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Smart Colony Automation Using Radio Frequency Identification Technology

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*Abstract— **The significant growth presents certain challenges for organisations and colony authorities. Rapid urbanization plays an integral role in economic and societal progress. However, it also strains a colony's infrastructure. Key challenges, such as traffic congestion, energy usage, public safety, and the building of sustainable communities are top of mind. Such challenges need to be addressed through the development and implementation of intelligent solutions. Smart Colony solution providers face the challenge yet a great opportunity of integrating key initiatives within a colony existing framework. Smart colonies are measured by the integration of their infrastructure and the intelligent ways by which they tackle challenges. A smart colony puts emphasis on creating a system of networks to allow for a systematic flow of information and effective management of resources. Enabling integration and convergence with organisations and local authorities to provide solutions for the development of a smart colony is crucial.***

Keywords— Audino kit, LED, Water sensor.

I. Introduction

The development of a country depends on the city and village's development. Smart Colony Vision segment was assembled with input from our smart colony practitioners and partners. It will help you create a vision for the future of your own colony. Equally important it will help you build an action plan to get to that better future. The first goal is to give "vision" of a smart colony, to help realise how technology will transform the colonies of tomorrow. Colonies around the world are already making tremendous progress in achieving economic, environmental and social sustainability, in export-based initiatives and in the creation of 21st century jobs.

All of these are excellent ways to improve living standards and economies. The concept of smart colonies doesn't compete with these efforts. Instead, smart colony technologies can support and enhance work already underway Policy makers go beyond the conventional focus on individual departments, programs or services. Indeed, they must start to consider colonies as complex ecosystems and adjust strategy, governance and operations accordingly. New solutions and insights are required to be able to manage these scarce resources efficiently and to be able to manage urbanization process for the benefit of all. Our need to improve our understanding of cities, however, is pressed not only by the social relevance of urban environments, but also by the availability of new strategies for city-scale interventions that are enabled by emerging technologies.

Leveraging advances in data analysis, sensor technologies, and urban experiments, This project will provide new insights into creating a data-driven approach to urban design and planning. Our future colonies will desperately need such understanding. Colonies evolutions are already happening. This evolution will provide cities with excellent ways to improve its living standards and economies. As a result, people would have access to comfortable, clean, engaged, healthy and safe lifestyle. Cities in turn would access further economic development with the foundations of prosperity – the fundamental infrastructure services that let compete in the world economy.

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II. Smart Colony Automation

A. *Various Components:*

- Arduino Uno board
- RFID Reader
- Soil moisture sensor
- LDR sensor
- LED
- Servo motor
- Water pump
- Relay

B. *Arduino UNO Board:*

An Arduino microcontroller board can be thought of as a user-friendly, open-source input-output system. An input can range from anything from a finger pressing a button to a change in light intensity, and outputs can range from lighting up a simple LED light to sending out a Twitter message. Technical featur3es of Arduino are:

- Microcontroller ATmega328
- Operating Voltage 5V
- Input Voltage (recommended) 7-12V
- Input Voltage (limits) 6-20V
- Digital I/O Pins 14 (of which 6 provide PWM output)
- Analog Input Pins 6
- DC Current per I/O Pin 40 mA
- DC Current for 3.3V Pin 50 mA
- Flash Memory 32 KB of which 0.5 KB used by
- Boot loader
- SRAM 2 KB
- EEPROM 1 KB
- Clock speed 16Mhz

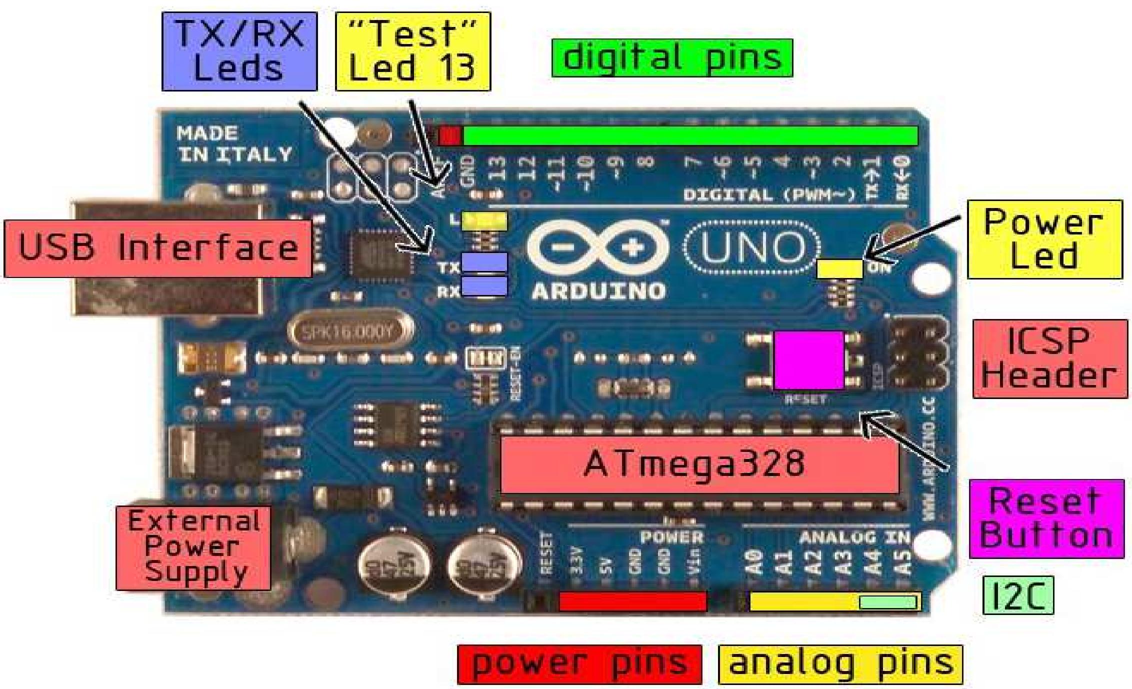

Fig 2.1 Arduino board

For testing and prototyping, your laptop provides the power for the Arduino via the USB data cable. However, for laptop independent projects you will probably want to provide an independent, portable power source for your project. A link is provided under online resources that shows how to use battery power for your Arduino.

C. *EEPROM:*

EEPROM stands for Electrically Erasable Programmable Read-Only Memory. This is a type of computer chip that can be written and re-written with code (instructions). Notice that it is electrically erasable. This means that an electric current can be used to erase it so that it can be used again. However, when it is erased, the entire chip must be erased. This is different from RAM, or Random Access Memory, which can have just certain bytes erased. RAM is more like writing on sheet of paper with a pencil, where you can erase and rewrite just the parts you want. EEPROM is like a writing on a sheet of paper with a pen, where if you erase you need start with a fresh sheet of paper. The electrical erasure is the equivalent to providing a clean, empty sheet of paper.

D. *Serial Communication:*

When serial communication is occurring, it means that two systems are sending digital pulses back and forth between each other at an agreed upon rate. Let’s say you and a friend are talking on a cell phone. You agree to take turns with each person saying what they want to say for five seconds. When you five seconds are up, you have to stop – even if you aren’t finished. When their five seconds are up, it’s your turn to talk again and you will need to pick up where you let off. That is serial communication in a nutshell.

E. *UART:*

The acronym UART stands for Universal Asynchronous Receiver/Transmitter. It is a microchip that is used to convert between serial and parallel data. For example, it may receive information from several parallel streams of data, but it can convert those multiple, parallel stream into a single serial stream. On the other hand, it may receive a single serial stream of data from an outside source (such as a modem) and converts that into a set of multiple, parallel streams that the system can work with better.

In short, a UART chip empowers your system to communicate not just using data sent in parallel, but also data sent in a single, serial stream.

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers.

The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega8U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '8U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, an *.inf file is required..

The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Uno's digital pins.

Power pins:

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

VIN:

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The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin. 5V The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply.

F. *POWER SUPPLY:*

The input to the circuit is applied from the regulated power supply. The a.c. input i.e., 230V from the mains supply is step down by the transformer to 12V and is feeded to rectifier to convert the AC to DC with help of diodes and capacitor and shown in Fig 2.1.

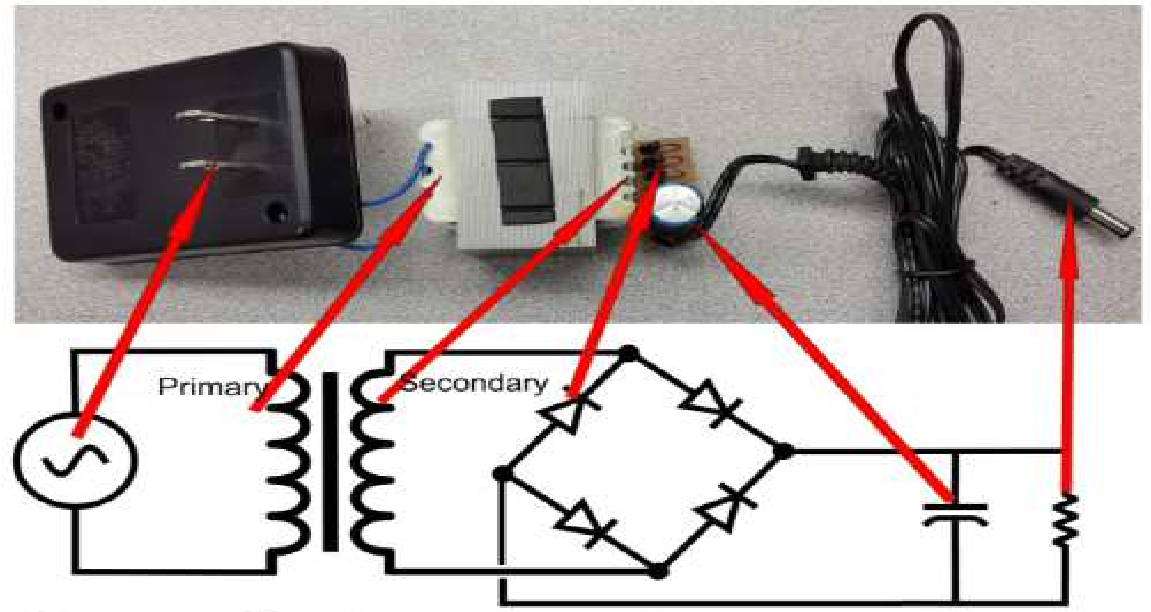

Fig 2.1 Regulated Power Supply

Usually, DC voltages are required to operate various electronic equipment and these voltages are 5V, 9V or 12V. But these voltages cannot be obtained directly. Thus the a.c input available at the mains supply i.e., 230V is to be brought down to the required voltage level. This is done by a transformer. Thus, a step down transformer is employed to decrease the voltage to a required level.

The output from the transformer is fed to the rectifier. It converts A.C. into pulsating D.C. The rectifier may be a half wave or a full wave rectifier. In this project, a bridge rectifier is used because of its merits like good stability and full wave rectification.

The Bridge rectifier is a circuit, which converts an ac voltage to dc voltage using both half cycles of the input ac voltage. The Bridge rectifier circuit is shown in the figure. The circuit has four diodes connected to form a bridge. The ac input voltage is applied to the diagonally opposite ends of the bridge. The load resistance is connected between the other two ends of the bridge.

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Fig. 2.2 Transformer

G. *Filter:*

Capacitive filter is used in this project. It removes the ripples from the output of rectifier and smoothens the D.C. Output received from this filter is constant until the mains voltage and load is maintained constant. However, if either of the two is varied, D.C. voltage received at this point changes. Therefore a regulator is applied at the output stage.

H. *Voltage regulator:*

As the name itself implies, it regulates the input applied to it. A voltage regulator is an electrical regulator designed to automatically maintain a constant voltage level. In this project, power supply of 5V and 12V are required. In order to obtain these voltage levels, 7805 and 7812 voltage regulators are to be used.

The first number 78 represents positive supply and the numbers 05, 12 represent the required output voltage levels. The L78xx series of three-terminal positive regulators is available in TO-220, TO-220FP, TO-3, D2PAK and DPAK packages and several fixed output voltages, making it useful in a wide range of applications.

These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1 A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltage and currents.

A voltage regulator is a system designed to automatically maintain a constant voltage level. A voltage regulator may use a simple feed-forward design or may include negative feedback.

I. *Series Voltage Regulator:*

A series voltage regulator uses a variable element placed in series with the load. By changing the resistance of that series element, the voltage dropped across it can be changed. And, the voltage across the load remains constant. The amount of current drawn is effectively used by the load; this is the main advantage of the series voltage regulator. Even when the load does not require any current, the series regulator does not draw full current. Therefore, a series regulator is considerably more efficient than shunt voltage regulator. The amount of current drawn is effectively used by the load; this is the main advantage of the series voltage regulator. Even when the load does not require any current, the series regulator does not draw full current. Therefore, a series regulator is considerably more efficient than shunt voltage regulator.

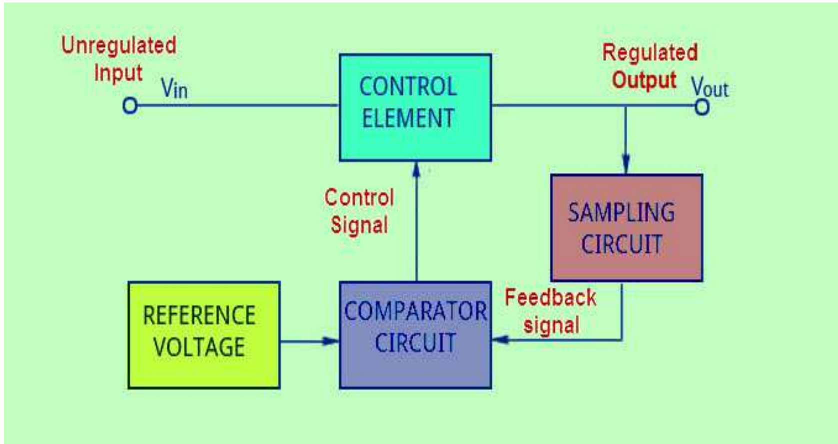

Fig. 2.3 Series Voltage Regulator

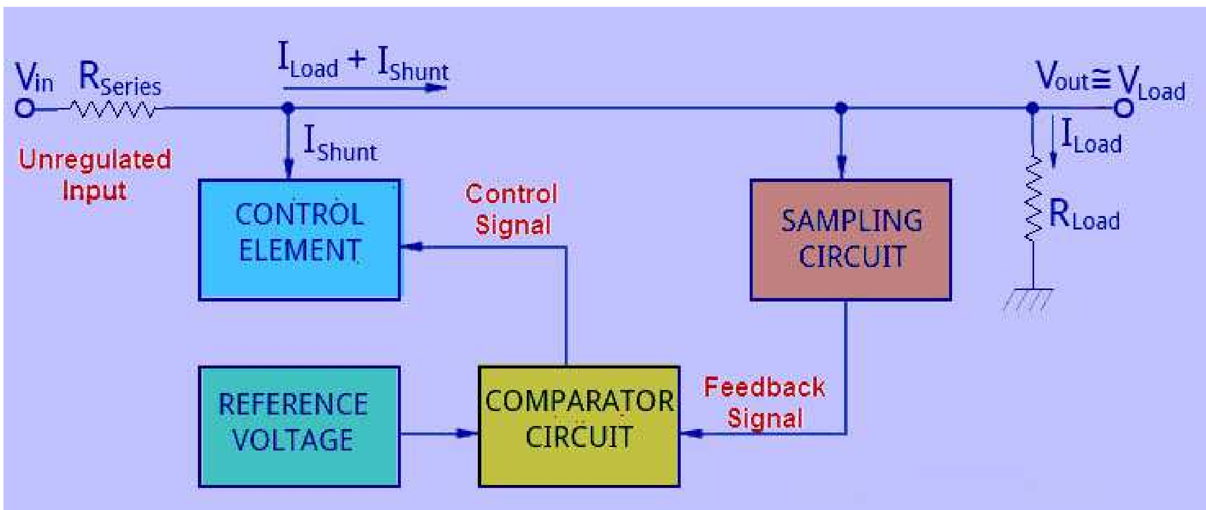

Fig. 2.4 Shunt Voltage Regulator

III. Results And Discussion

A. *Arduino IDE:*

Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. The microcontroller on the board is programmed using the Arduino programming language (based on Wiring) and the Arduino development environment (based on Processing). Arduino projects can be stand-alone or they can communicate with software on running on a computer (e.g. Flash, Processing, MaxMSP). Arduino is a cross-platform program. You'll have to follow different instructions for your personal OS.

Fig 3.1 Licence Agreement

If asked if you want to allow it to make changes to your computer, say yes(That's the only way you can get it installed). Next, you should see the licensing agreement.
Click Install, and it will begin the installation process.
For more advanced control of this process, see our system-specific guides:

- Linux
- Mac OS
- Windows

B. *Applications of Shunt Regulators:*

Shunt regulators are used in:

- Low Output Voltage Switching Power Supplies
- Current Source and Sink Circuits
- Error Amplifiers
- Adjustable Voltage or Current Linear and Switching Power Supplies
- Voltage Monitoring
- Analog and Digital Circuits that require precision references
- Precision current limiters

IV. CONCLUSION

This projects is very useful in many places like colleges and schools and hospitals its very to give messages and the voice announcements, and we are using a latest technology which like raspberry pi to achieve a very high accuracy output. The smart cities concept has gained a lot of attention lately and it will most likely continue to do so in the future. Cities are publishing smart plans, related conferences are trending and more and more books are being written on the subject .Smart technologies can provide solutions for cities by helping them save money, reduce carbon emissions and manage traffic flows. But the complexity of the agenda is hindering its progress. It involves a large number of stakeholders (local authorities, citizens, technology companies and academics) each having their own vision of what a smart city should be; most of the debate gets bogged down on trying to understand what 'smart' means rather than focusing on how it can help cities meet their goals.

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