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# HOME AUTOMATION BASED ON IOT

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**Abstract**: In this era of science internet is one of a fast growing factor which affiliates many facilities just like: Home Automation which is based on IOT is one of the most useful technologies for the safety purpose of home. It plays a very important role from industrial machines to the neither consumer home appliances which will be working even if you are nor active for some time.
In this modern generation, peoples used automatic devices rather than using the manual devices. Since, internet is influencing people at high rate of population, inventing new technologies daily. In all the technologies IOT is the most useful technology. Home Automation System utilizes the innovation of Internet of Things for checking and controlling of the electrical and electronic machines at home from any remote area by just utilizing a Smartphone. Execution of a minimal effort, adaptable home mechanization framework is exhibited.

**Introduction**: Home automation refers to the application of computer and information technology for control of home appliances easily. It is an automation of the home, housework or household activity. The popularity of home automation has been increasing greatly in recent years due to much higher affordability and simplicity through Smartphone and tablet connectivity. The concept of the Internet of Things has tied in closely with the popularization of home automation. Through the Integration of information technologies with the home environment, systems and appliances are able to communicate in an integrated manner which results in convenience, energy efficiency, and safety benefits. As we are using Arduino Uno. It is a popular open-source single-board microcontroller, a descendant of the open-source Wiring platform, designed to make the process of using electronics in multidisciplinary projects more
accessible. In this IOT project, we are going to monitor the PIR sensor, IR sensor, gas sensor over the internet using Thingspeak, It is accomplished by the data communications between Arduino, gas sensor, PIR sensor, IR sensor.

**Arduino:-**

An Arduino is an open source hardware platform with built-in programming support. No additional hardware or software (e.g. Hex burner) is required to transfer your programs (i.e. hex file) to the Arduin0. There are all the necessary peripherals attached for the basic operation. It is based on simple AVR microcontrollers.

Arduino is a growing industry nowadays and the major reason behind it is the vast majority of libraries. Users don't have to invent the wheel again. Long traditional codes have been reduced to a few lines now. it is easy to use and enhance productivity. Arduino can be used to make a variety of projects taking analog as well as digital inputs and can easily interface with different hardware like switches, encoders, Sensors, Motors, relays and many more.

Arduino board PCB designs and schematics are freely available on internet community and blogs and it can also be purchased from the respective sellers and its Integrated Development Environment is free to download, different versions of this IDE are available to make it compatible with different OS (Operating systems) like Mac, windows, etc.

1) Arduino has its built-in a programmer to burn the Hex file in it, for most of the beginners, it is very irritating to buy Microcontroller and Burner separately and sometimes it is very annoying when poor hardware has a little hidden broken wire and you will waste plenty of precious hours.

2) Its open source so the whole word developer constantly working on its upgrade and fixing its bugs, so its support is readily available worldwide.

3) The largest number of libraries is freely available to the person does not need to write a lot of basic code to make the things run.

4) Arduino supports many different shields, which can be attached to the basic Arduino board with a male to female Headers. It reduces the traditional wiring and chances of errors are less. It is also space and power efficient.

These all the above features are generally not available with a single stand-alone microcontroller. That's why Arduino is loved by the hobbyist as well as professionals.

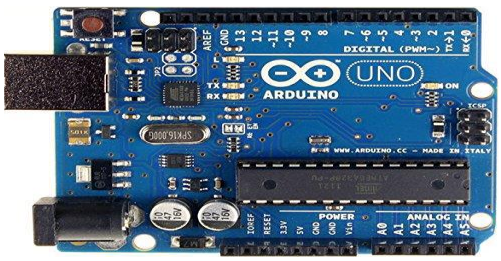

**Figure 1.1: Arduino Circuit.**

**II. Communication**

The Arduino Uno has various offices for speaking with a PC, another Arduino, or different microcontrollers. The ATmega328 gives UART TTL (5V) serial correspondence, which is accessible on advanced pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial correspondence over USB and shows up as a virtual com port to programming on the PC. The 16U2 firmware utilizes the standard USB COM drivers, and no outer driver is required. In any case, on Windows, an .inf document is required. The Arduino programming incorporates a serial screen which enables straightforward printed information to be sent to and from the Arduino board. The RX and TX LEDs on the board will streak when information is being transmitted by means of the USB-to-serial chip and USB association with the PC (yet not for serial correspondence on pins 0 and 1).

A Software Serial library takes into consideration serial correspondence on any of the Unos computerized pins.

The ATmega328 likewise underpins I2C (TWI) and SPI correspondence. The Arduino programming incorporates a Wire library to improve the utilization of the I2C transport;

Programming

The Arduino Uno can be customized with the Arduino programming. Select Arduino Uno from the Tools > Board menu (as indicated by the microcontroller on your board).

The ATmega328 on the Arduino Uno comes preburned with a bootloader that enables you to transfer new code to it without the utilization of an outside equipment developer. It conveys utilizing the first STK500 convention (reference, C header records).

You can likewise sidestep the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header; see these guidelines for points of interest.

The ATmega16U2 (or 8U2 in the rev1 and rev2 sheets) firmware source code is accessible.

The ATmega16U2/8U2 is stacked with a DFU bootloader, which can be enacted by:

• On Rev1 sheets: interfacing the patch jumper on the back of the board (close to the guide of Italy) and after that resetting the 8U2.

• On Rev2 or later sheets: there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it less demanding to put into DFU mode.

You would then be able to utilize Atmels FLIP programming (Windows) or the DFU software engineer (Mac OS X and Linux) to stack another firmware. Or on the other hand you can utilize the ISP header with an outside developer (overwriting the DFU bootloader)

Programmed (Software) Reset

Instead of requiring a physical press of the reset catch before a transfer, the Arduino Uno is planned in a way that enables it to be reset by programming running on an associated PC. One of the equipment stream control lines (DTR) of theATmega8U2/16U2 is associated with the reset line of the ATmega328 by means of a 100 nanofarad capacitor. At the point when this line is stated (taken low), the reset line drops sufficiently long to reset the chip. The Arduino programming utilizes this capacity to enable you to transfer code by basically squeezing the transfer catch in the Arduino condition. This implies the bootloader can have a shorter timeout, as the bringing down of DTR can be very much organized with the beginning of the transfer.

This setup has different ramifications. At the point when the Uno is associated with either a PC running Mac OS X or Linux, it resets each time an association is made to it from programming (by means of USB). For the accompanying half-second or something like that, the bootloader is running on the Uno. While it is customized to disregard deformed information (i.e. anything but a transfer of new code), it will capture the initial couple of bytes of information sent to the board after an association is opened. On the off chance that an outline running on the load up gets one-time setup or other information when it first begins, ensures that the product with which it conveys sits tight for a second in the wake of opening the association and before sending this information.

The Uno contains a follow that can be sliced to handicap the auto-reset. The cushions on either side of the follow can be bound together to re-empower it. Its named RESET-EN. You may likewise have the capacity to cripple the auto-reset by associating a 110-ohm resistor from 5V to the reset line; see this gathering string for subtle elements.

USB Overcurrent Protection

The Arduino Uno has a resettable polyfuse that shields your PCs USB ports from shorts and overcurrent. Albeit most PCs give their own particular inside assurance, the circuit gives an additional layer of security. In the event that in excess of 500 mA is connected to the USB port, the wire will consequently break the association until the point when the short or over-burden is evacuated.

Physical Characteristics

The most extreme length and width of the Uno PCB are 2.7 and 2.1 inches separately, with the USB connector and power jack stretching out past the previous measurement. Four screw gaps enable the board to be connected to a surface or case. Note that the separation between advanced pins 7 and 8 is 160 mil (0.16), not an even different of the 100 mil dispersing of alternate pins.

**Sensors:**

A sensor is a device that detects and responds to some type of input from the physical environment. The specific input could be light, heat, motion, moisture, pressure, or any one of a great number of other environmental phenomena. The output is generally a signal that is converted to human-readable display at the sensor location transmitted electronically over a network for reading or further processing.

**PIR sensor**: Passive Infrared Rays-based motion detector is used to sense the movement of people, animals, or other objects. They are commonly used in burglar alarms and automatically-activated lighting systems. They are commonly called simply PIR, or sometimes PID, for passive infrared detector.

An individual PIR sensor detects changes in the amount of infrared radiation impinging upon it, which varies depending on the temperature and surface characteristics of the objects in front of the sensor. When an object, such as a human passes in front of the background, such as a wall, the temperature at that point in the sensors field of view will rise from room temperature to body temperature, and then back again. The sensor converts the resulting change in the incoming infrared radiation into a change in the output voltage and this triggers the detection.

**Applications of PIR Sensors**

- All outdoor Lights
- Lift Lobby
- Multi Apartment Complexes
- Common staircases
- For Basement or Covered Parking Area
- Shopping Malls
- For garden lights

**IR sensor**: An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called a passive IR sensor. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes, that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, The resistances and these output voltages, change in proportion to the magnitude of the IR light received.

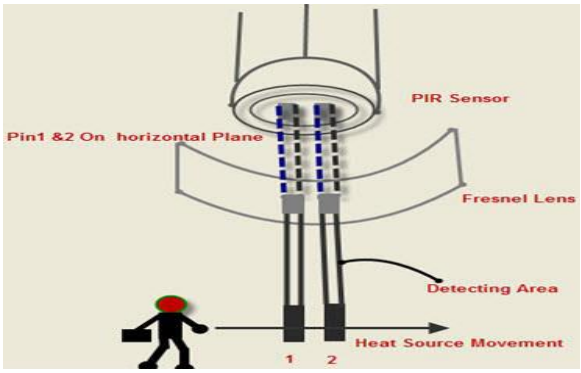


**Figure 1.2: PIR Sensor.**

**IR Sensor Circuit Diagram and Working Principle**

An infrared sensor circuit is one of the basic and popular sensor modules in an electronic device. This sensor is analogous to humans visionary senses, which can be used to detect obstacles and it is one of the common applications in real time.

This circuit comprises of the following components

- LM358 IC 2 IR transmitter and receiver pair
- Resistors of the range of kilo ohms.
- Variable resistors.
- LED (Light Emitting Diode).

In this project, the transmitter section includes an IR sensor, which transmits continuous IR rays to be received by an IR receiver module

**IR Sensor Circuit**

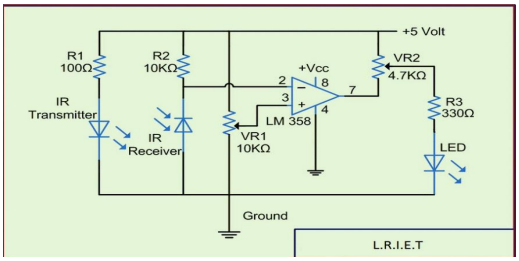


**Figure 1.3: IR Sensor Circuit.**

An IR output terminal of the receiver varies depending upon its receiving of IR rays. Since this variation cannot be analyzed as such, therefore this output can be fed to a comparator circuit. Here an operational amplifier (op-amp) of LM 339 is used as a comparator circuit.

When the IR receiver does not receive a signal, the potential at the inverting input goes higher than that non-inverting input of the comparator IC (LM339). Thus, the output of the comparator goes low, but the LED does not glow. When the IR receiver module receives a signal to the potential at the inverting input goes low. Thus, the output of the comparator (LM

339) goes high and the LED starts glowing. Resistor R1 (100 ohms), R2 (10k) and R3 (330) are used to ensure that minimum 10 mA current passes through the IR LED Devices like Photodiode and normal LEDs respectively. Resistor VR2 (preset=5k) is used to adjust the output terminals. Resistor VR1 (preset=10k) is used to set the sensitivity of the circuit Diagram. Read more about IR sensors.

**Specifications:**

- Detection range: 300 to 10000ppmm
- The characteristics of gas: 1000ppmm, isobutane
- Sensitivity: R in air / Rin, typical gas ≥ 5
- Sensing Resistance: 1KΩ 50ppm toluene to 20KΩ in.
- Response time: ≤ 10s
- Recovery time: ≤ 30s
- Heat resistance: 31Ω ± 3Ω
- Heating current: ≤ 180mA
- Heating voltage: 5.0V ± 0.2V
- Heating power: ≤ 900mW
- Measuring voltage: ≤ 24V
- Working conditions of ambient temperature: -20 ℃ ~ +55 ℃
- Humidity: ≤ 95% RH
- Environmental oxygen content: 21%
- Storage conditions Temperature: -20 ° C to +70 ° C
- Humidity: ≤ 70% RH

**III. General Packet Radio Service (GPRS)**

General Packet Radio Services is a packet-based wireless communication service that promises data rates from 56 to 114 kbps and continuous connection to the Internet for mobile phone and computer users. The higher data rates allow users to take part in video conferences and interact with multimedia websites and similar applications using mobile handled devices as well as notebook computers.GPRS is based on Global System for Mobile(GSM) communication and complements existing services such as circuit-switched cellular phone connections and the Short Message Service(SMS).

GPRS reuses the existing GSM infrastructure to provide end-to-end packet-switched services. Benefits of GPRS include efficient radio usage, fast set-up/access time and high bandwidth with multiple timeslots. GPRS also provides a smooth path for GSM evolution to the third generation mobile network. Specifically, a third generation network can continue to utilize the GPRS IP backbone network. We describe the GPRS network nodes and the interfaces among these nodes. Deployment issues for GPRS are also elaborated.

GPRS /GSM SIM900A MODEM WITH ARDUINO COMPATIBLE This is a very low cost and simple Arduino GSM and GPRS shield. We use the module SIMCom SIM900A. The Shield connects your Arduino to the internet using the GPRS wireless network. Just plug this module onto your Arduino board, plug in a SIM card from an operator offering GPRS coverage and follow a few simple instructions to start controlling your world through the internet. You can also make/receive voice calls (you will need an external speaker and microphone circuit) and send/receive SMS messages

There are two modules

1. GSM SHIELD WITH STACKABLE UNO HEADERS ON BOTH SIDES(WITH NOMIC AND SPEAKER)
2. GSM SHIELD WITH SINGLE UNO HEADERS WITH MIC

- Dual-Band GSM/GPRS 900/ 1800 MHz.
- RS232 interface for direct communication with computer or MCU kit.
- Configurable baud rate.
- Power controlled using 29302WU IC.
- ESD Compliance.
- Enable with MIC and SPeaker socket.
- With slid in SIM card tray.
- With Stub antenna.
- Stackable UNO headers
- optional power on through microcontroller.
- External serial pins.

GPRS Architecture

Figure 1 shows the GPRS network nodes and the corresponding interfaces, where SMS-related components and the Equipment Identity Register are not shown. In this architecture, MS, BSS, Mobile Switching Center/Visitor Location Register (MSC/VLR) and Home Location Register (HLR) in the existing GSM network are modified. For example, the HLR is enhanced with GPRS subscriber information. Two new network nodes are introduced in GPRS. The Serving GPRS Support Node (SGSN) is the GPRS equivalent to the MSC. The Gateway GPRS Support Node (GGSN) provides interworking with external packet-switched networks and is connected with SGSNs via an IP-based GPRS backbone network.

GPRS architecture. BSS: Base Station System; GGSN: Gateway GPRS Support Node; HLR:

Home Location Register; MS: Mobile Station; MSC: Mobile Switching Center; SGSN:

Serving GPRS Support Node; PDN: Packet Data Network; VLR: Visitor Location Register

The MS and the BSS communicate through the Um interface. The BSS and the SGSN are connected by the Gb interface with Frame Relay. Within the same GPRS network, SGSNs/GGSNs are connected through the Gn Interface. When SGSN and GGSN are in different GPRS networks, they are interconnected via the Gp interface.

**GPRS Network Nodes**

This section discusses the GPRS network nodes: MS, BSS, SGSN, GGSN, HLR, and MSC/VLR. We also describe the solutions for these nodes provisioned by equipment suppliers.

**Mobile station**

A GPRS MS consists of Mobile Terminal (MT) and Terminal Equipment (TE). An MT communicates with the BSS over the air. The MT is equipped with software for GPRS functionality, which establishes links to SGSN. A TE can be a computer attached to the MT. Existing GSM MS does not support GPRS. For example, GPRS MS utilizes Automatic Re-transmission (ARQ) at the data link layer to re-transmit the error frames. In GSM, no re-transmission is provided in a GSM voice channel. With multiple timeslots, GPRS may provide a high transmission rate. GSM only offers single timeslot for voice.

Three MS operation modes are introduced in GPRS 07.60 5. Class A mode of operation allows simultaneous circuit-switched and packet-switched services. The duplexer is required to support this mode. Class B mode of operation provides an automatic choice of circuit-switched or packet-switched service, but only one at a time. A Class B MS involved in packet transfer can receive a page for circuit-switched activity. In this case, the MS suspends the data transfer for the duration of the circuit-switched connection and afterward resumes the data transfer elaborated in Section 4.4. Class C mode of operation supports packet-switched data only. Neither Class B nor Class C mode requires duplexer.

The MSs access the GPRS services that are with or without GPRS-aware Subscriber Identity Modules (SIMs). An MS maintains MM and PDP contexts to support GPRS mobility management. Some of the MM context fields stored in GPRS-aware SIM are listed next:

**Base station system**

To accommodate GPRS, the Base Transceiver Station (BTS) and the Base Station Controller (BSC) in the BSS are modified, and a new component Packet Control Unit (PCU) is introduced. The BTS is modified to support new GPRS channel coding schemes. The BSC forwards circuit-switched calls to the MSC, and packet-switched data (through PCU) to the SGSN. Every BSC can only connect to one SGSN. The Gb interface described in Section 4.2 is implemented to accommodate functions such as paging and mobility management for GPRS. The BSS should also manage GPRS-related radio resources such as allocation of packet data traffic channels in cells. As will be described in Section 4.1, the Um radio interface is modified to support GPRS features. To support GPRS

traffic, the transmission capacity of the BSS is increased through the standard upgrade process.

**GPRS support node**

Two kinds of GSNs are introduced in GPRS: Serving GSN (SGSN) and Gateway GSN (GGSN). The functionality of SGSN and GGSN can be combined in a physical node (e.g., Symmetrys UWS-GSN 9 and Ericssons Combined SGSN/GGSN or

**Evolving from GSM to GPRS**

By reusing GSM infrastructure, most GPRS implementation costs of the existing GSM nodes are software related. As illustrated in Table II, major hardware impact on the GSM network is limited to the addition of a PCU-model to the BSC and the introduction of two new node types: SGSN and GGSN. GPRS software upgrade can be performed efficiently. In many vendor solutions, GPRS software can be remotely downloaded to BTSs, so that no site visits are needed. In the MS development, a major challenge is to resolve the power consumption issue. To support data-related features (e.g., multiple timeslots transmission), GPRS MS consumes much more power than a standard GSM MS.

**Table I.** GSM network elements impact by GPRS.

| Element | Software | Hardware |
|---|---|---|
| MS | Upgraded required | Upgraded required |
| BTS | Upgraded required | No change |
| BSC | Upgraded required | PCU interface |
| TRAU | No change | No change |
| MSC/VLR | Upgraded required | No change |
| HLR | Upgraded required | No change |
| SGSN | New | New |
| GGSN | New | New |

The GPRS protocols have a good characteristic in that each layer can be reused to support features in different GPRS nodes. The GPRS stack is designed so that multiple copies of every layer can be distributed across multiple processors. Thus, it can smoothly scale the network capacity to handle large volumes of data. For example Reference 14, the same SNDCP code can support both SGSN and MS. In other words, the SGSN code can be reused in the MS. GPRS protocol products can be implemented in general computer languages. For example, Trillium delivers its GPRS protocol software in standard C programming language. Lucent/Optimal GmbH provides GPRS protocol stack customization with a man-machine interface, which is designed to be modular and portable.

GPRS is typically deployed in two phases. Phase 1 deployment implements basic GPRS features including:

- Standard packet services delivery, i.e., point-to-point packet bearer service.
- Support for CS-1 and CS-2 channel coding schemes.
- GPRS internal network interfaces such as Gn, Gb, Gp, and Gs.
- Flexible radio resource allocation, i.e., multiple users per timeslot and multiple timeslots per user.
- Support for Classes B and C MSs.
- GPRS charging, e.g., packet-based billing and QoS-based billing.
- GSM-based services such as SMS over GPRS.
- IP and X.25 interfaces to the packet data network.
- Static and dynamic IP address allocation.
- Anonymous access.
- Security, i.e., authentication and ciphering.

In Phase 1 development, most vendors cover parts of, or all above, features with some variations. For example, Nortels Phase 1 development also considers advanced virtual private network features. Alcatels Phase 1 deployment covers the entire network with a limited investment such as BSS software update, a single A935 MFS per MSC site, and one SGSN and one GGSN for the entire network. In Ericssons Phase 1 development, the applications are based on IP, X.25, and SMS.

GPRS Phase 2 development includes the following features:

- Enhanced QoS support in GPRS.
- Unstructured octet stream GPRS PDP type.
- Access to ISPs and Intranets.

- GPRS prepaid.
- GPRS advise of charge.
- Group call.
- Point to multi-point services.

In Nortels Phase 2 development, the capacities of SGSN and GGSN will be significantly increased. Inter-SGSN handoff is implemented and inter-GPRS network roaming is supported. In Ericssons Phase 2 development, the enhanced applications will include PTM services, multicast and group call. In Alcatels Phase 2 development, 935 MFS will be smoothly upgraded, the SGSN and GGSN capacity will be increased, and security will be enhanced.

GPRS reuses GSM infrastructure so that both circuit-switched and packet-switched services co-exist under one subscription. GPRS also provides a smooth path to evolve from GSM to the third generation mobile network. Specifically, a third generation network can continue to utilize the GPRS IP backbone network. However, GPRS has its limitations. For example, based on existing GSM technology, radio resources for GPRS in a cell is limited and the GPRS data rate is probably too low for many data applications. This problem can be resolved by introducing the EDGE or the third generation radio technologies.

Although GPRS is an emerging technology driven by the equipment suppliers instead of the push from the customers, it has generated strong interest among service providers. Owing to the explosive growth of Internet applications, it is believed that data access is an important trend for mobile services. An obvious advantage of GPRS is that no dial-up modem connection is required to access data. After PDP context activation, the MS becomes an

always-on device that facilitates instant connections. This feature is required for mobile computing where information should be sent or received immediately as the need arises. Several potential GPRS applications have been identified.

**POWER MODES**

Power down mode

SIM900A is set to power down mode by AT+CPOWD=0

There are two methods for the module to enter into low current consumption status Minimum Functionality Mode

Minimum functionality mode reduces the functionality of the module to a minimum and thus minimizes the current consumption to the lowest level.

If SIM900A has been set to minimum functionality by AT+CFUN=0 If SIM900A has been set to full functionality by AT+CFUN=1

If SIM900A is set AT+CFUN=4 to disable both the above functionality.

**Sleep mode**

We can control SIM900A module to enter or exit the SLEEP mode in customer applications through DTR signal. When DTR is in high level and there is no on-air and hardware interrupt (such as GPIO interrupt or data on the serial port), SIM900A will enter SLEEP mode automatically. In this mode, SIM900A can still receive paging or SMS from the network but the serial port is not accessible.

**Wake up SIM900A from sleep mode**

- Enable DTR pin to wake up SIM900A. If DTR pin is pulled down to a low level
- This signal will wake up SIM900A from power saving mode. The serial port will be active after DTR changed to a low level for about 50ms.
- Receiving a voice or data call from the network to wake up SIM900A.
- Receiving an SMS from the network to wake up SIM900A.

**The Internet of Things applications**

- **Smart City**

The smart city spans a wide variety of use cases, from traffic management to water distribution, to waste management, urban security, and environmental monitoring. Its popularity is fueled by the fact that many Smart City solutions promise to alleviate the real pains of people living in cities these days. IoT solutions in the area of Smart City solve traffic congestion problems, reduce noise and pollution and help make cities safer.

- **Smart Grids**

Smart grids are a special one. A future smart grid promises to use information about the behaviors of electricity suppliers and consumers in an automated fashion to improve over the efficiency, reliability, and economics of electricity. 41,000 monthly Google searches highlight the concepts popularity. However, the lack of tweets (Just 100 per month) shows that people dont have much to say about it.

- **Industrial internet**

The industrial internet is also one of the special Internet of Things applications. While many market types of research such as Gartner or Cisco see the industrial internet as the IoT concept with the highest overall potential, its popularity currently doesnt reach the masses like smart home or wearables do. The industrial internet, however, has a lot going for it. The industrial internet gets the biggest push of people on Twitter (~1,700 tweets per month) compared to other non-consumer-oriented IoT concepts.

- **Connected car**

The connected car is coming up slowly. Owing to the fact that the development cycles in the automotive industry typically take 2-4 years, we havent seen much buzz around the connected car yet. But it seems we are getting there. Most large automakers, as well as some brave startups, are working on connected car solutions. And if the BMWs and Fords of this world dont present the next generation internet connected car soon, other well-known giants will: Google, Microsoft, and Apple have all announced connected car platforms.

- **Connected Health (Digital health/Telehealth/Telemedicine)**

Connected health remains the sleeping giant of the Internet of Things applications. The concept of a connected healthcare system and smart medical devices bears enormous potential (see our analysis of market segments), not just for companies also for the well-being of people in general. Yet, Connected Health has not reached the masses yet. Prominent use cases and large-scale startup successes are still to be seen.

- **Smart retail**

Proximity-based advertising as a subset of smart retail is starting to take off. But the popularity ranking shows that it is still a niche segment. One LinkedIn post per month is nothing compared to 430 for the smart home.

- **Smart supply chain**

Supply chains have been getting smarter for some years already. Solutions for tracking goods while they are on the road, or getting suppliers to exchange inventory information have been on the market for years. So while it is perfectly logical that the topic will get a new push with the Internet of Things, it seems that so far its popularity remains limited.

- **Smart farming**

Smart farming is an often overlooked business-case for the internet of Things because it does not really fit into the well-known categories such as health, mobility, or industrial. However, due to the remoteness of farming operations and the large number of livestock that could be monitored the Internet of Things could revolutionize the way farmers work. But this idea has not yet reached large-scale attention. Nevertheless, one of the Internet of Things applications that should not be underestimated. Smart farming will become the important application field in the predominantly agricultural-product exporting countries.

- **Smart home**

Smart Home clearly stands out, ranking as the highest Internet of Things application on all measured channels. More than 60,000 people currently search for the term Smart Home each month. This is not a surprise. The IoT Analytics company database for Smart Home includes 256 companies and startups. More companies are active in the smart home than any other application in the field of IoT. The total amount of funding for Smart Home startups currently exceeds $2.5bn. This list includes prominent startup names such as Nest or AlertMe as well as a number of multinational corporations like Philips, Haier, or Belkin.

- **Wearables**

Wearables remains a hot topic too. As consumers await the release of Apples new smartwatch in April 2015, there are plenty of other wearable innovations to be excited about: like the Sony Smart B Trainer, the Myo gesture control, or LookSee bracelet. Of all the IoT startups, wearables maker Jawbone is probably the one with the biggest funding to date. It stands at more than half a billion dollars!

**CONCLUSION**

In this project, a novel architecture for low cost and flexible home control and monitoring system using Android based Smartphone is proposed and implemented. The proposed architecture utilizes a micro web server and Bluetooth communication as an interoperable application layer for communicating between the remote user and the home devices. Any Android based Smartphone with built-in support for Wi-Fi can be used to access and control the devices at home. When a Wi-Fi connection is not available, mobile cellular networks such as 3G or 4G can engine thus eliminating the need for an external voice recognition module. We measured three things: What people search for on Google, what people talk about on Twitter, and what people write about on LinkedIn. The highest score received a rating of 100%, the other Internet of Things applications were ranked with a percentage that represents the relation to the highest score (relative ranking).

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