

Design and Implementation of Smart Living System using Internet of Things and Robotics

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Abstract:- The main objectives of this project is to make a smart living system for taking care of people with disabilities or those who require attention. A Distributed Smart home system, consists of several individual units which incorporate microcontroller and sensors. The smart system comprises of several functions such as A floor cleaning robot with automated cleaning. A Smart Mirror which will be able to display the basic information such as News, Weather, Notification, etc. Implementing a 2 in 1 device with a watch like structure, one will be used to monitor the health of the Elderly people while the other will be used to monitor the health of a Children. Implementation of this concept, where almost every device is automated to complement the smart way of life.

Keywords:- Arduino Uno, Gas sensor, Servo motor, ultrasonic sensor, Buzzer, DC motor, Universal remote, voice recognition module, raspberry pi, monitor, Node MCU, Ethernet shield, GSM module, Pulse Rate sensor.

I. INTRODUCTION

A smart Home or Home Automation is a system which allows user to control electric appliances of varying kind. Internet of Things (IoT) covers a wide are which includes variety of devices like smart phone, tablets, digital cameras and sensors. A floor cleaning robot which can be used by the masses. The cleaning robot can be divided into two functions, the vacuum cleaning robot, and a mopping robot. Among these function, the vacuum cleaning robot was developed earlier. Whereas, in addition to that a mopping robot was also embedded into it to make it as hybrid type of floor cleaning robot. A smart mirror is a mirror with “smart” capabilities much like how cell phones have become smart. That is, it is a display that looks and acts like a mirror but has the capability of displaying multimedia data through the mirror glass as if the mirror was a screen on its own accord. The major appeal of a smart mirror is that its physical design embeds a computational device in an ordinary piece of furniture that can integrate seamlessly into a home or working environment.

The idea we propose is to connect Robotics and IoT with Home Automation systems. As the title suggests, we implement a Smart Home which includes Home automation system connected with a Smart Mirror (which displays necessary notifications like weather, Headlines etc.), a robot which helps clean the floor, a Smart watch which can be used

to track health of an elderly person and also monitors the child as well.

II. LITERATURE SURVEY

A. Title: IoT Based Monitoring and Control of Appliances for Smart Home.

This IoT-based smart home system is a combination of different components. The components selected are on the basis of requirement of the goal. In this system, the Raspberry Pi2 model B and Arduino mega2560 are the main components.

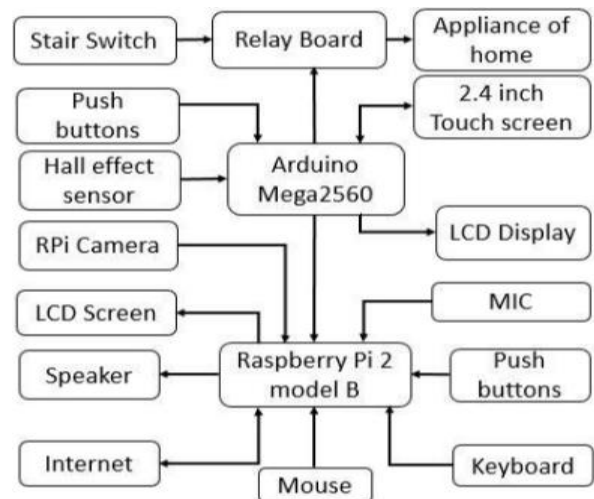


Fig. 6: Block diagram of smart permission and control system

- **Advantages**

This system helps in automating the existing system appliances.

- **Disadvantages**

The system requires power amps for the GSM, SMS Package and also requires a separate sim.

B. Title: Cleaning Module Design and Experiments of a Multifunction floor Cleaning Robot .

The existing system performs vacuum cleaning of the floor. the device described in this paper is a kind of intelligent cleaning robot. In general, it is composed by drive part, sensor

part, functional parts and control part, power supply part and so on.

- *Advantages:* The robot performs precise cleaning.
- *Disadvantages:*
This does not perform other functions like vacuuming and exact mopping and also expensive.

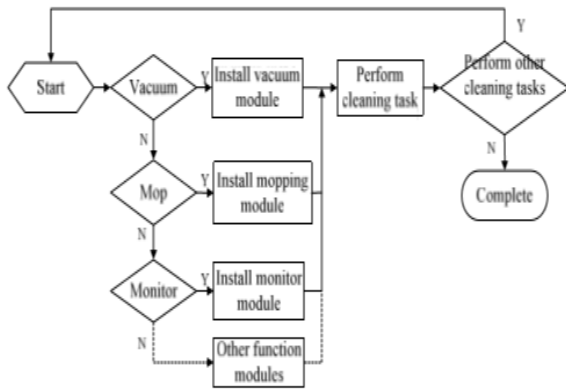


Fig 4 Flow diagram of the cleaning tasks

C. Title: SmartReflect: A Modular Smart Mirror Application Platform.

As an everyday object at home, mirrors have great potential to serve not only as a reflective surface, but also as an interactive display as part of a smart home environment.

- *Advantages*
The main advantage of Smart Mirror is sophisticated display of necessary information like weather conditions, news, etc.
- *Disadvantage:* Existing system is expensive.

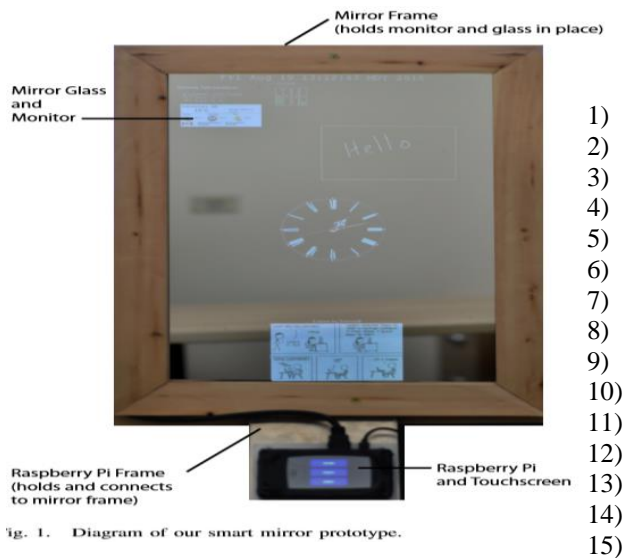


Fig. 1. Diagram of our smart mirror prototype.

D. Title: Wireless Smart Health Monitoring System Via Mobile Phone

Main target of this project is for those who had chronic disease but live normally and need extra observation from time to time

- *Advantages*
Because of the simplicity of this project, patients can use this application for their daily healthcare and the data will be sent to doctor via SMS.
- *Disadvantages*
The criteria that needed to fulfil in order for project to run accurately, both patients and doctors need to have GSM modem and enough of sms pack.

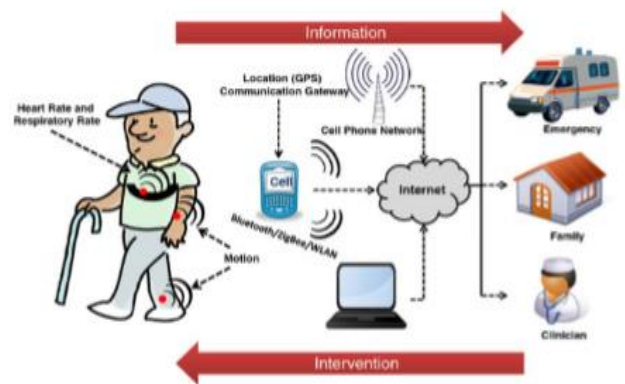
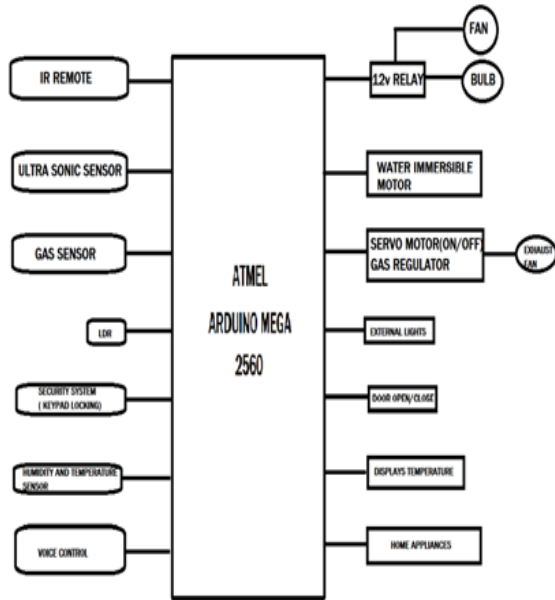


Figure 3(a) Monitoring System [5]

III. PROPOSESD SYSTEM

A. Home Automation

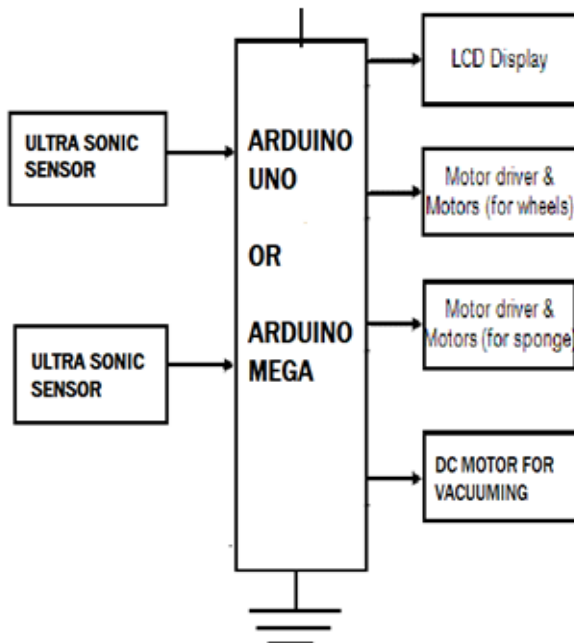
Home automation using sensors like Humidity, Temperature, Light Dependent Resistor (LDR), Gas sensor, water level sensor and microcontrollers like Arduino Mega. The basic idea of Home Automation is to interconnect the Electrical and Electronic devices with the hardware and software devices. In this project we implemented some ideas in a better manner like gas sensor is used which detect the leakage then servo motor which programmed will automatically turns of the gas regulator and also turns the exhaust fan to avoid suffocation of the smell and also prevent then from blast. Secondly, smart filling tank that is nothing but ultra-sonic sensor is used that measures the length of the tank and programmed as per the bottom and top length that fills the tanks if value is higher else if the value indicates lower value the watering is automatically switched off. The most helpful application of smart home system is controlling various electrical appliances through a remote control and also voice control mechanism.



B. Floor Cleaning Robot

The Floor Cleaning Robot is one that performs basic floor cleaning functions like Vacuum Cleaning and Floor Mopping. This robot will be able to perform its function based on the time duration which will be mentioned through the program. Arduino UNO or Arduino NANO are the microcontrollers that will be used along with the sensors like Ultrasonic sensors and a Servomotor and DC motor to make this work.

This is how the program works, it is programmed with the manual distance that we measure and fed into the program then it moves according to it.



C. Smart Mirror

The Smart Mirror which will be able to display the basic required messages such as News, Weather, Notifications in home which will be helpful for normal or disabled people to know the notification as soon as possible as well as the mirror helps to remind what to do at the particular time. The Smart Mirror will be able to update the data according to the user's preference. Raspberry Pi, an LCD Screen, an Acrylic See-Through mirror are the components that builds up a Smart Mirror.

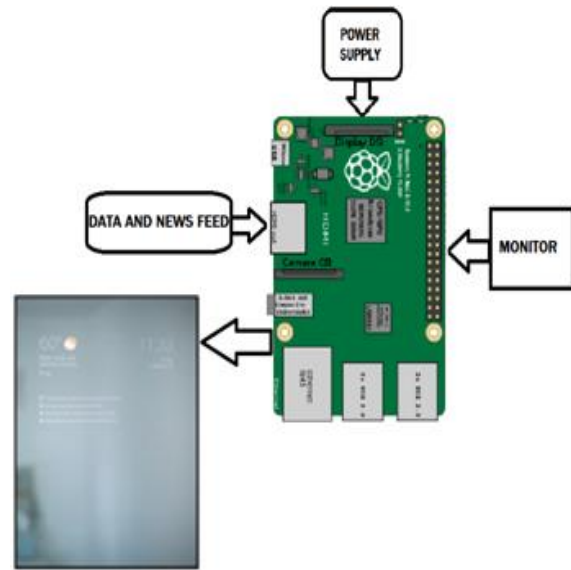
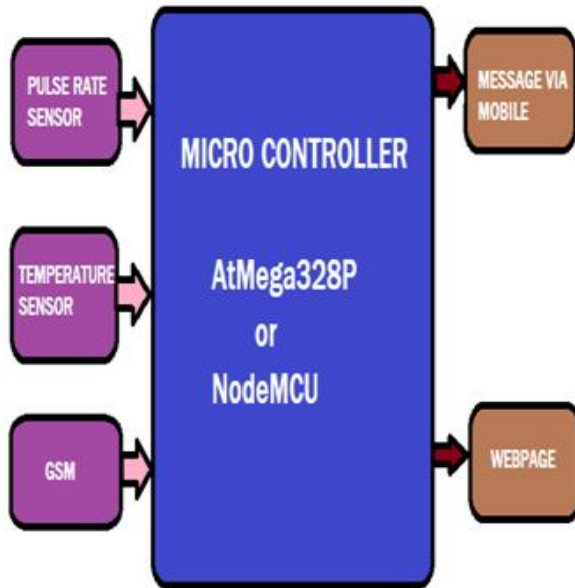


Fig 7:- Smart Mirror Block Diagram

Here raspberry pi acts as a mini computer and performs each and every command successfully without any flaw. The main advantage is that we can use this as to see our mirror as well as the information right behind it.

D. Smart Band

The Smart Band is an innovative approach to health monitoring system with a sophisticated design. This system helps monitor health factors such as Heart Rate and Temperature of the human body. The Smart Band consists of ESP 8266-12E Node MCU, a Pulse Rate Sensor, a Temperature Sensor and an OLED Display. This Smart Band will be able to monitor and track the heart rate and the temperature of the Human body and able to display the values either in mobile phones or web pages that we implemented. The implementation was designed in this manner that the old people or even normal people were affected by cardiac arrest because of the various changes that happens in world day to day. So the pulse rate sensor will read the values and if there is abnormal values other than program it will automatically messages to the relatives and the ambulance driver or to the hospital to indicate that the patient is in danger and need rescue and can be done



IV. CONCLUSION AND FUTURE SCOPE

The project is mainly focused on improving the smartness of a Home by allowing an external source like the Arduino, to take control of the devices and by performing actions based on the defined inputs. This mainly constitutes the use of Arduino board, GSM, Node MCU in order to establish communication and setup for the interaction within the device. This will ease out the man-work in a home since it also contains various simple systems that monitor the basic entities like Gas Leakage, Water monitoring system etc. The use of Smart Mirror is mainly to learn all the daily news or headlines while you get ready for the day's work by just looking at the mirror and reading the data.

On the other hand, the floor cleaning robot will perform Vacuuming and moping the entire house all by itself. The use of Smart band in the entire project is that, it acts like a health monitoring system for the elderly by constantly monitoring the basic data that is Pulse Rate of the patient and constantly updating that same to the concerned person. This project is mainly concerned with simplifying the setup and reducing the overall build cost so that it is accessible to most of the people. This project requires less or no man power in order for the working of the system. The overall picture of the project is that, it is low in cost than other relevant existing systems, contains more additional features and can also be expanded by adding or modifying the work done by the system.

The previously proposed system's working limits have been limited based on the components used by them. It has a source that is not as efficient as the source component used in this project. Future scope of the project, allows people to relax at home and enjoy the Smartness of their home. When

floor cleaning is taken into account, a garbage collector is to be embedded with the existing system. Then smart mirror to be added with more features like home automation which is included into it. Finally, smart band made to an advanced level which acts as defibrillator, the necessary Adjustments or modifications are possible to this system, depending on the necessity of the user.

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