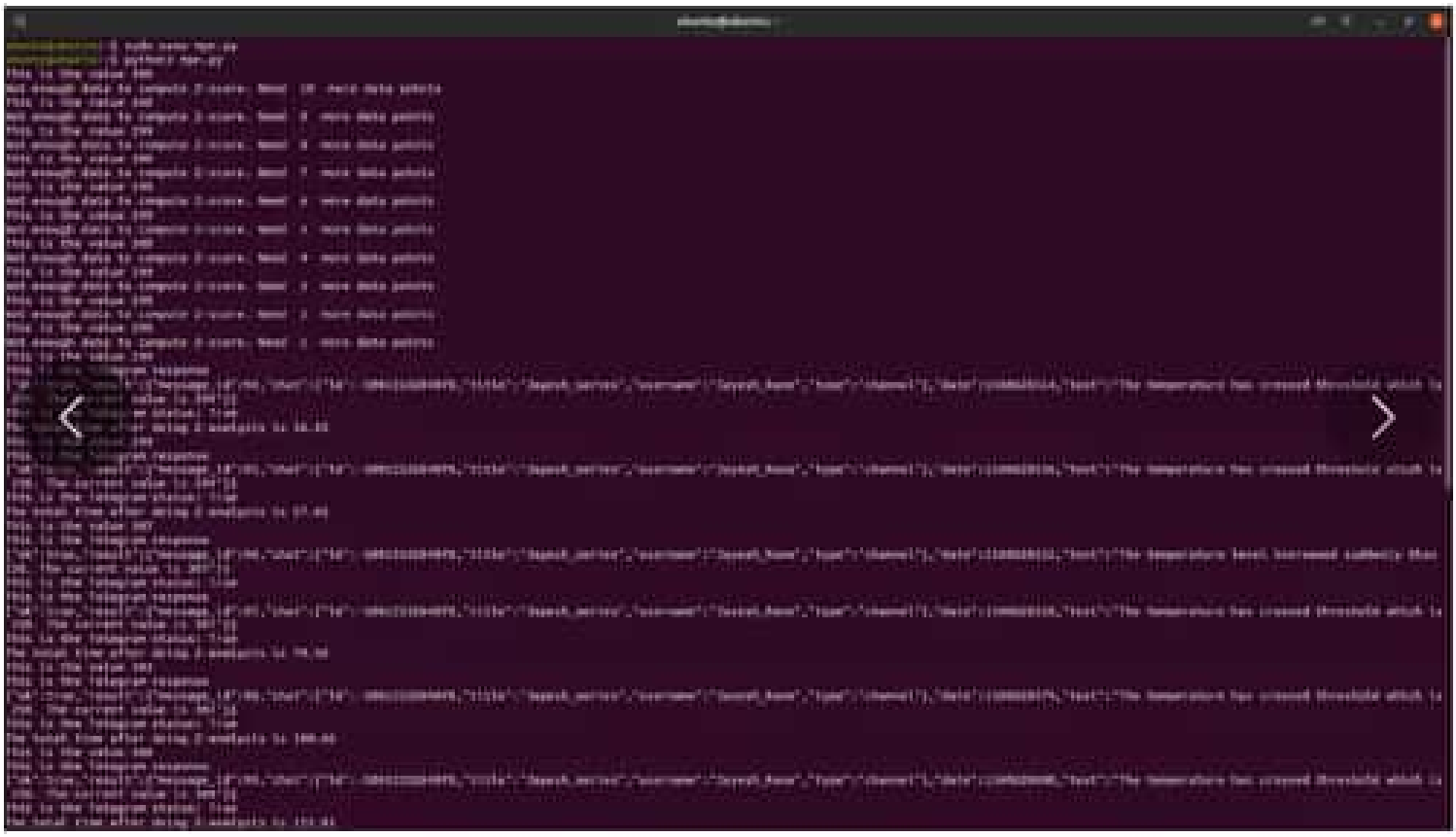
Select code file or paste code below

```
import conf1, json, time, math, statistics,requests
from boltiot import Sms, Bolt
def compute_bounds(history_data,frame_size,factor):
    if len(history_data)<frame_size :
        return None

    if len(history_data)>frame_size :
        del history_data[0:len(history_data)-frame_size]
    Mn=statistics.mean(history_data)
    Variance=0
    for data in history_data :
        Variance += math.pow((data-Mn),2)
    Zn = factor * math.sqrt(Variance / frame_size)
    High_bound = history_data[frame_size-1]+Zn
    Low_bound = history_data[frame_size-1]-Zn
    return [High_bound,Low_bound]

minimum_limit =200
maximum_limit =250
#mybolt = Bolt(conf.API_KEY, conf.DEVICE_ID)
mybolt = Bolt(conf1.bolt_api_key, conf1.device_id)

#sms = Sms(conf.SSID, conf.AUTH_TOKEN, conf.TO_NUMBER, conf
.FROM_NUMBER)

history_data=[]
startTime = time.time()    # get the first lap's start time
lastTime = startTime
lapNum = 1
'''
def get_sensor_value_from_pin(pin):
    """Returns the sensor value. Returns -999 if request
fails"""
    try:
        response = mybolt.analogRead(pin)
        data = json.loads(response)
        if data["success"] != 1:
            print("Request not successfull")
            print("This is the response->", data)
            return -999
        sensor_value = int(data["value"])
        return sensor_value
    except Exception as e:
        print("Something went wrong when returning the sensor
value")
        print(e)
        return -999
'''

def send_telegram_message(message):
    """Sends message via Telegram"""
    url = "https://api.telegram.org/" + conf1.telegram_bot_id +
"/sendMessage"
    data = {
        "chat_id": conf1.telegram_chat_id,
        "text": message
    }
    try:
        response = requests.request(
            "GET",
            url,
            params=data
        )
        print("This is the Telegram response")
```

```
            params=data
        )
        print("This is the Telegram response")
        print(response.text)
        telegram_data = json.loads(response.text)
        return telegram_data["ok"]
    except Exception as e:
        print("An error occurred in sending the alert message via Telegram")
        print(e)
        return False


while True:
   # print ("Reading sensor value")
    response = mybolt.analogRead('A0')
    data = json.loads(response)
   # print("Sensor value is: " + str(data['value']))
    if data['success'] != 1:
        print("There was an error while retriving the data.")
        print("This is the error:"+data['value'])
        time.sleep(10)
        continue

    print ("This is the value "+data['value'])
    sensor_value=0
    try:
        sensor_value = int(data['value'])
    except e:
        print("There was an error while parsing the response: ",e)
        continue

    bound = compute_bounds(history_data,conf.FRAME_SIZE,conf.MUL_FACTOR)
    if not bound:
        required_data_count=conf.FRAME_SIZE-len(history_data)
        print("Not enough data to compute Z-score. Need ",required_data_count," more data points")
        history_data.append(int(data['value']))
        time.sleep(2)
        continue

    try:
        if sensor_value > bound[0] :
            # print ("The temperature level increased suddenly. Sending an SMS.")
            message = "The temperature level increased suddenly than " + str(conf1.threshold) + \
                      ". The current value is " +str(sensor_value)
            telegram_status = send_telegram_message(message)
            print("This is the Telegram status:", telegram_status)

     # response = sms.send_sms("Someone has opened the fridge")
            # print("This is the response ",response)
        elif sensor_value < bound[1]:
            # print ("The temperature level decreased suddenly. Sending an SMS.")
             message = "The temperature level decreased suddenly than " + str(conf1.threshold) + \
                      ". The current value is " +str(sensor_value)
             telegram_status = send_telegram_message(message)
             print("This is the Telegram status:", telegram_status)

            #response = sms.send_sms("Someone has closed the fridge")
            #print("This is the response ",response)
        history_data.append(sensor_value);
    except Exception as e:
```

```
115                 #print("This is the response ",response)
116             history_data.append(sensor_value);
117         except Exception as e:
118             print ("Error",e)
119         time.sleep(5)
120 
121         try:
122             sensor_value = int(data['value'])
123             if sensor_value > maximum_limit or sensor_value <
    minimum_limit:
124                 #print("The temperature has crossed threshold.Sending
    an SMS")
125                 message = "The temperature has crossed threshold
    which is " + str(conf1.threshold) + \
126                         ". The current value is "+str(sensor_value)
127                 telegram_status = send_telegram_message(message)
128                 print("This is the Telegram status:", telegram_statu
    s)
129 
130          # print("Making request to Twilio to send a SMS")
131                 # response = sms.send_sms("The Current temperature
    sensor value is " +str(sensor_value))
132                 #print("Response received from Twilio is: " + str
    (response))
133                 #print("Status of SMS at Twilio is :" + str(response
    .status))
134             else:
135                 print("The temperature has not crossed threshold")
136         except Exception as e:
137             print ("Error occured: Below are the details")
138             print (e)
139         time.sleep(5)
140 
141         try:
142             lapTime = round(time.time() - lastTime, 2)
143             totalTime = round(time.time() - startTime, 2)
144 
145             lapNum += 1
146             lastTime = time.time() # reset the last lap time
147             ans=round(totalTime,2)
148             print("The total time after doing Z-analysis is",ans)
149             if ans>=120 and sensor_value>=200 and sensor_value<=300:
150               #print("The temperature is between 200 to 300 for more
    than 2 minutes,Warning!.Sending an SMS")
151                 message = "The temperature is between 200 to 300 for
    more than 2 minutes,Warning!.Sending an SMS."  "The current
    value is "+str(sensor_value)
152                 telegram_status = send_telegram_message(message)
153                 print("This is the Telegram status:", telegram_status)
154 
155                 #response = sms.send_sms("The Current temperature
    sensor value is " +str(sensor_value))
156                 #print("Response received from Twilio is: " + str
    (response))
157                 #print("Status of SMS at Twilio is :" + str(response
    .status))
158             elif ans>=120:
159               # print("The temperature is not between 200 and 300
    after 2 minutes")
160                 message = "The temperature is not between 200 and 300
    after 2 minutes.Sending an SMS."  " The current value is "+str
    (sensor_value)
161                 telegram_status = send_telegram_message(message)
162                 print("This is the Telegram status:", telegram_status)
163 
164 
165         except KeyboardInterrupt:
166             print('\nDone.')
167         time.sleep(10)
```

OUTPUT:

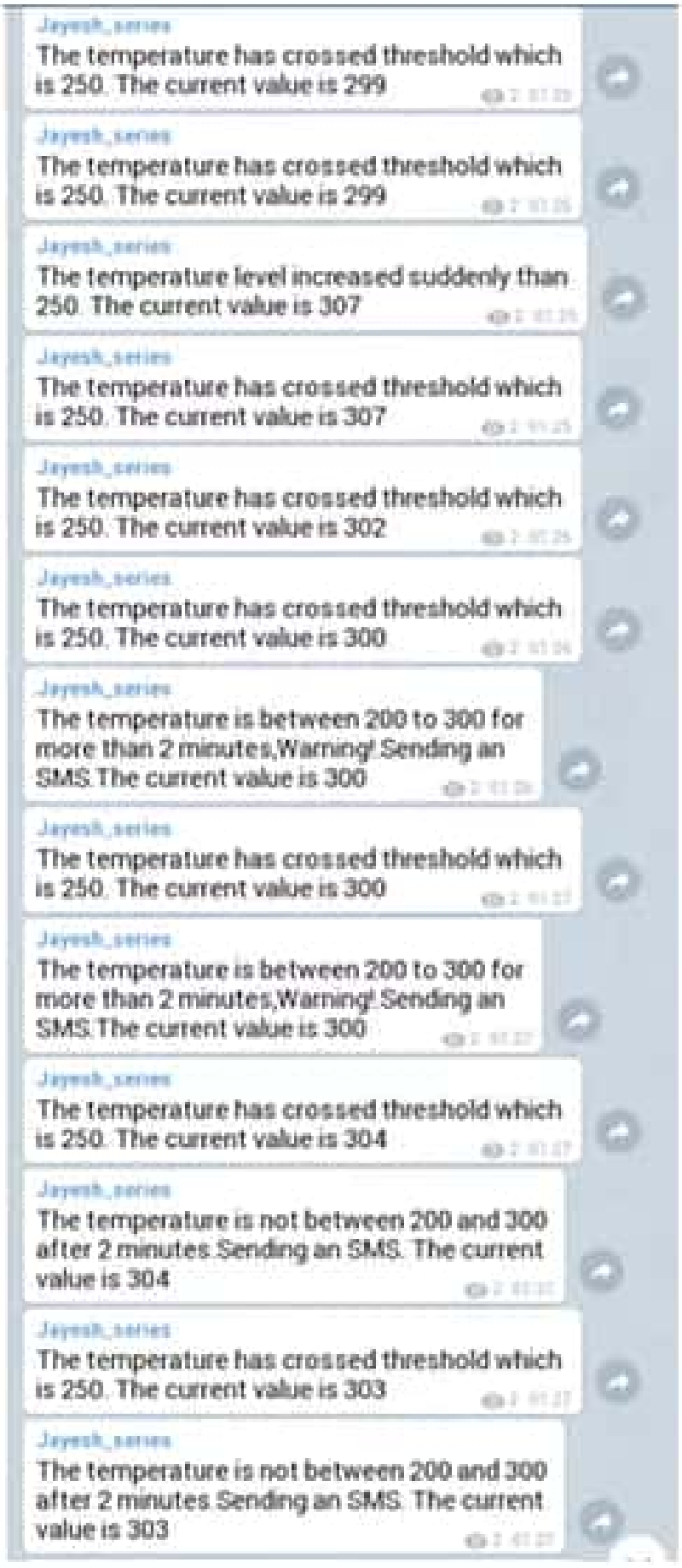


1 / 2 • This is the output the system gives after executing it

```
ubuntu@ubuntu:~$ sudo nano mpn.py
ubuntu@ubuntu:~$ python3 mpn.py
This is the value 300
Not enough data to compute Z-score. Need  10  more data points
This is the value 300
Not enough data to compute Z-score. Need  9  more data points
This is the value 299
Not enough data to compute Z-score. Need  8  more data points
This is the value 300
Not enough data to compute Z-score. Need  7  more data points
This is the value 299
Not enough data to compute Z-score. Need  6  more data points
This is the value 299
Not enough data to compute Z-score. Need  5  more data points
This is the value 300
Not enough data to compute Z-score. Need  4  more data points
This is the value 299
Not enough data to compute Z-score. Need  3  more data points
This is the value 299
Not enough data to compute Z-score. Need  2  more data points
This is the value 299
Not enough data to compute Z-score. Need  1  more data points
This is the value 299
This is the Telegram response
{"ok":true,"result":{"message_id":94,"chat":{"id":-1001213284078,"title":"Jayesh_series","username":"Jayesh_Rane","type":"channel"},"date":1560628514,"text":"The temperature has crossed threshold which is
 250. The current value is 299"}}
This is the Telegram status: True
The total time after doing Z-analysis is 36.15
This is the value 299
This is the Telegram response
{"ok":true,"result":{"message_id":95,"chat":{"id":-1001213284078,"title":"Jayesh_series","username":"Jayesh_Rane","type":"channel"},"date":1560628536,"text":"The temperature has crossed threshold which is
 250. The current value is 299"}}
This is the Telegram status: True
The total time after doing Z-analysis is 57.61
This is the value 307
This is the Telegram response
{"ok":true,"result":{"message_id":96,"chat":{"id":-1001213284078,"title":"Jayesh_series","username":"Jayesh_Rane","type":"channel"},"date":1560628552,"text":"The temperature level increased suddenly than
250. The current value is 307"}}
This is the Telegram status: True
This is the Telegram response
{"ok":true,"result":{"message_id":97,"chat":{"id":-1001213284078,"title":"Jayesh_series","username":"Jayesh_Rane","type":"channel"},"date":1560628558,"text":"The temperature has crossed threshold which is
 250. The current value is 307"}}
This is the Telegram status: True
The total time after doing Z-analysis is 79.56
This is the value 302
This is the Telegram response
{"ok":true,"result":{"message_id":98,"chat":{"id":-1001213284078,"title":"Jayesh_series","username":"Jayesh_Rane","type":"channel"},"date":1560628579,"text":"The temperature has crossed threshold which is
 250. The current value is 302"}}
This is the Telegram status: True
The total time after doing Z-analysis is 100.66
This is the value 300
This is the Telegram response
{"ok":true,"result":{"message_id":99,"chat":{"id":-1001213284078,"title":"Jayesh_series","username":"Jayesh_Rane","type":"channel"},"date":1560628600,"text":"The temperature has crossed threshold which is
 250. The current value is 300"}}
This is the Telegram status: True
The total time after doing Z-analysis is 121.81
```

```
This is the Telegram status: True
The total time after doing Z-analysis is 79.56
This is the value 302
This is the Telegram response
{"ok":true,"result":{"message_id":98,"chat":{"id":-1001213284078,"title":"Jayesh_series","username":"Jayesh_Rane","type":"channel"},"date":1560628579,"text":"The temperature has crossed threshold which is
 250. The current value is 302"}}
This is the Telegram status: True
The total time after doing Z-analysis is 100.66
This is the value 300
This is the Telegram response
{"ok":true,"result":{"message_id":99,"chat":{"id":-1001213284078,"title":"Jayesh_series","username":"Jayesh_Rane","type":"channel"},"date":1560628600,"text":"The temperature has crossed threshold which is
 250. The current value is 300"}}
This is the Telegram status: True
The total time after doing Z-analysis is 121.81
This is the Telegram response
{"ok":true,"result":{"message_id":100,"chat":{"id":-1001213284078,"title":"Jayesh_series","username":"Jayesh_Rane","type":"channel"},"date":1560628606,"text":"The temperature is between 200 to 300 for mor
e than 2 minutes,Warning!.Sending an SMS.The current value is 300"}}
This is the Telegram status: True
This is the value 300
This is the Telegram response
{"ok":true,"result":{"message_id":101,"chat":{"id":-1001213284078,"title":"Jayesh_series","username":"Jayesh_Rane","type":"channel"},"date":1560628622,"text":"The temperature has crossed threshold which i
s 250. The current value is 300"}}
This is the Telegram status: True
The total time after doing Z-analysis is 143.71
This is the Telegram response
{"ok":true,"result":{"message_id":102,"chat":{"id":-1001213284078,"title":"Jayesh_series","username":"Jayesh_Rane","type":"channel"},"date":1560628628,"text":"The temperature is between 200 to 300 for mor
e than 2 minutes,Warning!.Sending an SMS.The current value is 300"}}
This is the Telegram status: True
This is the value 304
This is the Telegram response
{"ok":true,"result":{"message_id":103,"chat":{"id":-1001213284078,"title":"Jayesh_series","username":"Jayesh_Rane","type":"channel"},"date":1560628644,"text":"The temperature has crossed threshold which i
s 250. The current value is 304"}}
This is the Telegram status: True
The total time after doing Z-analysis is 165.71
This is the Telegram response
{"ok":true,"result":{"message_id":104,"chat":{"id":-1001213284078,"title":"Jayesh_series","username":"Jayesh_Rane","type":"channel"},"date":1560628650,"text":"The temperature is not between 200 and 300 af
ter 2 minutes.Sending an SMS. The current value is 304"}}
This is the Telegram status: True
This is the value 303
This is the Telegram response
{"ok":true,"result":{"message_id":105,"chat":{"id":-1001213284078,"title":"Jayesh_series","username":"Jayesh_Rane","type":"channel"},"date":1560628666,"text":"The temperature has crossed threshold which i
s 250. The current value is 303"}}
This is the Telegram status: True
The total time after doing Z-analysis is 187.72
This is the Telegram response
{"ok":true,"result":{"message_id":106,"chat":{"id":-1001213284078,"title":"Jayesh_series","username":"Jayesh_Rane","type":"channel"},"date":1560628672,"text":"The temperature is not between 200 and 300 af
ter 2 minutes.Sending an SMS. The current value is 303"}}
This is the Telegram status: True
This is the value 300
This is the Telegram response
{"ok":true,"result":{"message_id":107,"chat":{"id":-1001213284078,"title":"Jayesh_series","username":"Jayesh_Rane","type":"channel"},"date":1560628688,"text":"The temperature has crossed threshold which i
s 250. The current value is 300"}}
This is the Telegram status: True
^Z
[26]+  Stopped                 python3 mpn.py
ubuntu@ubuntu:~$
```

Telegram Output :



Telegram Output for all kinds of the conditions