

Implementation of Smart Irrigation System Using Internet of Things through Android

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Abstract— The project is designed to develop an automatic irrigation system which switches the pump motor ON/OFF on sensing the moisture content of the soil. In the field of agriculture, use of proper method of irrigation is important. The advantage of using this method is to reduce human intervention and still ensure proper irrigation. The project uses a microcontroller which is programmed to receive the input signal of varying moisture condition of the soil through the sensing arrangement. This is achieved by using an op-amp as comparator which acts as interface between the sensing arrangement and the microcontroller. Once the controller receives this signal, it generates an output that drives a relay for operating the water pump. The sensing arrangement is made by using two stiff metallic rods inserted into the field at a distance. Connections from the metallic rods are interfaced to the control unit. The concept in future can be enhanced by integrating GSM technology, such that whenever the water pump switches ON/OFF, an SMS is delivered to the concerned person regarding the status of the pump. We can also control the pump through SMS.

Keywords—irrigation, sensor, iot, GSM module, Arduino.

I. INTRODUCTION

The Internet of Things is an emerging topic of technical, social, and economic significance. Consumer products, durable goods, cars and trucks, industrial and utility components, sensors, and other everyday objects are being combined with Internet connectivity and powerful data analytic capabilities that promise to transform the way we work, live, and play. The IOT will require a vast network of sensors, devices and everyday objects or “things” that serve everyday needs, from smart thermostats to smart cars, which will feed data – Big Data to every connected person’s personal cloud for processing and resulting insights, forecasts and other outputs. Cloud computing is a disruptive technology with profound implications not only for Internet services but also for the IT sector as a whole. Its emergence promises to streamline the on-demand provisioning of software, hardware, and data as a service, achieving economies of

scale in IT solutions' deployment and operation. [3]Operating Systems have developed a lot in last 15 years. Starting from black and white phones to recent smart phones or mini computers, mobile OS has come far away. Especially for smart phones, Mobile OS has greatly evolved from Palm OS in 1996 to Windows pocket PC in 2000 then to Blackberry OS and Android. One of the most widely used mobile OS these days is ANDROID. Android does a software bunch comprise not only operating system but also middleware and key applications. Android Inc was founded in Palo Alto of California, U.S. by Andy Rubin, Rich miner, Nick sears and Chris White in 2003. Later Android Inc. was acquired by Google in 2005. Android provides a rich application framework that allows you to build innovative apps and games for mobile devices in a Java language environment.

II. LITERATURE SURVEY

2.1: IOT

[5]The Internet of Things (IOT) has not been around for very long. However, there have been visions of machines communicating with one another since the early 1800s. Machines have been providing direct communications since the telegraph (the first landline) was developed in the 1830s and 1840s. Described as “wireless telegraphy,” the first radio voice transmission took place on June 3, 1900, providing another necessary component for developing the Internet of Things. The development of computers began in the 1950s. The Internet of Things, as a concept, wasn't officially named until 1999. One of the first examples of an Internet of Things is from the early 1980s, and was a Coca Cola machine, located at the Carnegie Mellon University. Local programmers would connect by Internet to the refrigerated appliance, and check to see if there was a drink available, and if it was cold, before making the trip. By the year 2013. The traditional fields of automation, wireless sensor networks, GPS, control systems, and others, all support the IOT.

2.2: ANDROID:

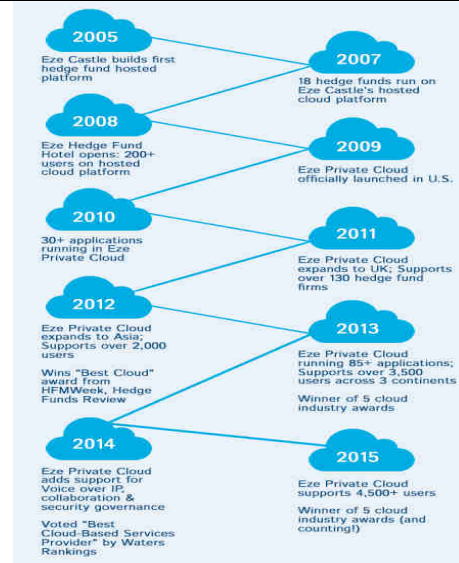
In October 2003, a group of young computing experts came together to establish a software development company that would go on to revolutionize the cellular

mobile phone as we knew it. In the third quarter of 2014, global shipments of Android based mobile devices reached 268 million. By the end of 2014, sales of Android devices this year alone could exceed one billion. During the second quarter of 2014, Android controlled an incredible 84.7 percent market share of the global smartphone industry, well ahead of iPhone, Windows Phone and the BlackBerry. Android has even been dominating in the sphere of tablet computers; about 62 percent of the nearly 195 million tablet computers sold during 2013 were Android devices.

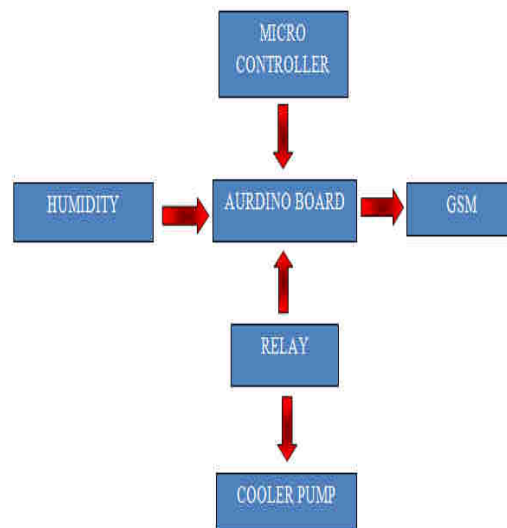
2.3: CLOUD COMPUTING:

[4]The term "cloud" is used as a representation of the Internet and other communications systems as well as an abstraction of the underlying infrastructures involved. Historically, telecommunications companies primarily offered only dedicated, point to point data circuits to their users. Beginning in the 1990s, however, they began expanding their offerings to include virtual private network services. In these earliest stages, the term “cloud” was used to represent the computing space between the provider and the end user. In 1997, Professor RamnathChellapa of Emory University and the University of South California defined cloud computing as the new “computing paradigm where the boundaries of computing will be determined by economic rationale rather than technical limits alone.”

During the second half of the 1990s, companies began to gain a better understanding of cloud computing and its usefulness in providing superior solutions and services to customers while drastically improving internal efficiencies. In 1999, Salesforce.com became one of the first major movers in the cloud arena, pioneering the concept of delivering enterprise-level applications to end users through Amazon.com proved it could outlast the dot com bubble burst with the introduction of its web based retail services in 2002. Amazon was the first major organization to modernize its data centres.



III. SMART IRRIGATION SYSTEM:



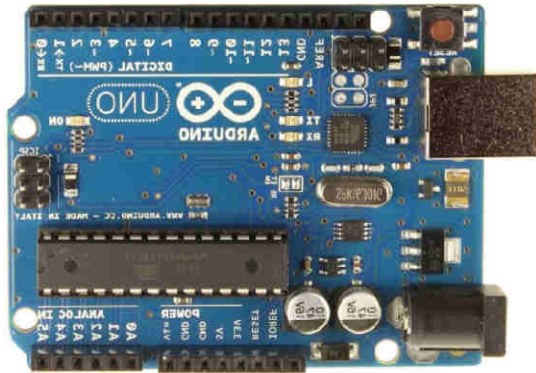
3.1: HUMIDITY SENSOR:



A humidity sensor senses, measures and reports the relative humidity in the air. It therefore measures both moisture and air temperature. The warmer the air temperature is, the more moisture it can hold. Humidity

sensors use capacitive measurement, which relies on electrical capacitance. Electrical capacity is the ability of two nearby electrical conductors to create an electrical field between them. The sensor is composed of two metal plates and contains a non-conductive polymer film between them. This film collects moisture from the air, which causes the voltage between the two plates to change. These voltage changes are converted into digital readings showing the level of moisture in the air.

3.2: ARDUINO:



[1]Arduino is an open source electronics platform based on easy to use hardware and software. Arduino boards are able to read inputs light on a sensor, a finger on a button, and turn it into an output activating a motor, turning on an LED, over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers students, artists, programmers, and professionals has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to experts. Arduino was born at the Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. Arduino board started changing to adapt new needs and challenges, differentiating its offer from simple 8-bit boards to products for IOT applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open source, empowering users to build them independently and eventually adapt them to their particular needs.

3.3: GSM:



[2]GSM (Global System for Mobile communications) module is basically a modem which accepts a SIM card and works in the GSM network provided by the operator just like a mobile phone. The GSM module can be controlled by a computer or a microcontroller to do different tasks in the network such as calling, sending messages etc. The GSM module usually communicates with the parent hardware by means of serial communication. If the parent hardware is a personal computer, the communication is usually done through the serial port (RS232).Advanced GSM modules may even have Bluetooth or Wi-Fi connectivity. Common applications of GSM module are message delivery reception systems, mobile based appliance control systems or simply any data communication application which is supported by the GSM network provider and the GSM module.

3.4: RELAY:



A relay is usually an electromechanical device that is actuated by an electrical current. The current flowing in one circuit causes the opening or closing of another circuit. Relays are like remote control switches and are used in many applications because of their relative simplicity, example circuit using a relay to power a 120v load long life, and proven high reliability. Relays are used in a wide variety of applications throughout industry, such as in telephone exchanges, digital computers and automation systems. Highly sophisticated relays are utilized to protect electric power systems against trouble and power blackouts as well as to regulate and control the generation and distribution of power.

3.5: COOLER PUMP:



A cooler pump is a machine shaped in the form of a box. It has one or more surfaces which are porous in nature, which allows air to pass through them. The unit has a fan inside it which pulls air from the outside through the sides of the appliance and passes it into the house. Cool air can be produced with the machine by using a water-absorbing material fitted on each of the porous sides. An evaporative cooler is a box-shaped appliance with one or more porous surfaces that enable air to pass through. Water is stored in a pan at the bottom of the cooler and a small pump lifts the water to the top of each side. Dampness creates the most evaporation and, therefore, the most cooling.

In present days, in the field of agriculture farmers are facing major problems in watering their crops. It's because they don't have proper idea about the availability of the power. Even if it is available, they need to pump water and wait until the field is properly watered, which makes them to stop doing other activities which are also important for them, and thus they loss their precious time and effort. But, there is a solution to this problem that is, an automatic irrigation system not only helps farmers but also others for watering their gardens or farms as well. This smart irrigation system senses the moisture content of the soil and if humidity is less sends a message to the person and automatically switches the pump when the power is on. A proper usage of irrigation system is very important because the main reason is the shortage of land reserved and unplanned use of water, as a result large amounts of water goes waste. For this reason, we use this smart watering system, and this system is very useful in all climatic conditions.

IV. CONCLUSION

The Smart Irrigation System is an original design made to conserve water consumption and would be a very efficient device if used in a large enough field that needs regular watering. Not only is it an autonomous device, which saves manual labour, it also saves water in turn saving the money. If equipped with an electronic compass it would be a very robust device which could be used in any field of any size. This smart irrigation system helps in controlling the supply of water in the field even if the

farmer is not available in that particular area. Since this is an automated system it performs the work by itself.

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