

DESIGN OF SMART HOME SECURITY SURVEILLANCE SYSTEM USING GSM

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Abstract: This paper depicts how to control the home appliances like lights, fan, and refrigerator etc and detection of abnormal activities like theft identification by using PIR sensor. If any human enters inside the home when the owner is not in the house the PIR sensor sends the signal to controller to enable camera. Camera gets enabled and captures the image and sends it to controller which is raspberry pi (ARM11). The controller attaches the captured image and sends it to the user and alternately through GSM module, SMS alert can be sent to the user mobile. PIC16F877A microcontroller is used in this. The home appliances which are connected to the controller through relays can be turned ON and OFF by sending the commands from user mobile. By this from anywhere we can control the loads and save the electricity. If in case there is any fire occurs, there is a fire sensor which detects the fire if it's over the threshold (normal) value, it sends that information to user to take appropriate action. The result shows that from the security surveillance system it is easy to control and reliability and easy to access from anywhere with GSM network. Here GSM module is used to communicate with the user when in anytime the sensors sense the fault which is much convenient to alert to the user. It consumes less power, process is fast, less effort and easy to control the devices.

Keywords: GSM module, Sensors, Raspberry pi, PIC microcontroller, Loads.

I. INTRODUCTION

The smart home facilities are common nowadays, where ever you see remote controlling, wireless controlling, web monitoring etc are common and it requires internet and costs more as compared to GSM. In this project, controlling the loads from anywhere with the use of mobile, which is to be sent by SMS i.e. AT commands from GSM network. This global system for mobile communication (GSM) is a module which sends the signal to the mobile with constant frequency to the user mobile.

The mobile network is available almost in every region so user can access loads by his preference. In the absence of owner there is a static surveillance camera which detects the unauthorized person entering into the home and user gets alert message and at a time e-mail is to be sent by attached captured images. From this user can call the police or any other prevention is done. At present, wireless technology is very convenient to use but cost more as compared to GSM system and as compared to signal range i.e. commands transferring and receiving GSM is more accurate than wireless its signal range is less than the GSM. The software code is written in mikroC PRO software for PIC and the corresponding hardware implementation is done and the results are accurate.

II. SYSTEM DESCRIPTION

In this there are two controllers first one is raspberry pi (ARM11) and PIC microcontroller (PIC16F877A). In raspberry pi the sensors like obstacle and fire is connected to the input side and to output side GSM module, Camera, PIR sensor are connected. In case of PIC microcontroller the loads are like light, fan is connected through relays, GSM module and LCD display used to see the working outputs. When sensors sense if that value is beyond threshold value it sends the signal to the raspberry pi controller. The controller receives signal and sends the command to GSM module to send the alert message to user. The user gets alert messages with respect to sensors and user has to take appropriate action.

III. HARDWARE DESCRIPTION

The block diagrams for both controllers are shown in Fig 1 and Fig 2. For the raspberry pi which requires 5V power supply, internet connection to send pictures to user E-mail, Camera which is connected to it. GSM module is connected if the controller receives any abnormal signal from respective of those sensors, it transmits the signal to pass alert message to user so, it will send those alert messages to the user.

If the PIR sensor sense any abnormal activities like unknown human enters at that time it gives the signal to controller to turn "ON" camera and it captures and sends that image to the user. From this method the faults can be identified.

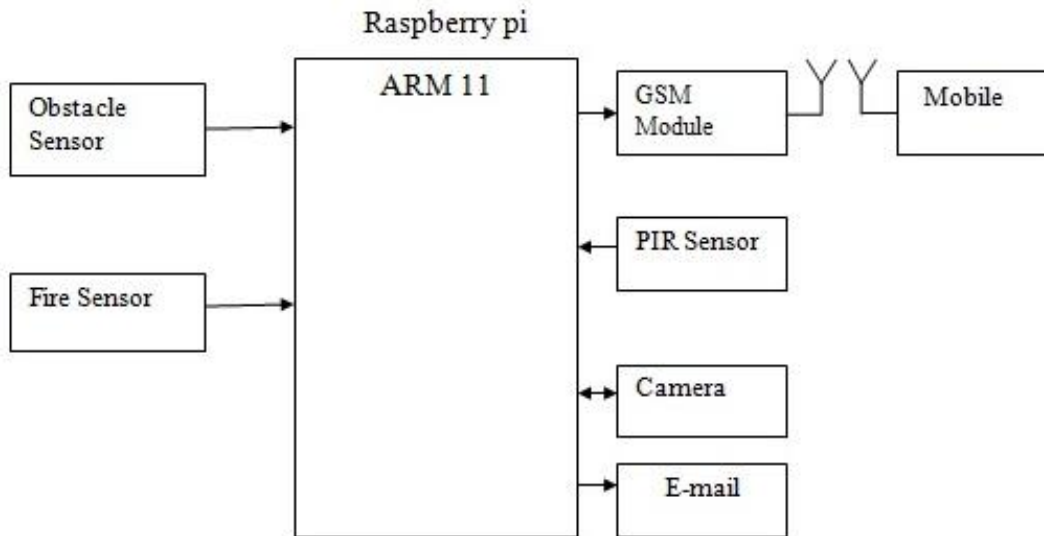


Fig1: Fault Identifications System

In case of controlling the loads, which are connected by relays has 12V and 7A capacity and for 4 loads particularly one relay is required. And the block diagram is as shown in Fig2. In GSM module SIM900 is chosen, which works under 850MHz, 900MHz, 1800MHz, 1900MHz frequencies. To get the alert message and to transmit the commands by user SIM900 is taken.

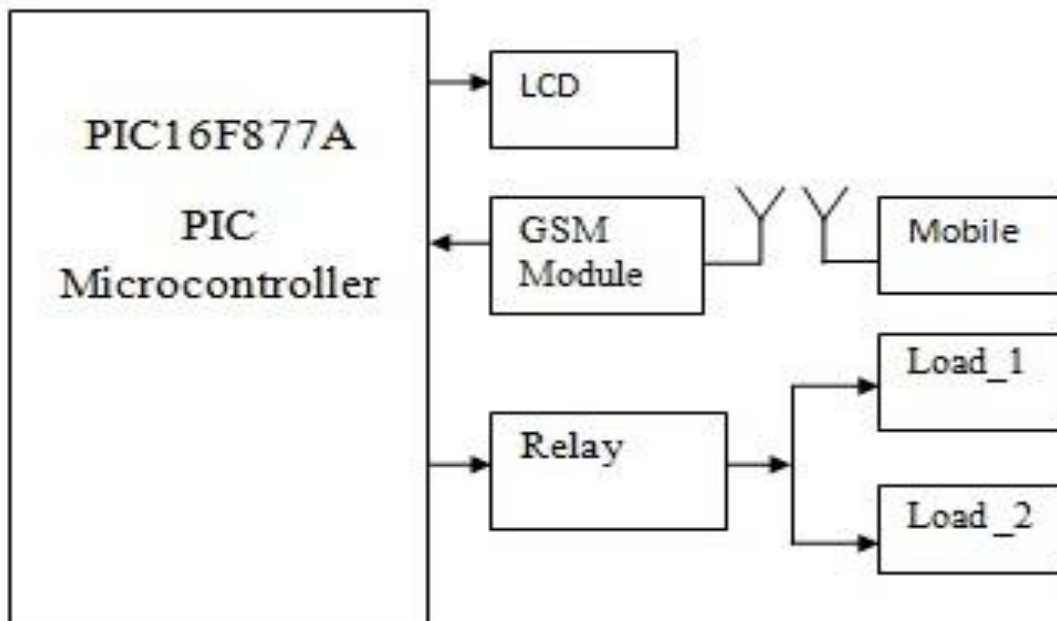


Fig2: Loads Control System

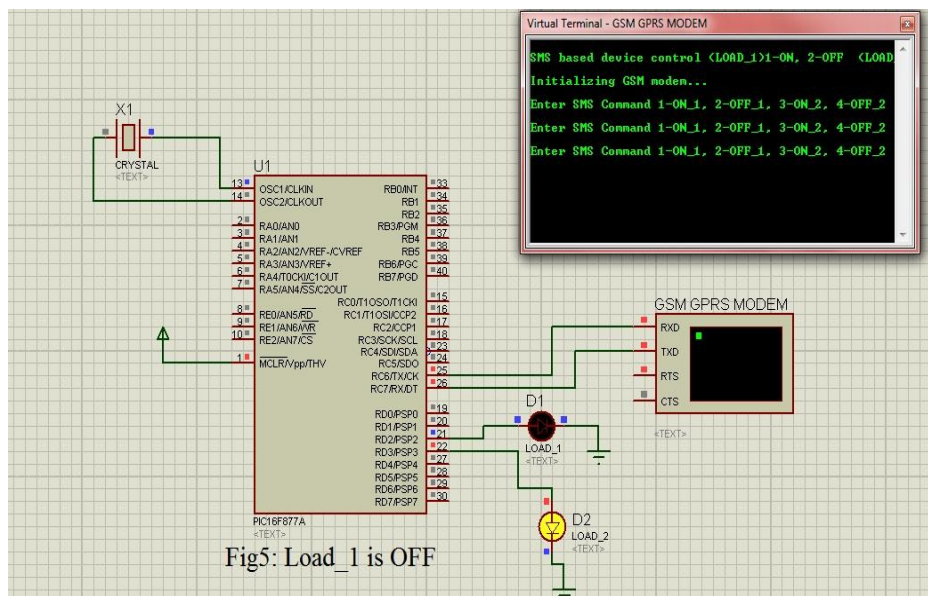
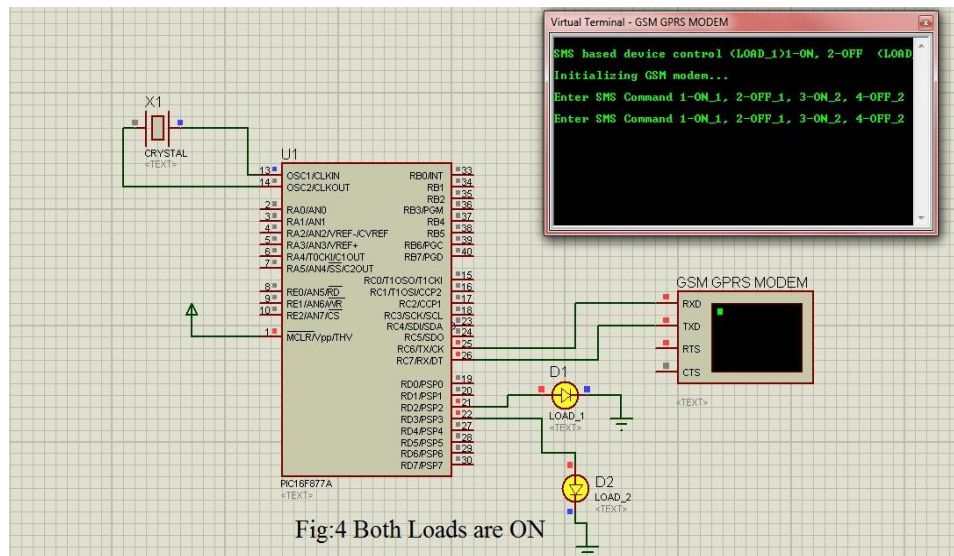
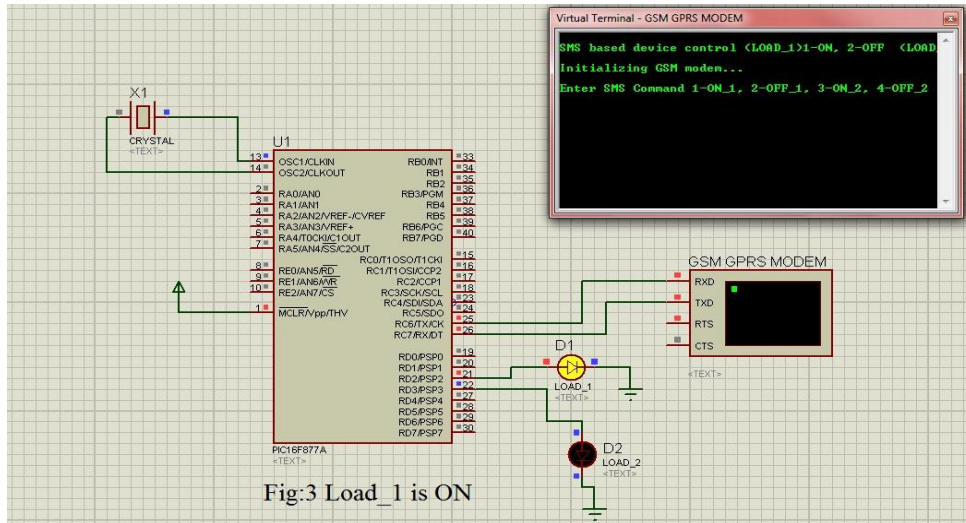
IV. SOFTWARE DESCRIPTION

Software part is designed in Proteus software7.1 includes SMS commands can be entered in virtual window. At first GSM modem is initialized and it has two loads if 1 is entered load_1 gets “ON” and if 3 is entered load_2 gets “ON”. If 2 and 4 entered load_1 and load_2 gets “OFF”. Same as it is done in practically by sending commands to loads get ON and OFF by SMS from mobile.

V. OVER ALL SIMULATION RESULTS

A. Software Simulations

Software simulation is done in Proteus7.1 software. The virtual terminal is acts like a LCD display. The results are shown below. Fig3 shows Load_1 turn “ON” by sending command like device 1 ON to the controller, same as for Load_2 turn “ON” and both loads gets turn ON as shown in Fig 5 and 4 respectively.



B. Hardware Simulations

As in the software simulation the hardware implementation has done and additional to the sensors alert texts and entry of unknown person detection results are shown below.

When only device 1 is ON and device 2 is in OFF state, the output results as shown below in Fig6.

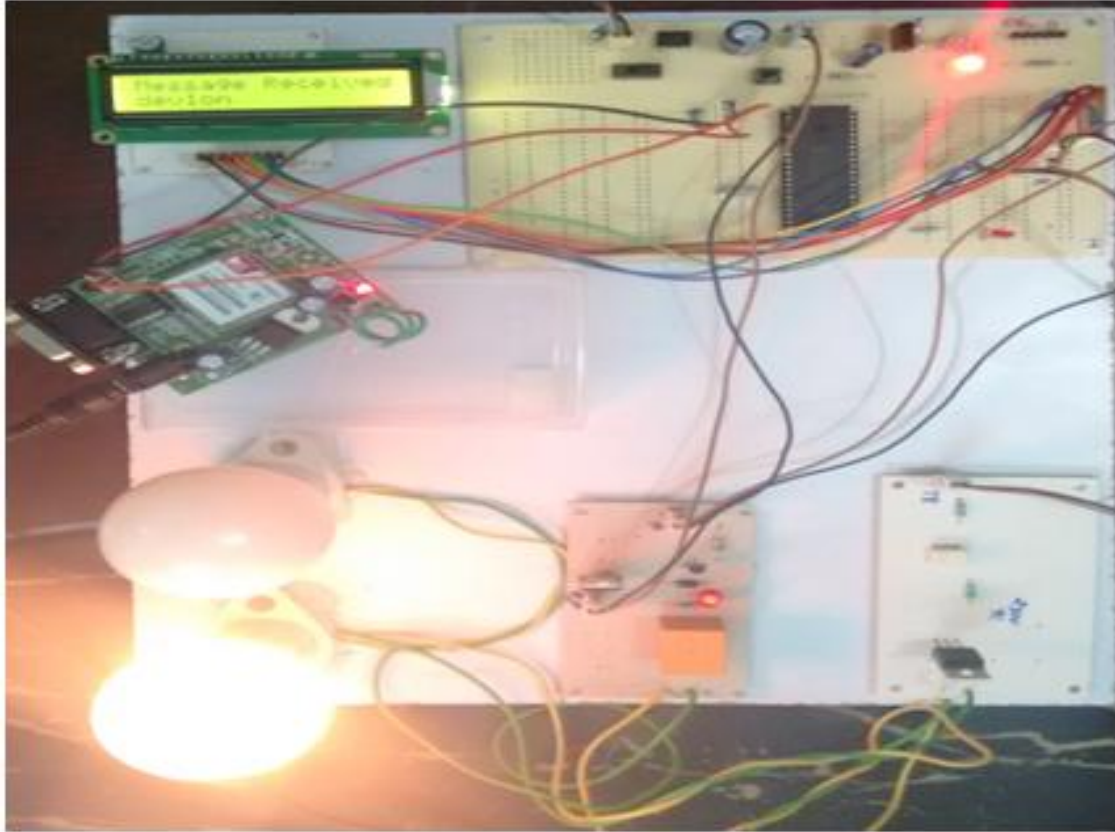


Fig6: Load_1 is ON

When only device1 is ON and device 2 is in ON state, the output results as shown below in Fig7.

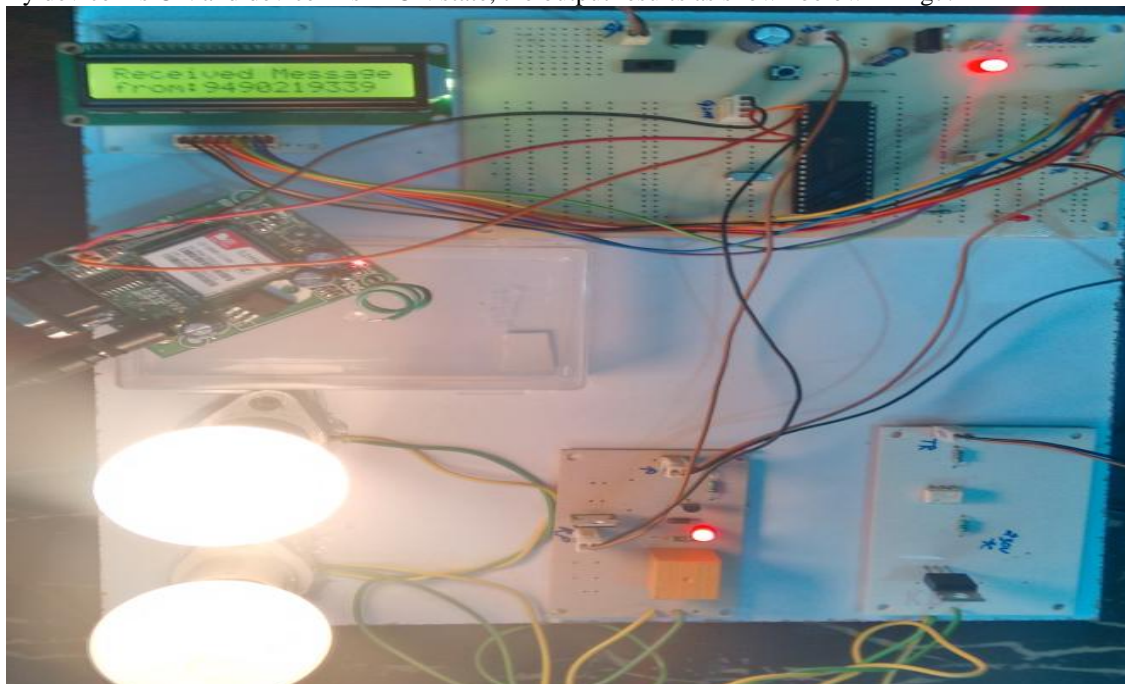


Fig7: Both Loads are ON

When only device 1 is in OFF state and device 2 is in ON state, the output result as shown below in Fig8.

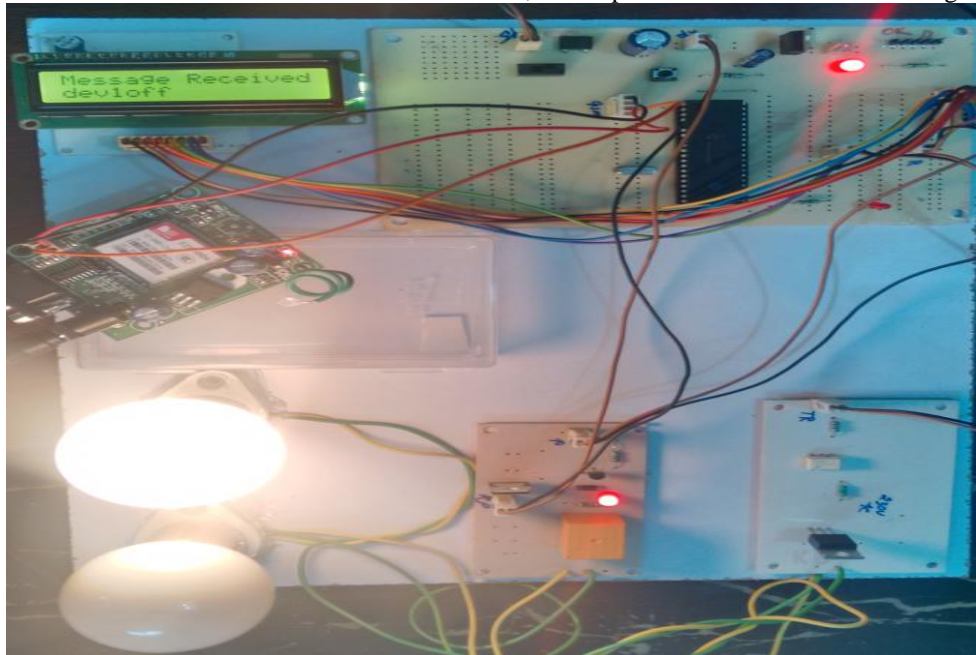


Fig8: Load_2 is ON

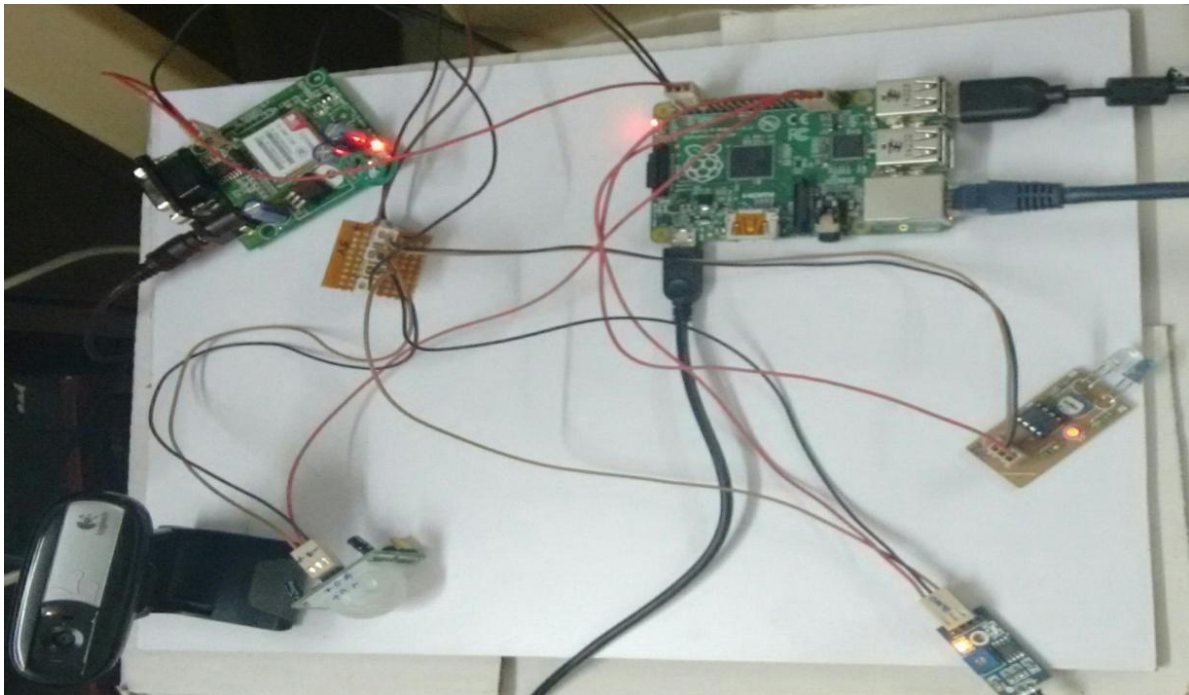


Fig9: Raspberry Pi controller with sensors

The Obstacle sensor and Fire sensor results will be received from mobile as alert SMS from GSM module. PIR sensor gets an alert message to the user and capture images sent to E-mail of user in case of any unauthorized enters in the home and the Model is as shown in Fig9.

VI. CONCLUSION

For the safety purpose, when no one in the home at that time by plugging in power supply to the socket of these two controllers it gives security to the home. Controlling home loads by GSM module which is connected to both controllers. Short Message Service (SMS) chosen due to longer distance rather than zigbee and bluetooth which are done in limited distance. It has application for detecting the thief or any unknown person in the absence of owner.

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BIOGRAPHIES

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