

Opulent Futuristic Smart Sensing Garden

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Abstract— The project proposed here is an automatic public garden system which uses a PIC16F877A controller. The PIC controller is used to control the entire system. The hardware components required for this project are PIC16F877A, timer, battery, DC motor, humidity sensor, relay, solar panel, water level sensor, voice module, IR sensor. The project is an automatic design in which PIC controller controls the entire public garden system like gate, water system, lights and dustbin. Initially, the controller switches ON the entry gate that is opened for certain time, after some time the exit gate will also open. A voice indication is given to alert the public for closing time of garden then both gates will be closed. An IR sensor is fixed in the exit gate which is used to exit the people stuck inside the garden after closing time. Lights are automatically turned ON and OFF using timer. Based on humidity sensor the DC motor will supply water by using water sprinklers. If the water level in tank is beyond a certain fixed level the motor will automatically ON and fills the tank by using water level sensor. For disposal of garbage we introduce a smart garbage system which has two dustbins in which if one dustbin is filled by trash it gets automatically closed and another dustbin will be opened. The filled dustbin is indicated by LED and a message is send to the corresponding authorities for disposal. The overall power supply to the garden is generated and provided internally using a renewable energy.

Keywords— PIC16F877A, Timer, Moisture sensor, Water level sensor, IR sensor, GSM, Solar panel

I. INTRODUCTION

At present the public gardens are playing a vital role in our society. Garden helps to keep cities cool and act as a place of recreation. In crowded cities, it will be difficult to maintain a clean and secure public garden. The most important problems faced in public garden are the misuse of electricity. Sometimes carelessness of the workers will result in wastage of electricity. The water wastage is another issue which will be faced in gardens. Due to improper watering, plants are suffering from prolonged drought or high humidity which causes infection to the greeneries. In addition, it requires manpower to open and close the garden's gate.

The improper maintenance of trash is a big problem in gardens. This can cause spread of pest species and many diseases. So by implementing a smart garbage system this can be overcome which is also easy to maintain. There is a need of external power supply from the Electricity Board for the garden. To overcome this, we use renewable energy will play a vital role to generate the needed power for the garden. By implementing the project named as '**Opulent Futuristic Smart Sensing Garden**' all the above situations can be avoided which is used to develop a smart city.

II. RELATED WORK

Pawar P.M, et al (2016) proposed an automatic garden monitoring system that is used for household gardens and can be expanded to greenhouses. It is a microcontroller based project. It helps to reduce the human efforts and makes the appropriate use of water resources to improve the health and life of plants [1].

Mr. Mahadev Vilas, et al (2017) proposed a project that helped to gain a better knowledge on various aspects related to automation. Using this system the farmers can utilize the available resources efficiently without wastage. The user can feed the input through the GSM so that a particular condition will turn on for a predefined time [2].

Ramkumar.E, et al (2018) proposed the plant monitoring and smart gardening using IoT in the Raspberry Pi platform. The main goal of automation is to make the people comfortable by reducing manual work. All the sensors in this system connected with the Raspberry pi and the information about the garden is directly monitored and controlled by the owner through smart phone [5].

R.B.Thombare, et al (2018) proposed a public garden automation by using arduino. To control the wastage of

electricity they have used LDR and to control the wastage of water they have used moisture sensor. In this system the disposal of garbage is done by using arduino and GSM [6].

III. METHODOLOGY

Design and Development

Initially, the entry gate will be opened for a predefined time which is driven by the timer. Timer control is also used for automatic ON and OFF of the light in the garden. Based on the various moisture level of the soil, plants will be watered through sprinklers by detecting the water level in the tank by using water level sensor [2]. A APR9600 is used for indicate the closing time of the garden. IR sensor is used at the exit gate to open it automatically, if someone is stuck inside the garden after the gate closure time. In this project we proposed a smart dustbin where there is a LED in the dustbin is used to indicate the state of the dustbin by using an IR sensor [7]. Once the dustbin is filled a message will send through GSM to the concerned authority [4]. The overall power supply for the garden is produced internally using solar panel.

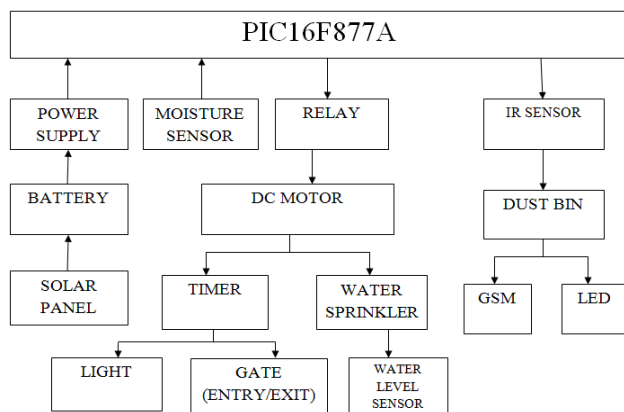


Fig.1: Block diagram

Hardware Description

The **PIC controller** is used as a major part of this project. It is used to control the all other components. It has eight analog pins and more memory space which is used for garden automation. It also has an UART for efficient communication. The power required for this controller is given by the internal power supply.

Power supply is used here for stabilizing the voltage at constant level. In this power supply there is a rectifier and regulator. Rectifier is used to convert the AC to DC and if there is any polarity change it will rectify and provide desired output power. The regulator act as a buffer to protect the components and it generates a fixed output voltage.

Solar panel is used to generate electricity so that there is no need of any other external electric power supply. It provides

12V lamps from the solar light which is used to produce the electricity to the entire garden. A 12V 1.3H battery is connected with the solar panel for storing the electrical energy. The battery has a charging circuit which provides energy from the solar panel. The stored energy is then given to the power supply.

Timer is connected with light and gate. Based on timer signal, lights in the garden will turn on and off automatically. The operation of **humidity sensors** are based on the measure of soil moisture [1]. Humidity sensor will sense the humidity level at various areas in garden and give it to the PIC controller which drives the relay. The output of the humidity sensor is an ADC value if this value reaches to the fixed value then it will switches on the water sprinkler for automatic watering of the greeneries depending on the output of **water level sensor**. If there is no sufficient water in the tank the DC motor is turned ON automatically to get the water tank filled.

Relay operated in both forward and reverse direction which is driven by the relay driver. Here we use two relays for changing the polarity of the motor. Based on the control circuit both relays are operated in forward and reverse direction. These relays are used here for automatic watering and automatic gate system. It is common for both entry gate and exit gate.

The work of **IR sensor** is to sense the state of dustbin whether it is filled or not. When it senses the level to be filled, dustbin will get closed automatically and another dustbin will get opened for the use. The filled dust bin is indicated by a **LED**.

The **Global System for Mobile and Communication** is used to transfer data between two stations. This modem is connected with the PIC controller for sending a message to the corresponding authorities about the state of the dustbin.

Voice module used here for recording and playing the sound. Once we record the voice it will play whenever we need based on the coding. The operation of voice module is based on the 1s and 0s combination. When the mode is 1 it will record when the mode is 0 it will play the recorded voice. In our project this voice module is used for indication of closing time of the garden.

Abbreviations and Acronyms

GSM – Global System for Mobile Communication

IR sensor – Infra Red sensor

LED- Light Emitting Diode

PIC – Peripheral Interface Controller

II. RESULTS AND DISCUSSION

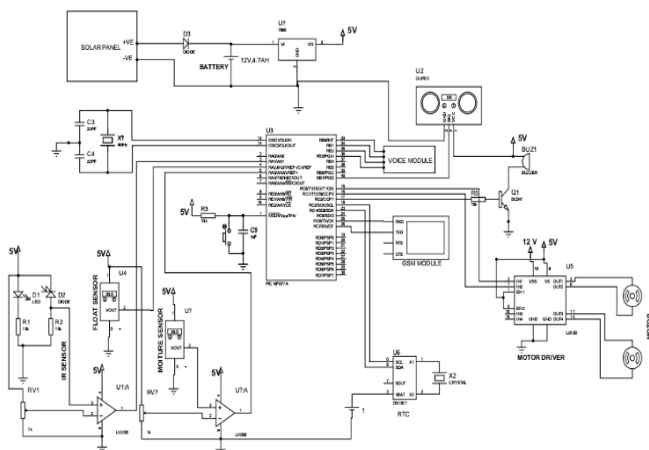


Fig.2: Schematic diagram using Proteus

The results of experiment in automation of garden are discussed below. The proposed project includes PIC16F877A, moisture sensor, timer, IR sensor, GSM, solar panel. The microcontroller can be coded in Embedded C to control the entire garden automation. The coding is done in the MaTlab.

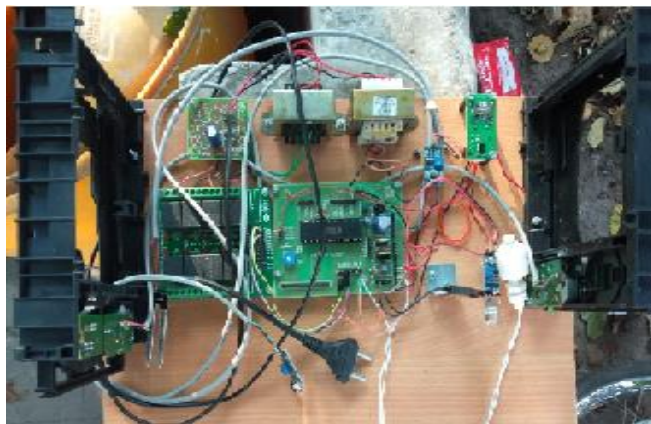


Fig.3: Prototype of garden automation

The Entry gate is automatically opened at the predefined time for the visitors. The lightening system is turned ON based on the timer. Water sprinklers start watering the greeneries depending upon the moisture level of the soil which is detected by the moisture sensor. Water level sensor is used to detect the level of water in the water tank, which results in automatic turn ON of the motor if the water level is below certain fixed level. The Exit gate is opened after few hours from the entry time. The voice module is used to specify the closing time of the garden during which the entry gate is automatically closed. After the visiting hours the exit gate is closed. IR sensor which is placed in the exit gate, detect the persons stuck inside the garden after the exit time so that the exit gate is opened automatically for their exit.

Disposal of the garbage is done in a smart way by the usage of IR sensor, which is used to detect the level of garbage and once the dustbin is filled, GSM technology is used to send message to the concerned authority. At the same time, filled dustbin is closed automatically and the neighbouring one is opened for further use. LED in the dustbin is used to indicate, that the dustbin is filled with garbage to its fullest. The overall power to the garden is generated by using a solar set-up. The entire project is controlled by using PIC16F877A Microcontroller.

III. CONCLUSION AND FUTURE SCOPE

Smart garden helps to make the public garden automatic as there is no need for manpower to maintain the garden. The usage of solar panel replaces the need for external electricity. Plant irrigation will be reduced by monitoring the humidity level. It is easy to maintain the garbage disposal which helps to keep the garden non polluted. As a whole it greatly helps for the development of smart city.

By including some more sensors this system can be used for betterment of farmers. This can be expanded in the sense of security. By using appropriate sensors the battery percentage indication can be send to the authorities.

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