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HOME GUARD ROBOT - AGAINST EFFECTIVE CRIMES

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ABSTRACT

The objective of this paper is to design a home security robot that is efficient in reporting anything unusual that happens around the house to the house members and also to the police .I have planned to implement a design of home guard robot that consists of several inputs and react to those inputs with appropriate outputs. The robot name is HG-ROBOT which is able to safeguard our homes in an effective way. This robot has been designed which comprises of different variety of technology with powerful hardware components. A graphic user interface (GUI) helps in functioning of capturing images and sending reports. The captured images along with the live HD video and a message comprising of danger alert is forwarded to the house owners and the police force. This is performed in order to prevent the thief's' invasion. It is made of a material that is a mixture of rubber and plastic. Hence it will be unbreakable.

Keywords: *Home guard robot, live HD video, Graphical User Interface*

1. INTRODUCTION

The annual reports about the crime from countries in the world have presented us continuous increase in criminal affairs. During last few years there were almost 1.4 billion violent crimes and more than 10 million property crimes happen in all over India [4]. This violence not only occurs in the unsafe places but also occurs inside the houses. This uses a GPRS/GSM based wireless security sensor nodes developed by Y.Zhao[5]. It has the following features: 1.Low cost 2.Low power consumption 3.Simple installation 4.Fast response 5.Simple user interface 6.Beautiful appearance like toy. The GSM terminal is used as the SMS interface to send messages. The most common way to secure house is of 3 types: Pretend, Secured, Aware, and Alert.

Pretend: Pretend that someone is present in the house by switching on the lights at the garden and inside the house automatically in the evening and turning it off automatically at the morning when the family members have gone out.

Secured: Use good locks for doors and windows.

Aware: Awareness comes by using a robot that could secure our home.

Alert: The security robot when detects alerts the neighbors by an alarm system. It indicates breakthrough in the house to the owners plus police force by message and HD-video.

2. PRIOR AND RELATED WORKS

In [1] AIBO (Artificial Intelligence Robot) is an iconic series of robotic pets designed and manufactured by Sony. Sony announced a prototype robot in mid-1998. The first consumer model was introduced on May 11, 1999. New models were released every year until 2005. Although most models were dog-like, other inspirations included lion-cubs and space explorer, and only the final ERS-7 version was explicitly a "robot dog".

In [2] Birk, A. ; Schwertfeger, S. ; Pathak, K., Safety, security, and rescue robotics is an important application field that can be viewed as a prototypical example of a domain where networked mobile robots are used for the exploration of unstructured environments that are inaccessible to or dangerous for humans.

In [3] Buonanno, A, et.al, development of intelligent surveillance systems is an active research area. In this context, mobile and multifunctional robots have been recently adopted as successful means to reduce fixed installations and the number of devices needed to cover a given area. On the other hand, modern techniques for data fusion and decision making can significantly increase the information content extracted from sensors both mounted on the robots and on the infrastructure. The use of many heterogeneous sensors, the number and complexity of operational tasks required for monitoring and surveillance with autonomous components like robots makes the overall system design very challenging.

3. OUR MOTIVATION AND APPROACHES

3.1 MOTIVATION: To develop a robot that is inexpensive and must be used in the society widely. The chapter specifies the technologies extracted from already implemented robots and other home security systems and implement those into the "HG-ROBOT" to get even powerful security. The HG-ROBOT has a very good look which will be adorable by most kids as well as elder people. When there is no one in the house if someone arrives at the door the robot automatically senses "who they are?" by the face recognition technology. Even the neighbors or relatives try to open the door it alert the family members with a message and if they reply with an "OK" message then it does nothing or else if they send a "NOT KNOWN" message then something unusual occurs, it immediately sends a message in a fraction of second to the nearby police station along with a live video.

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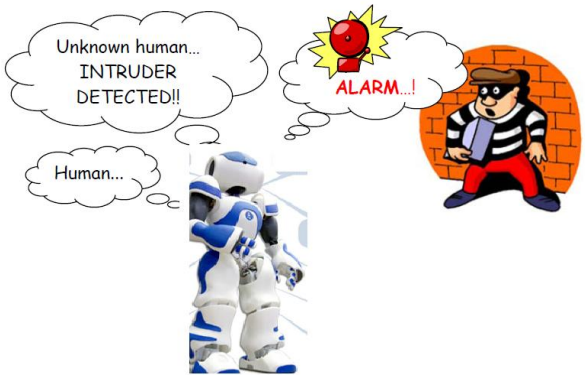


Fig 1: HG ROBOT AGAINST CRIME

3.2 APPROACHES

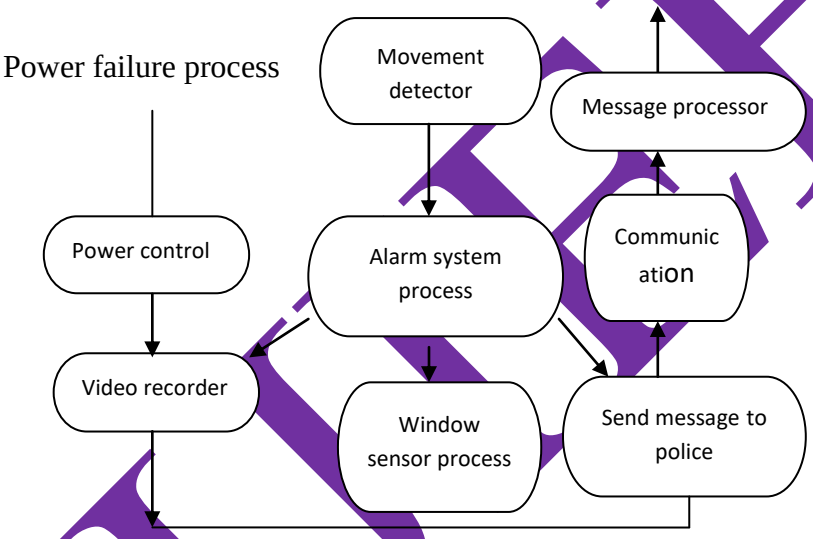
HG – Robot is very efficient which help the police and the house owner to protect their home in a much secured manner. This robot is doll-like structure in different colors. The components of the robot are: Actuators, Electric Motors, Air muscles, Electro active polymers, Sensors – touch and vision, etc. This is cheap in cost since anyone can buy and keep it in our showcase. If our neighbors, relatives or any other visits our home, no one can identify that it is HG – Robot, all will think it's a doll. It has a digital camera to capture live images, voice synthesis and voice Recognition to identify the voice of the known and unknown person in-order to help police in better way. All AIBO robot against crimes are modeled like watch dog, Dinosaur, machine, etc. This is the first home guard robot designed like a human doll in smaller size.

3.3 FEATURES

- Modeled like a Doll with different colors that monitors the house.
- Watches the cameras around the clock.
- Break-in of house is intimated first by alarm system to the neighbors by sensing the minute sound made by door breakage.
- Fast response.
- Sends live or recorded HD-video to the owner as will the police along with Danger message.
- If intrude inside the house attacks the intruders eye with LED lights.

Fig 2: HG ROBOT MODEL

4 ARCHITECTURE



5 SPECIFICATION OF HG-ROBOT

- CPU : 32 or 64 bit RISC Processor
- CPU Clock : 576 MHz
- RAM : 64 MB
- Movable parts: Head =360 degree rotation
- Hands =360 degree rotation

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- Mouth =90 degree rotation
- Legs = 360 degree rotation*2
- Image input : 400.000-pixal CMOS image Sensor
- Audio input : stereo microphones.
- Audio output : speaker 21 mm.
- Power consumption: approximately 6w (in standard mode) or can be shut-down and used at required times.
- Operating time: 24*7 hours if fully charged.
- Weight: 1.5kg including memory etc.
- Eyes: video camera inbuilt
- Head: memory chip, touch sensor.
- Ears: stereo microphones, sound sensor able to detect sound below audible range.
- Hands: LED lights, capable to blind intruder's eyes in a few seconds.

6 SOFTWARE

OPEN-R is promoted by Sony as the standard interface for its entertainment robot systems such as AIBO.OPEN-R system layer is built on top of the operating system APERTOS.OPEN-R system layer offers the access to the software, hardware and network capabilities of the AIBO such as face recognition, voice recognition, obstacle avoidance etc.. Since Sony does not provide the documentation about the application layer, there is only documentation about only the system layer.

6.1 APERTOS SOFTWARE

It is an object-oriented embedded OS based on meta-level architecture. The DDX control system consists of a small board with an internal fuzzy logic. The Linux OS helps the processor to record the crimes in faster way.

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7 WORKING OF HG-ROBOT

The HG-ROBOT can be viewed as an agent. It realizes and recognizes its environment through sensors and reacts upon them by actuators. It relies on the sensors and face recognition unit most importantly on all time. Sound sensor perceives the sound-frequency ranging from very low to high ranges. Image sensor perceives the face recognition that is, it senses the color and shape and face-recognition unit recognizes the face and its expressions. The working can be quite easily explained by the algorithm and flowchart.

7.1 ALGORITHMS

Step 1: When someone enter into the house by breaking or tries to unlock the doors robot immediately recognizes the face if they are unknown persons it starts beeping to alert everyone inside the house, if something unusual happens it sends an alert message to the nearby police station along with a live video of what is happening. The HG-ROBOT itself senses even the minute sound through its sensors. This procedure is done when members are present inside the house.

Step 2: When no one is inside the house if any person tries to intrude the house then robot automatically senses who they are by the face recognition technology. Even the neighbors or relatives try to open the door it alerts the family members with a message and if they reply with an "OK" message then it does nothing or else if they send a "NOT KNOWN" message then something unusual occurs then it immediately sends a message within a few seconds to the nearby police station along with a live video.

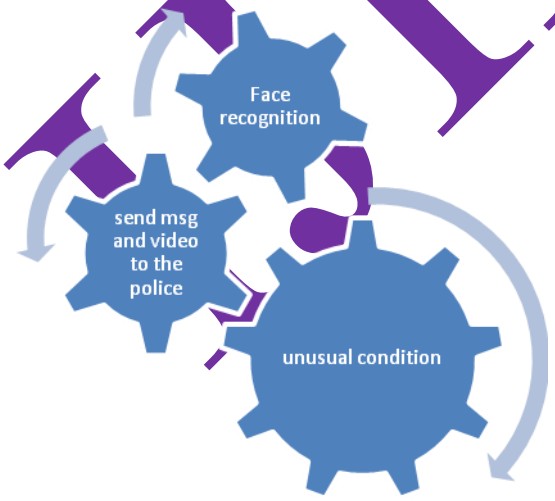


Fig 3: WORKING MODEL1

7.2 SECURITY CONTROL SYSTEMS [GUI]

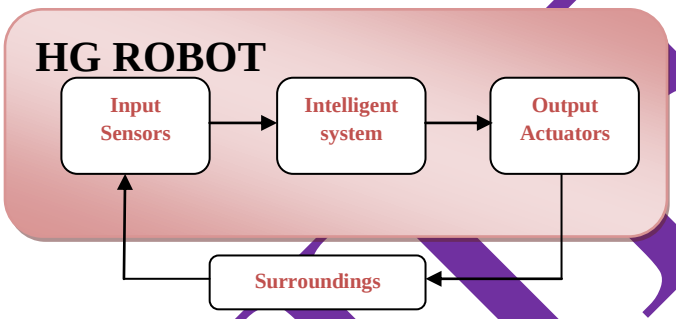
GUI is developed by Visual basic 2010 Express Edition. It is used to display and perform various functions when the ROBOT is triggered [5]. The signal is send to the GUI through the signal sent by UART which allows communicating between the hardware and software. This calls the video recording function and image capturing function. It also sends instant messages to the house owners and the police station.

7.3 ALARM SYSTEMS

An alarm is an electronic device. We have planned to install this alarm in door 5n an attempt to discourage theft of the jewelry and valuable things in a house. It works by emitting high volume sound.

Two versions:

One type of alarm is-which was manually armed and triggered when someone tried to enter into the house when owners of the house are present.



8 FACE RECOGNITION

It is a unique biometric identification method backed by high tech. The human face plays a vital role in our social interaction, conveying people's identity. Using human face as a key to security, biometric face recognition technology has received important attention in the past several years due to its potential for a wide variety of application in both law enforcement and non-law enforcement. As compared with other biometrics system using finger print and iris, face recognition has different advantage because of its non-contact process. Face images can be captured from a distance without touching the person being identified and the identification does not require interacting with the person.

In addition face recognition serves the crime deterrent purpose because face images that have been recorded and archived can later help to identify a person. Over the past decades, NEC has

concentrated on developing the recognition methods within the framework of biometric security system and is now applying face recognition technology to other markets. NEC's face recognition technology was ranked number one in the latest biometric grand challenge's "still face challenge" carried out by the National Institute of Standards and Technology (NIST).

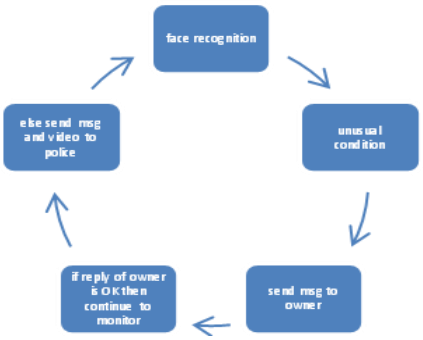


Fig 4: WORKING MODEL2

8.1 FEATURES OF FACE RECOGNITION

1. Speed and accurate face recognition.
2. GLVQ based multiple-matching face detection.
3. It combines the eye-zone extraction and facial recognition.
4. Recognition based on neural network technology.
5. Short processing time, high recognition rate.
6. Recognition regardless of vantage point and facial changes.
7. Matching is reliable.
8. Optimal results by Adaptive Regional Blend Matching (ARBM) technology.
9. Identification and authentication based on individual facial features.
10. Simple integration into many types of video monitoring systems.
11. Easy way of connection to NEC AFIS.
12. Supports diverse graphics and video formats along with live cameras.

8.2 TECHNOLOGIES USED IN FACE RECOGNITION

GMFD- Generalized Matching Face Detection method. This is used for recognizing the face of anyone who comes to the house. After that it reacts to the normal and unusual condition as written in the algorithm. The best technologies are used which will be work efficiently to help the common man.

9 COMPARISON CHART

Specification	Camera	Guard	Dog	Robot
Detect intruder	Sometime	often	often	Always
Stop intruder	Never	often	often	possible
Evidence recording	yes	no	no	yes
Costs	low	high	average	average
Development state	High level	High level	animal	Starting phase

10 CONCLUSIONS

Thus the HG-ROBOT will be of vital use in the near future to prevent the theft and all sort of crimes that occur in the society as it will be implemented with the best technologies. We have designed it with much care in order to work according to the appropriate signals and sense properly with accurate face recognition. They will be manufactured in such a way that it will be affordable to everyone. There is no need of any password or key incase of HG-ROBOT as in other systems. The decision of the robot is clear which reduces the complexity of implementation and usage of the users. It is quite pretty in appearance and is made of unbreakable material so that it can be handled with ease. All the configurations are encapsulated inside a shell made of tough material which prevents the malfunction of the robot incase of mishandling. Hence it prevents theft, violences, and crimes that are so prevalent around us. Therefore the HG-ROBOT if implemented will be of great use to the society.

11 REFERENCES

[1] en.wikipedia.org/wiki/AIBO

[2] Birk, A. ; Schwertfeger, S. ; Pathak, K, "A networking framework for teleoperation in safety, security, and rescue robotics" IEEE journal on wireless communication , ISSN: 1536-1284 Volume:16 , Issue: 1pp: 6- 13, February 2009.

[3] Buonanno, A. ; SELEX Sist. Integrati S.p.A., Naples, Italy ; D'Urso, M. ; Mattei, M. ; Meliado, E.F. **"Robotic sensor networks for security"** IEEE International workshop on Measurements and Networking Proceedings, pp:12-15, 10-11 Oct 2011.

[4] Bou Tsing Hau, **"AIBO as an Intelligent Robot Watchdog**", 1015184.

[5] Jer-Vui Lee, Yea-Dat Chuah and Chin-Tin Chai **"A Multilevel Home Security System (MHSS)"** International Journal of Smart Home Vol. 7, No. 2, March, 2013.