

A Surveillance System for Real Time Monitoring and Capturi 3G with User-Friendly

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Abstract: This paper presents a surveillance robot with real Time Monitoring and capturing with user-friendly security. The proposed system has a separate robotic section and docking section. The surveillance robot is a palm-sized triangular shaped with three wheels and a CMOS camera. The communication between the surveillance robot and PC is through WiFi. CMOS camera captures the image of the person and stored in database which can be used as backup. The captured imaged is compared with existing images to perform authentication. PIR sensor indicates when a person arrives at the doorstep. In both normal and security mode, this robotic system can be operated and navigated by user and automatically respectively. The docking system is a trapezoidal structure with an arc shaped interface which can be used for automatic recharging when the battery is too low. Experiments are performed using MATLAB software successfully which produced accurate results.

Key words: CMOS camera • Docking system • PIR sensor • Surveillance robot • Wi-Fi

NTRODUCTION

Nowadays, mobile robots are used in many fields such as home security, industrial surveillance, hospitals and in many other fields. The main reason for this evolution is that the cost of producing and designing the robot is reduced to a great extent. The robots that are designed and reduces the human burden in various way in which the home surveillance robot is widely and popularly used. To overcome lack security in the society and each and every surveillance robot has its own working methods and principles.

Literature Review: In [1] a study is made on a surveillance robot using ultrasonic sensor. These ultrasonic sensor was used in both receiver and transmitter sides. The transmission of ultrasonic waves are interrupted when a human interrupts or comes near to sensing area and it is checked by majority voting mechanism. Home automation is used to make the perfect interaction between the devices.

This enables the drastic changes in the interaction between devices and the usage of devices by an uneducated person easily [2]. Recharging system was implemented in robot using a multi-level multi sensor which determines when to charge it by connecting to the recharging station and when to disconnect from it [3]. A home Monitoring system using hybrid sensors was designed using web access. This hybrid node was stable and provides a forever home monitoring of home appliances [4]. For home monitoring, a speech recognizing robot was developed in which the person's speech is recorded and compared with the existing voice notes. If the voice notes are matched the person is allowed inside, otherwise they are not allowed [5]. A call and come robot was designed in which the robot moves to the person correctly when the name is called. The name is registered with tri-phone model but the drawback is the word error rate [6]. A docking system was designed using an autonomous underwater vehicle which was used in aquariums for charging the robot which was used for cleaning purpose [7]. A hopping robot is designed to climb stairs when it is used in home monitoring. This type

of robot only rolls over the floor and step when there is any obstacle [8]. A neural network and multilayer perceptron for the purpose of home monitoring. Robot is trained to certain words and then the processing is done [9]. A home monitoring robot is designed with PIR sensor and camera on the door. This ensnares the image when a person arrives near the door [10]. A video surveillance robot was designed and is considered as a safer monitoring system because the video of the person was caught in video camera [11].

Proposed System: The proposed system depicted and implemented at a home surveillance robotic system by using PIR sensor and CMOS camera. The communication is established by using WiFi. Whenever a person comes near the door the PIR sensor is activated and the image is nabbed. The robot is manipulated into two modes such as normal mode and security mode.

In normal mode the person can use while he is inside the home and navigates it by using keys such as right, left, up, down, clockwise and anticlockwise movements. The navigation is done through certain keys on the keyboard of the device that is attached to the robot. Security mode is used when the user or the person is out of home in which the robot moves automatically towards the door and captures the image of the intruder and saves the image automatically in the database such that the when the person arrives home, he can check the database to see who came home on that particular day. Another peculiarity of this system is the automatic charging system. Automatic charging is done by using docking system. The charging is enabled when the charge is reduced. The robot module moves automatically by using the docking section.

Block Diagram

LPC2148 ARM Processor Is Used in the Proposed System: The ARM processor is connected to a power supply and connected to the PIR sensor, WiFi, CMOS camera, LCD display and motors. Above mentioned product has individual working principles in it. Once the ARM processor is powered up the surveillance section is powered and the surveillance process is geared up. PIR sensor automatically senses the intruder and communicates to the process once a person hinders the doorstep through Wi-Fi. If the signal is received to the processor, the surveillance section moves towards the door and nabs the intruder's image. This obtained image

is checked with the existing database. If it matches, then the person is authorized and he is allowed into the home. Else, person is restricted to enter into home considering him as unauthorized person.

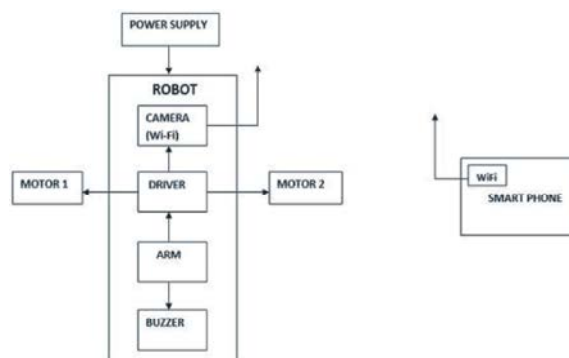


Fig. 1: Block diagram

For automatic recharge the docking system of the robotic module is used. To a greater extent when the charge of the robotic module is reduced, then the robot is hooked up to the charging unit which is indicated by LED blinking. Once charging is done the robotic module is detached from the charging unit.

The monitoring section is for the purpose of monitoring, capturing the image, checking for authorization and storing the image. The monitoring section operates differently in different modes. In normal mode only authorization is done but, in surveillance mode the storing of image in the database is done.

Software Used: The proposed system uses ANDRIOD as simulation software. The ANDRIOD software runs the code that is coded for the software part of the proposed system. This generates the output for selecting the mode of operation, navigation of robot module and to capture and store the image. Another part of the software coding is the checking if the person is authorized or unauthorized person by comparing the image nabbed and the existing images.

RESULT AND DISCUSSION

The software output is as follows. The Fig. 4 shows the robot module mode selection, navigation of the robot in corresponding direction, port connection and capturing the image. Fig. 5 shows the process of getting the input image. The input image is captured using the CMOS camera.

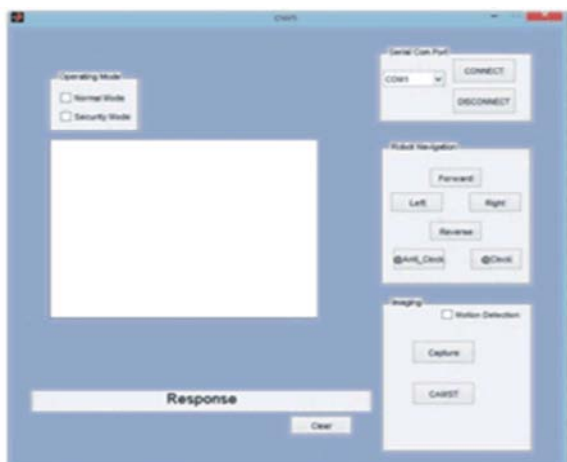


Fig. 4: Screenshot of the robot module output

Fig. 6 shows the DCT output of the input image process. The process is performed for compressing the input image because the image occupies lot of memory space. Fig. 7 shows the output of Gabor filter. The Gabor filter is used for edge detection which produces an output which co-insides the human visual system and this is peculiar for texture representation and discrimination. Fig. 8 intimates if the person entering is authorized or unauthorized person.

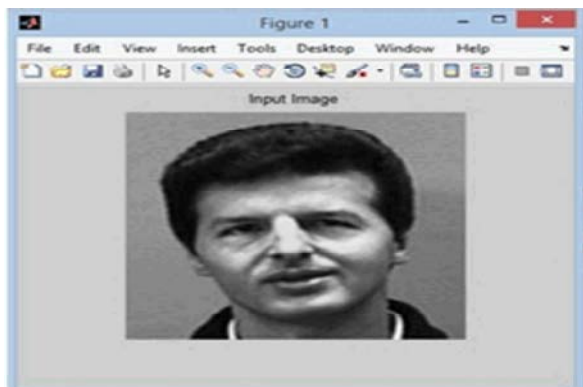


Fig. 5: Input image

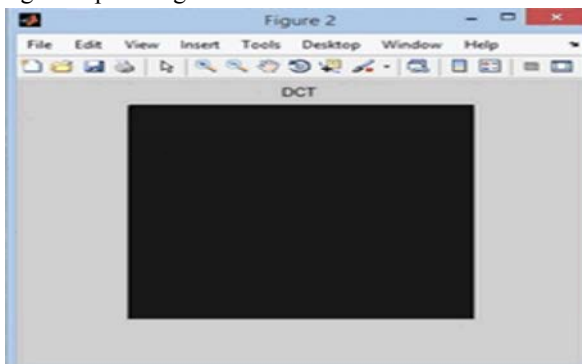


Fig. 6: DCT of the input image



Fig. 7: Gabor filter output

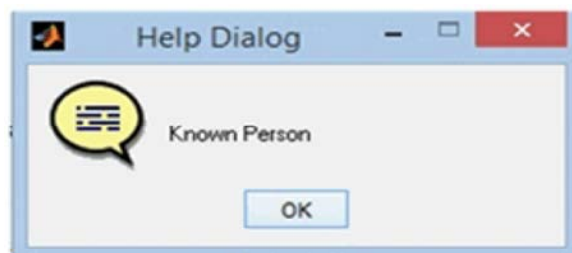


Fig. 8: Dialog box for user authentication

CONCLUSION

This project produces result in such a way that it can be used for navigating the robot or else it automatically navigates different modes. Along with this the authentication of the person entering the home is done by nabbing the image of person. The future scope of this project is to implement a further security by sending SMS to the user when an intruder arrives.

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