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B.E. SEMESTER VI, ACADEMIC YEAR 2021-2022

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Ideation Canvas	**Completed**
Product Development Canvas	**Completed**
Prototype	**Completed**
Report	**Completed**

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GUJARAT TECHNOLOGICAL UNIVERSITY

Shri S'ad Vidya Mandal Institute of Technology

affiliated with GTU

A

Report

on

(INNOVATIVE IRRIGATION SYSTEM)

Under the subject of

DESIGN ENGINEERING – 2B

B. E. III, Semester - VI

(Computer Engineering)

Submitted by:

Group:

Sr.	Name of student	Enrollment No.
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Prof. Nital J. Prajapati
Head of the Department

Academic Year
(2020-21)

Shri S'ad Vidya Mandal Institute of Technology

Department of Computer Engineering and InformationTechnology

Academic Year 2019-20

CERTIFICATE

This is to certify that the Project entitled **"INNOVATIVE IRRIGATION SYSTEM"** has been prepared by **RUCHI NAKUM (180450131022), NAGMA PATEL (180450131034), SHIVAM PATEL (180450131036), DARSHAN UPADHYAY (180450131054)** in the subject of **DESIGN ENGINEERING – 2B** under my guidance in partial fulfillment of the degree of Bachelor of Engineering in Computer Engineering (6^{th} Semester) of Gujarat Technological University, Ahmedabad during the academic year 2020-21.

Date: / / 2020

Place: SVMIT, Bharuch

Project Guide

Prof. Nital J. Prajapati

Head of CE/IT Department

Prof. Nital J. Prajapati

Shri S'ad Vidya Mandal Institute of Technology, Bharuch

Department of Computer Engineering and Information Technology

CERTIFICATE

This is to certify that the work embodied in this Design Enginnering-2B report entitled "**INNOVATIVE IRRIGATION SYSTEM"** has been carried out by **RUCHI NAKUM (180450131022), NAGMA PATEL (180450131034), SHIVAM PATEL(180450131036), DARSHAN UPADHYAY (180450131054)** at Department of Computer Engineering and Information Technology of **Shri S'ad Vidya Mandal Institute of Technology, Bharuch** in partial fulfillment of the requirements for the degree of Bachelor of Engineering in Computer Engineering to be awarded by Gujarat Technological University.

Date:

Examiner Name and Sign

ACKNOWLEDGEMENT

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ABSTRACT

Irrigation is the key to a successful garden and farm. Long gone are the days of manual watering or relying on a friend to water when you are on vacation or away on business. This project's proposed an embedded system for automatic control of irrigation. You can water your plants regularly when you are out for vacation. The system has wireless sensor network for real-time sensing and control of an irrigation system. This system provides uniform and required level of water for the garden and farm and it avoids water wastage. This system is intended to create an automated irrigation mechanism which turns the pumping motor ON and OFF on detecting the dampness content of the earth. In this system we are interfacing Arduino board through, soil moisture sensor and also Wi-Fi module. This paper of "Innovative Irrigation System" is implemented using the "ARDUNIO" software and hardware using "Embedded C" along with the "ANDROID" for sending users command to the Ardunio for controlling the motor.

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Chapter 1
Introduction

1.1 Introduction to Concept

Irrigation in India to maximum extent is dependent on the monsoons, which are not a reliable source of water. Depending on the soil type, plants are to be provided with water, which is called as intelligent irrigation system. This project discusses the prototype design of microcontroller based Intelligent irrigation system which will allow irrigation to take place in zones where watering is required, while bypassing zones where adequate soil moisture is indicated. At present cost saving technology, labor-saving are the addressing key issues in-irrigation. Agriculture plays the important role in the economy and development of the country like India. In our country, the farmers have been using manual control techniques for irrigation. Land is irrigated only at the regular intervals/seasons. In this process, few plants in the zone receive more water and for few other zone plants water reaches late due to which the crops get dried.

There is a need in the residential/commercial irrigation industry for an irrigation controller that responds to soil moisture sensors in individual zones as a way of conserving water. An ideal controller should be "user friendly", i.e., easy to program and requiring a minimum number of keys or push-buttons to operate the controller. It should also allow irrigation to take place in zones where watering is required, while bypassing zones where adequate soil moisture is indicated- To add flexibility, it should be possible to selectively deactivate any of the moisture sensors to thereby override the modification to the controller Performance caused by sensor inputs. Moreover, the system should be easy to trouble shoot in the event of faults in any of the plurality of zone.

1.2 Scope and Purpose

India is an agricultural country, and hence a lot of water is required for farming. Water should be used in a proper way. We propose a microcontroller based system for automatic drip irrigation. We make use of the various sensors like soil moisture sensor, water flow meter to keep a check on the amount of water used. By this project we can control the moisture content of the soil in the cultivating field. The water flow will be monitored and based on the data available, analysis and prediction will be done. This will help the user to use water wisely in future.

In our proposed scheme, the sensors transmit the data to the server through microcontroller after the fixed time interval. There are predefined values stored in the database for the particular crops. These values will be compared to the values from the sensors. If the values from the sensors are below the predefined values then the microcontroller will trigger the pump to water the plants. While crops are being watered, the values from the sensors will be monitored after the fixed interval. The values will be monitored till the values are matched or above the threshold values in the database. If the values are matched or are above the threshold values in the database then the microcontroller will trigger the pump to stop watering the plants. The amount of water flow will be monitored during watering the fields and the reading will be stored in the database. The user will be notified during each slot of watering the plants.

The purpose of this project is to mainly reduce the human work and to save the water and environment.

Chapter 2

Modelling and analysis using software

2.1 Models

- **UML diagram**

2.1.1 Class Diagram

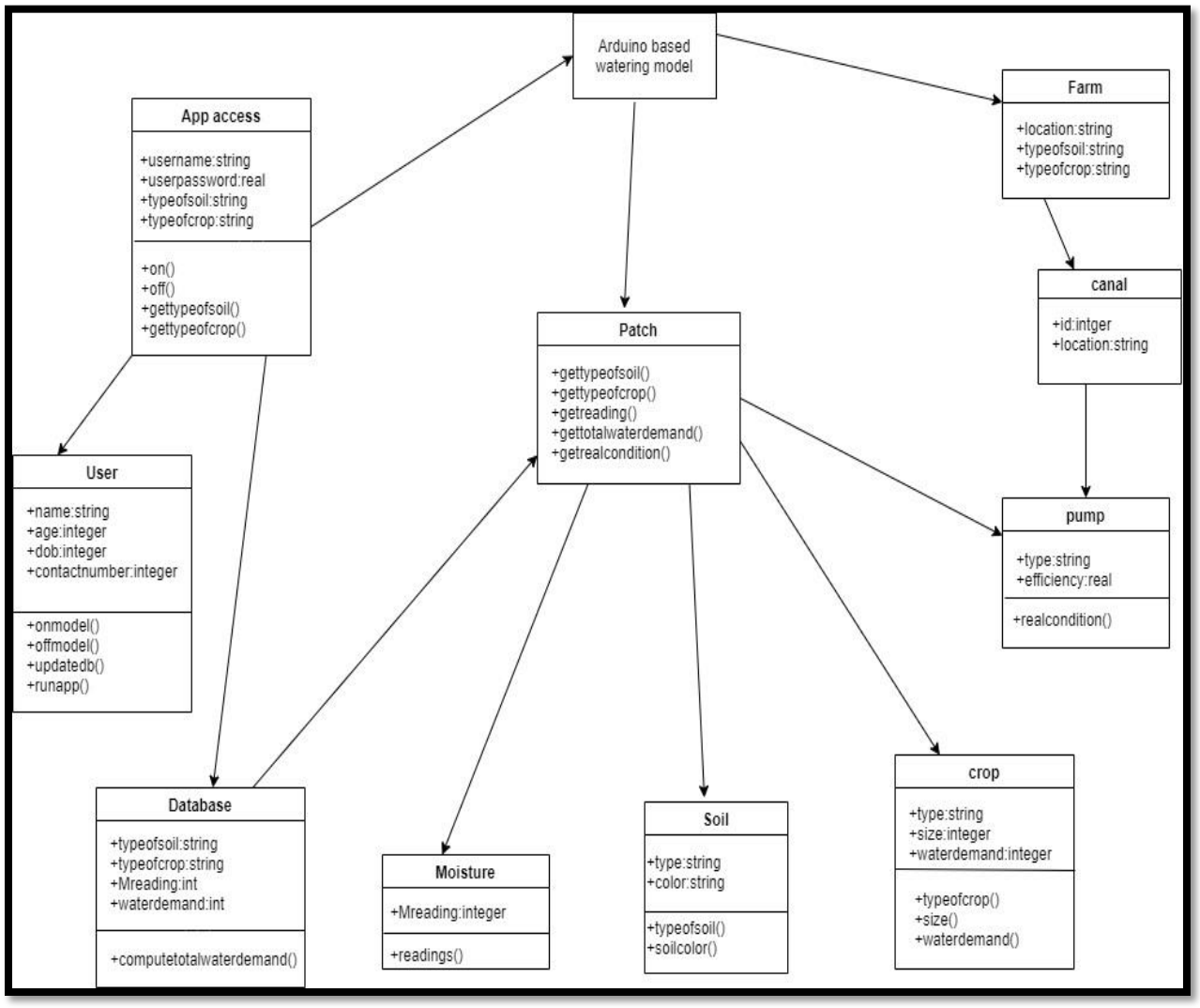

Figure 2.1.1 Class Diagram

2.1.2 Use-case Diagram

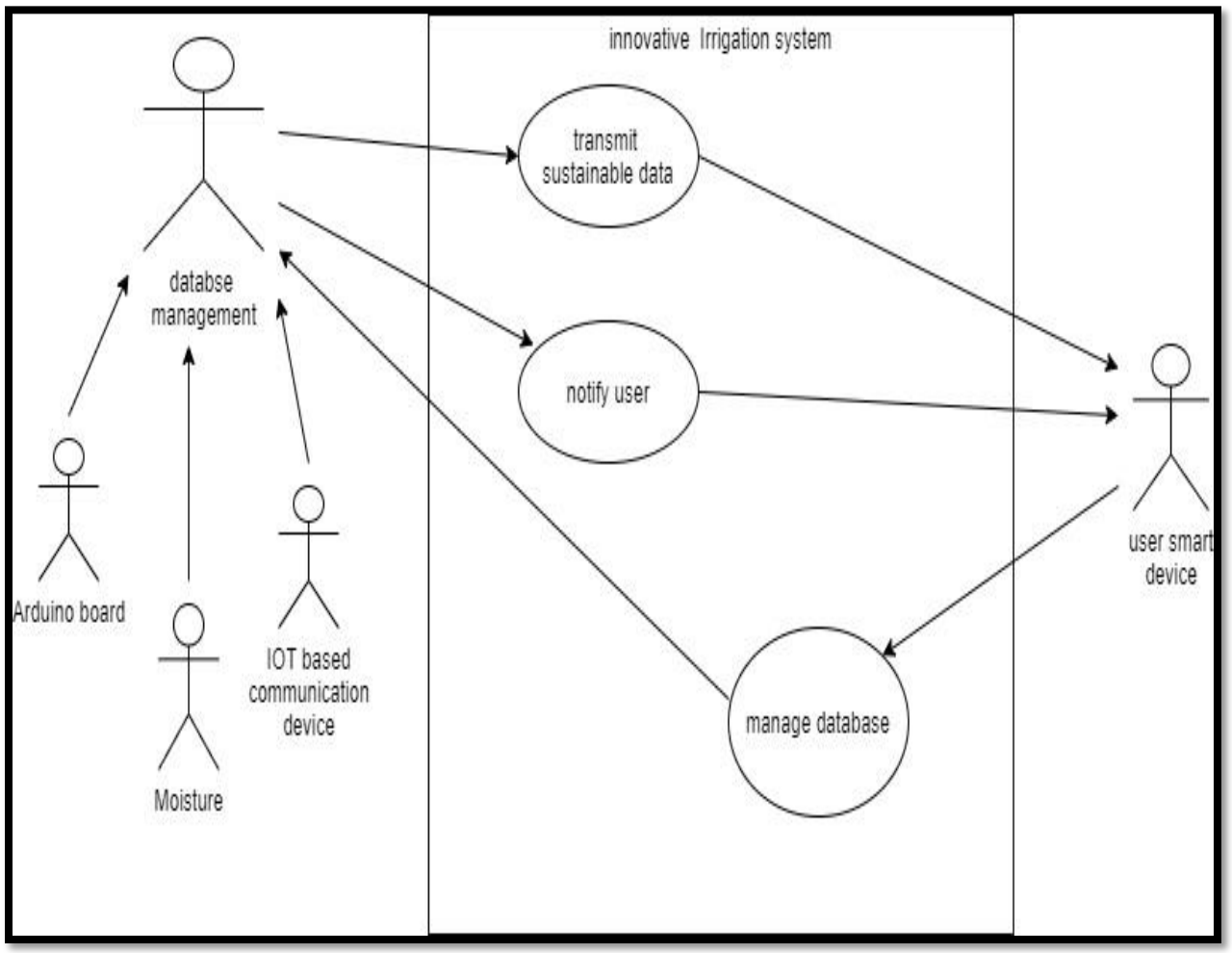

Figure 2.1.2 Use-case Diagram

2.1.3 Sequence Diagram

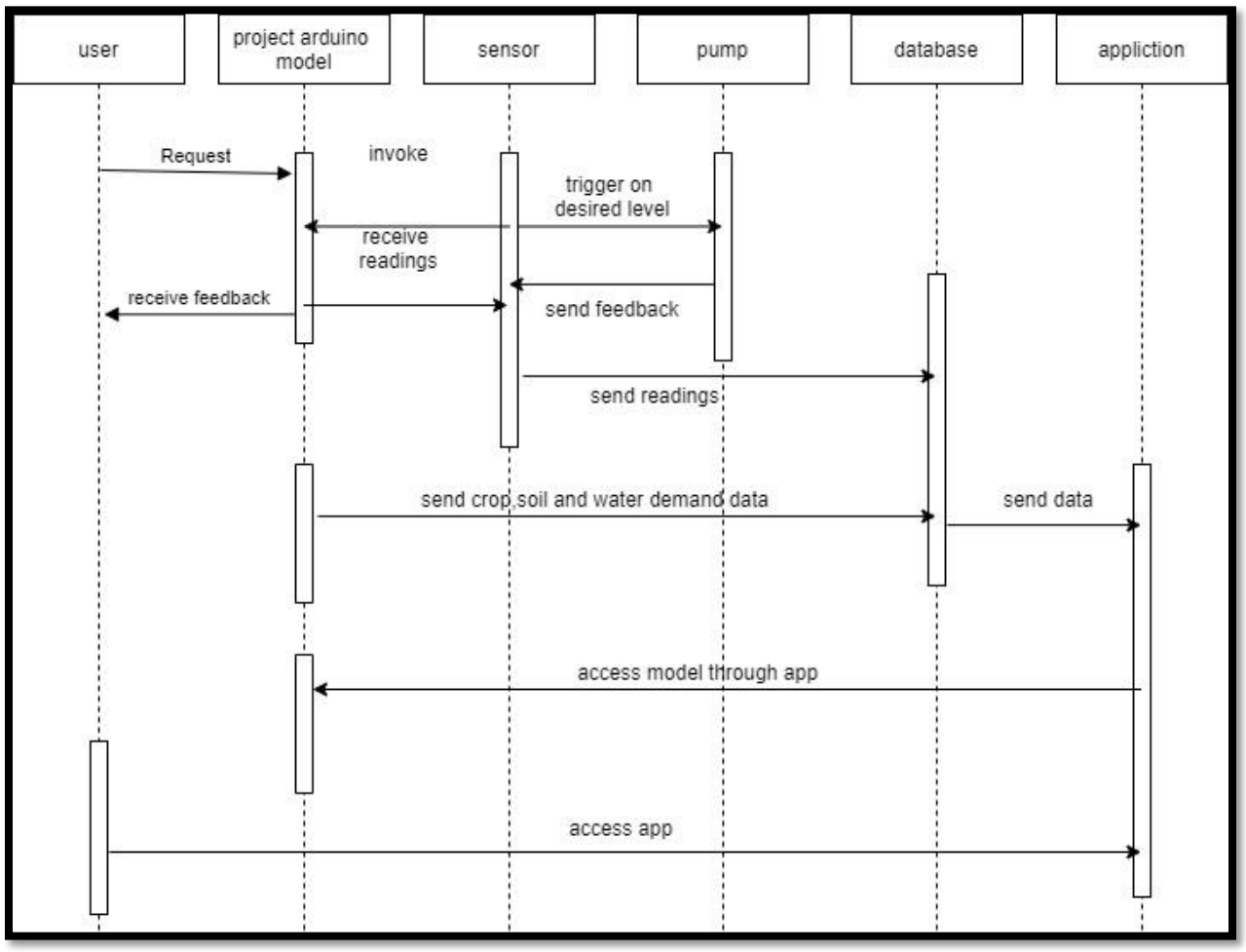

Figure 2.1.3 Sequence Diagram

2.1.4 Activity Diagram

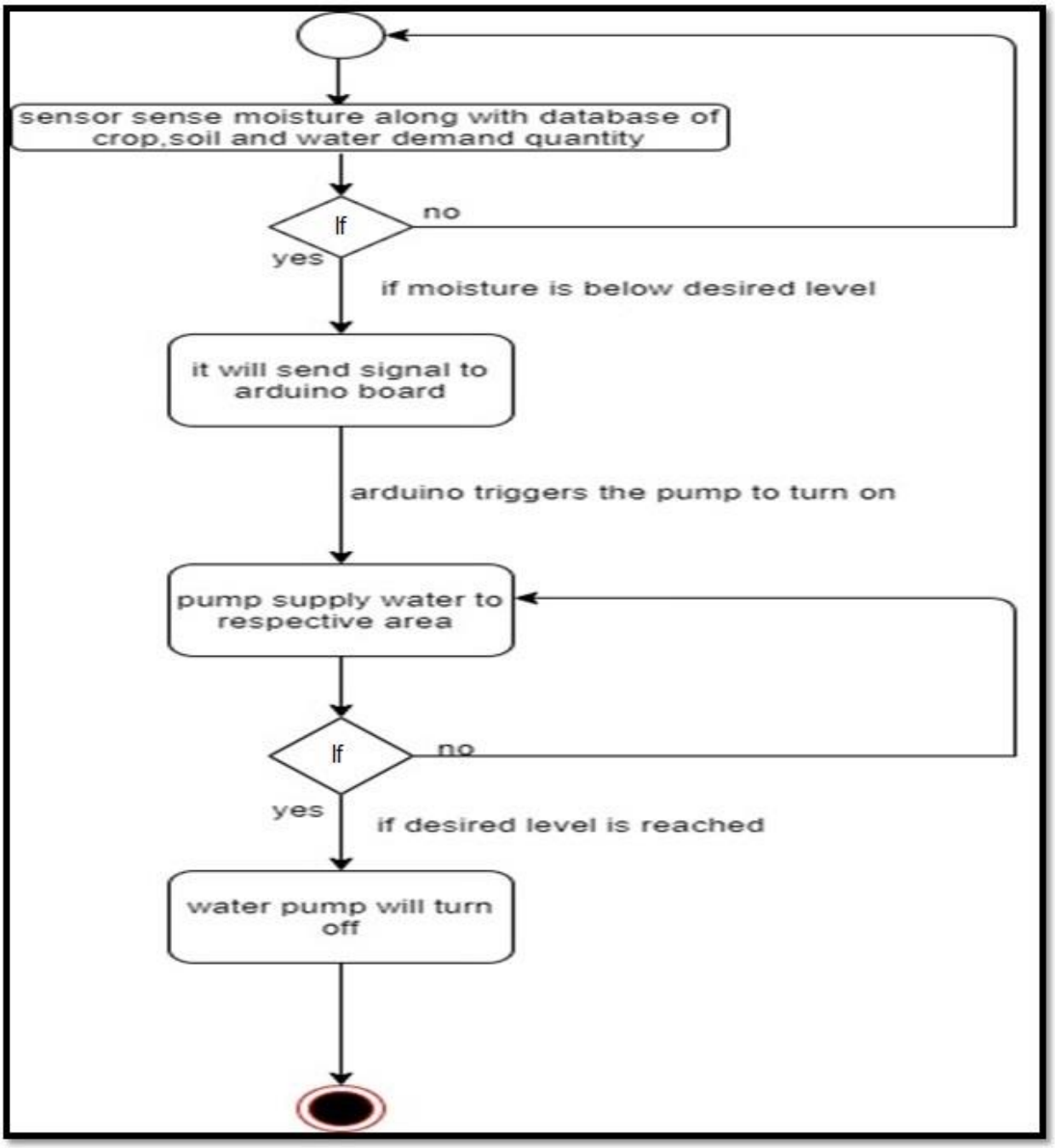

Figure 2.1.4 Activity Diagram

2.1.5 State Diagram

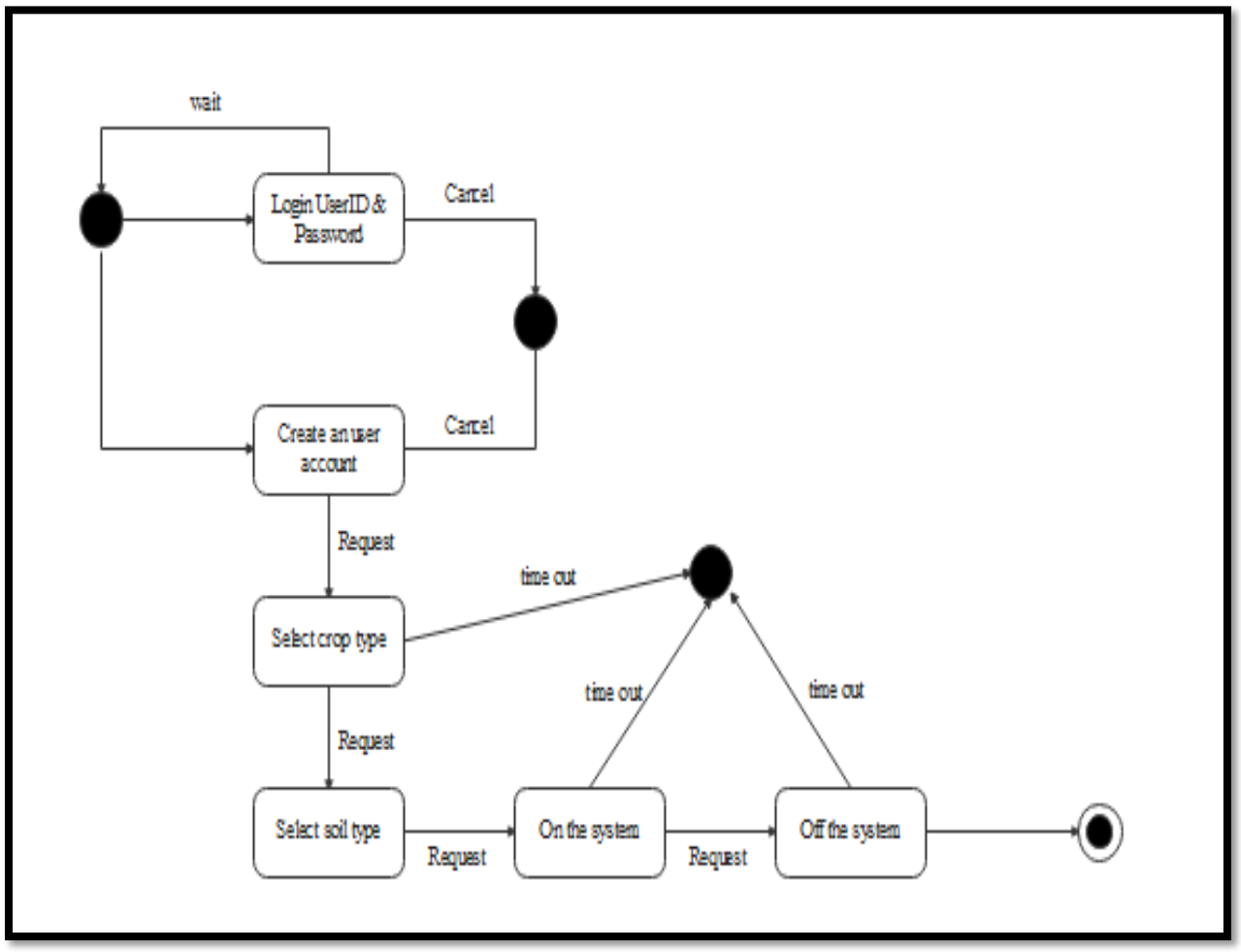

Figure 2.1.5 State Diagram

2.2 Platform

- **Arduino UNO**

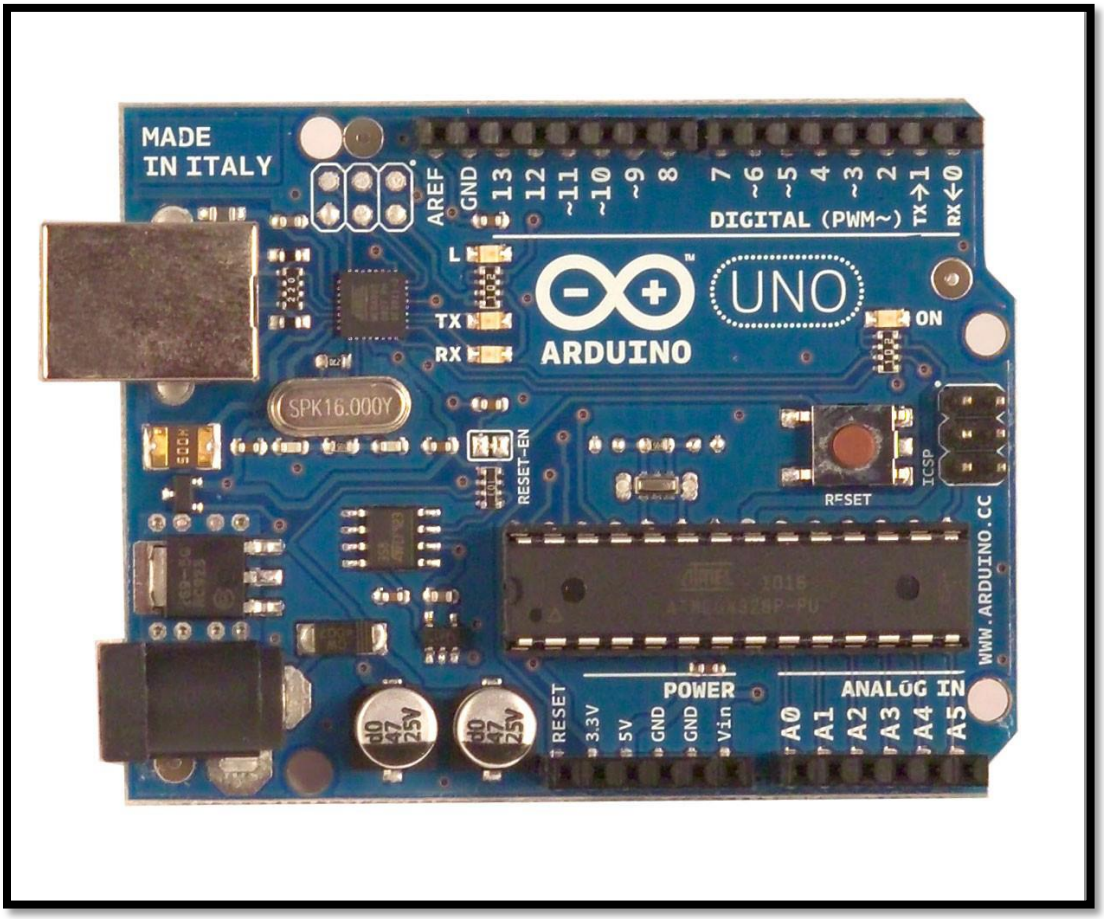

Fig. 2.2.1 Arduino UNO

The Arduino Uno is a microcontroller board based on the ATmega328 . It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduiino, moving forward.

Table 2.2.1 Technical Specification

Microcontroller	ATmega328
Operating voltage	5V
Input voltage(recommended)	7-12V
Input voltage(limits)	6-20V
Digital I/O pins	14(of which 6 provides PWM output)
Analog input pins	6
DC current per I/O pins	40 mA
DC current for 3.3V pin	50 mA
Flash memory	32 KB of which 0.5 kb used by bootloader
SRAM	2 KB
EEPROM	1 KB
Clock speed	16 MHz

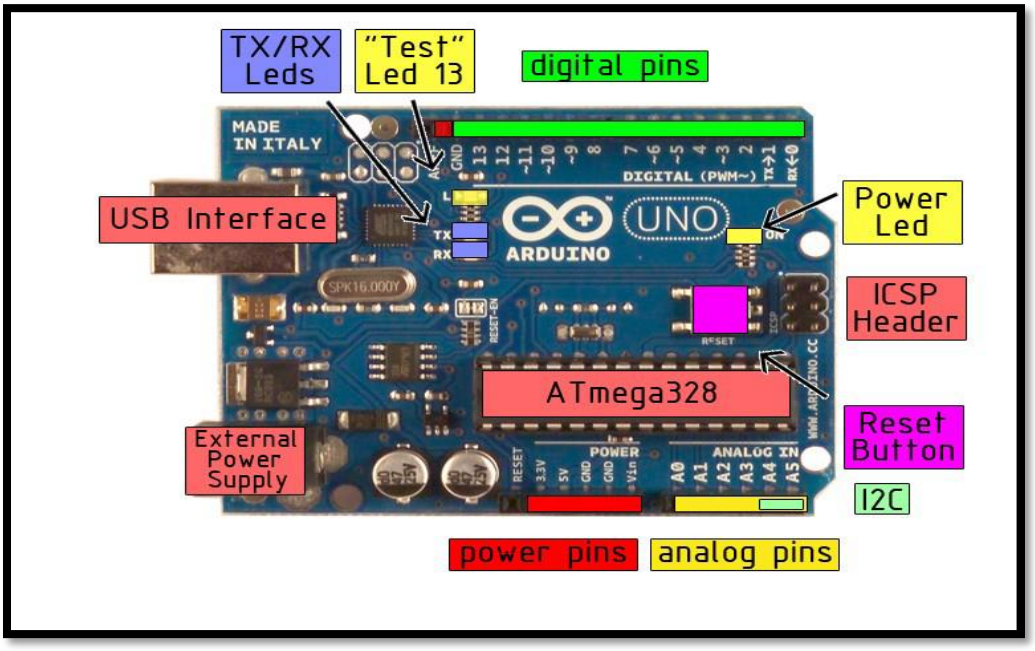

Fig. 2.2.2 Board Specification

- **POWER**

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.

The power pins are as follows:0

- **VIN.** 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.
- **3V3.** A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- **GND.** Ground pins.

- **Memory**

The Atmega328 has 32 KB of flash memory for storing code (of which 0,5 KB is used for the bootloader); It has also 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

- **Inputs and Outputs**

Each of the 14 digital pins on the Uno can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms. In addition, some pins have specialized functions:

- **Serial: 0 (RX) and 1 (TX).** Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.
- **External Interrupts: 2 and 3.** These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value.
- **PWM: 3, 5, 6, 9, 10, and 11.** Provide 8-bit PWM output with the analog Write() function.
- **SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK).** These pins support SPI communication, which, although provided by the underlying hardware, is not currently included in the Arduino language.
- **LED: 13.** There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off. The Uno has 6 analog inputs, each of which provides 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analog Reference () function. Additionally, some pins have specialized functionality:
  - **I^2C: 4 (SDA) and 5 (SCL).** Support I2C (TWI) communication using the Wire library. There are a couple of other pins on the board:
  - **AREF.** Reference voltage for the analog inputs. Used with analog Reference ().
  - **Reset.** Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

- **Communication**

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. RX

and TX LEDs on the board will flash when data is being transmitted via the USB-toserial 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. The ATmega328 also support I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus. To use the SPI communication, please see the ATmega328 datasheet.

- **Programming**

The Arduino Uno can be programmed with the Arduino software (download). Select "Arduino Uno w/ATmega328" from the **Tools > Board** menu (according to the microcontroller on your board). The ATmega328 on the Arduino Uno comes preburned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files).You can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header. The ATmega8U2 firmware source code is available.

The ATmega8U2 is loaded with a DFU bootloader, which can be activated by connecting the solder jumper on the back of the board (near the map of Italy) and then resetting the 8U2. You can then use Atmel's FLIP software (Windows) or the DFU programmer (MacOS X and Linux) to load a new firmware. Or you can use the ISP header with an external programmer (overwriting the DFU bootloader).

- **Automatic Software reset**

Rather than requiring a physical press of the reset button before an upload, the Arduino Uno is designed in a way that allows it to be reset by software running on a connected computer.

One of the hardware flow control lines (DTR) of the ATmega8U2 is connected to the reset line of the ATmega328 via a 100 nanofarad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip.

The Arduino software uses this capability to allow you to upload code by simply pressing

the upload button in the Arduino environment. This means that the bootloader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload. This setup has other implications. When the Uno is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the bootloader is running on the Uno. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened.

If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits a second after opening the connection and before sending this data. The Uno contains a trace that can be cut to disable the auto-reset. The pads on either side of the trace can be soldered together to re-enable it. It's labeled "RESET-EN". You may also be able to disable the auto-reset by connecting a 110 ohm resistor from 5V to the reset line.

- **USB overcurrent protection**

The Arduino Uno has a resettable polyfuse that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

- **Physical Characteristics**

The maximum length and width of the Uno PCB are 2.7 and 2.1 inches respectively, with the USB connector and power jack extending beyond the former dimension. Three screw holes allow the board to be attached to a surface or case. Note that the distance between digital pins 7 and 8 is 160 mil (0.16") , not an even multiple of the 100 mil spacing of the other pins.

- **How to program Arduino**

STEP: 1. Obtain Arduino board (preferably Uno, Duemilanove or Leonardo model)

STEP: 2. Install the Arduino IDE software on your PC. This is how IDE would look like:

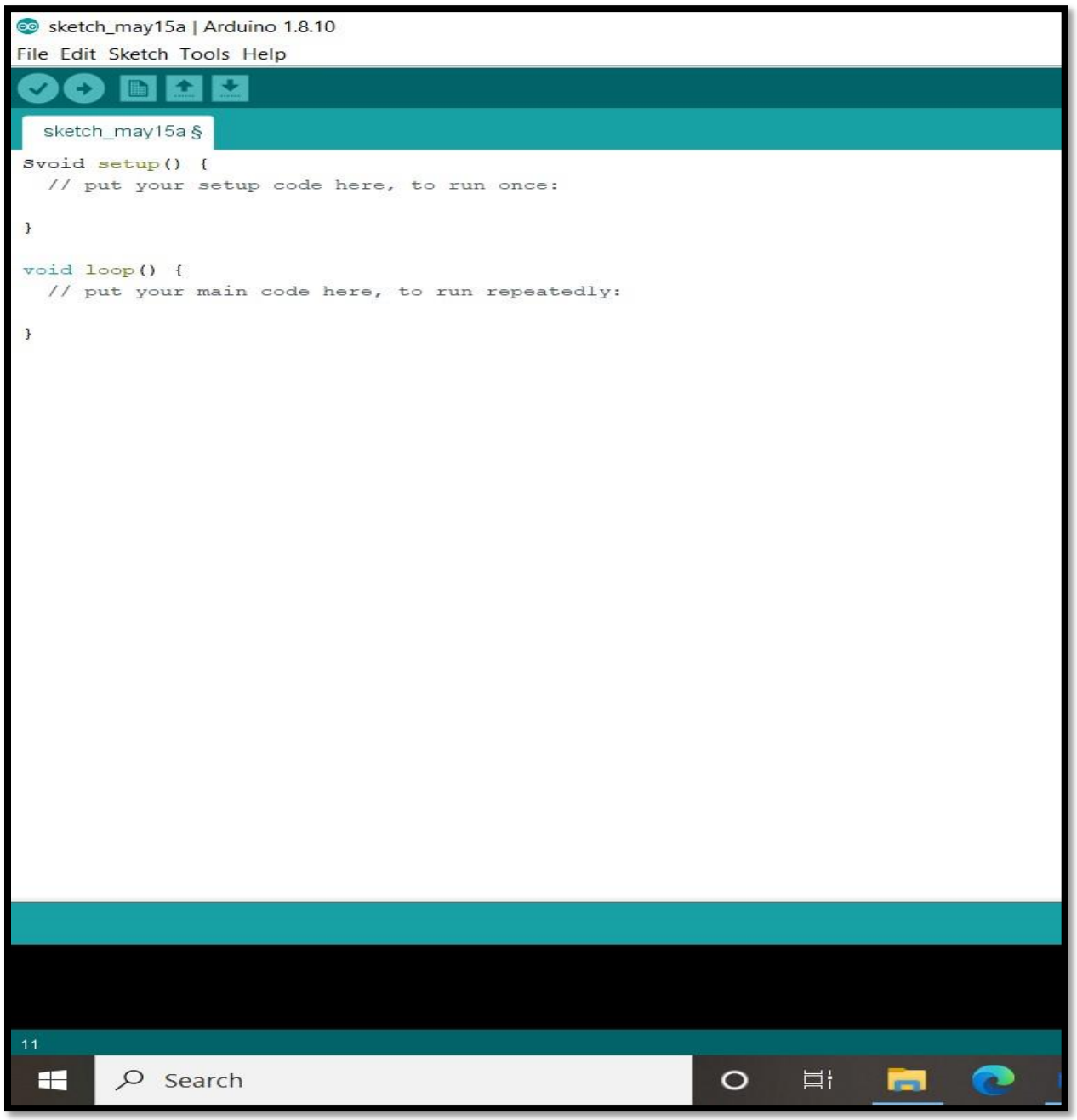

Fig. 2.2.3 Arduino IDE software

STEP: 3. Connect the Arduino board using USB cable provided to your PC. Wait till the necessary drivers are installed and device is recognized as COM port.

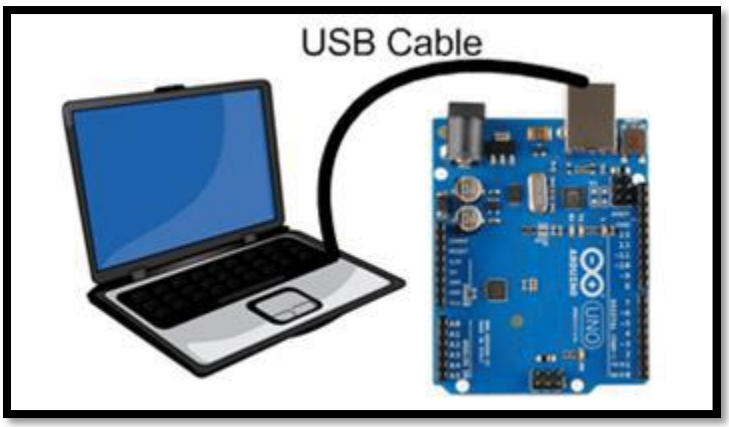

Fig. 2.2.4 Connection of Arduino with pc

STEP: 4. Select the correct Arduino Board type as show below: **Tools > Board >**

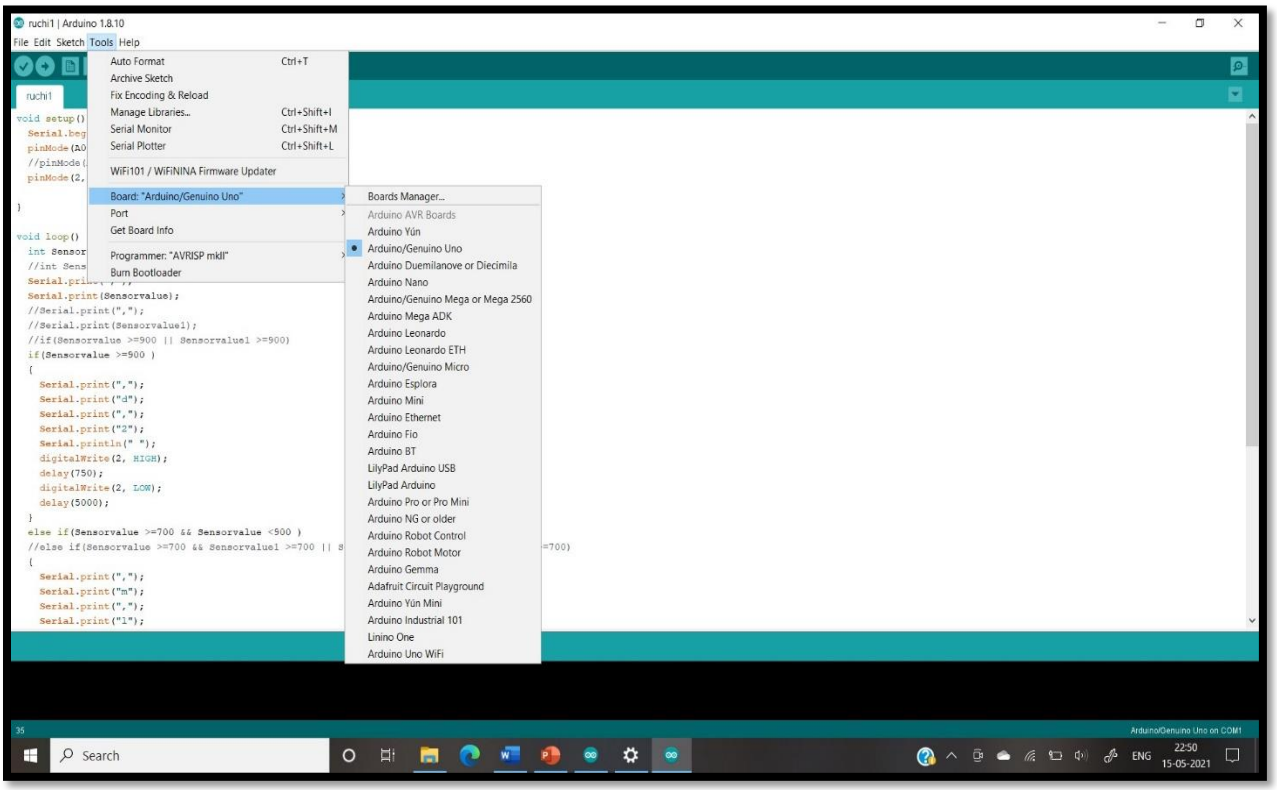

Fig.2.2.5 Select Arduino board type

STEP: 5. Ensure that COM Port identified for your Arduino board is correct. You can also change / select appropriate COM Port your Arduino is connected as from following menu: **Tools > Serial Port >**

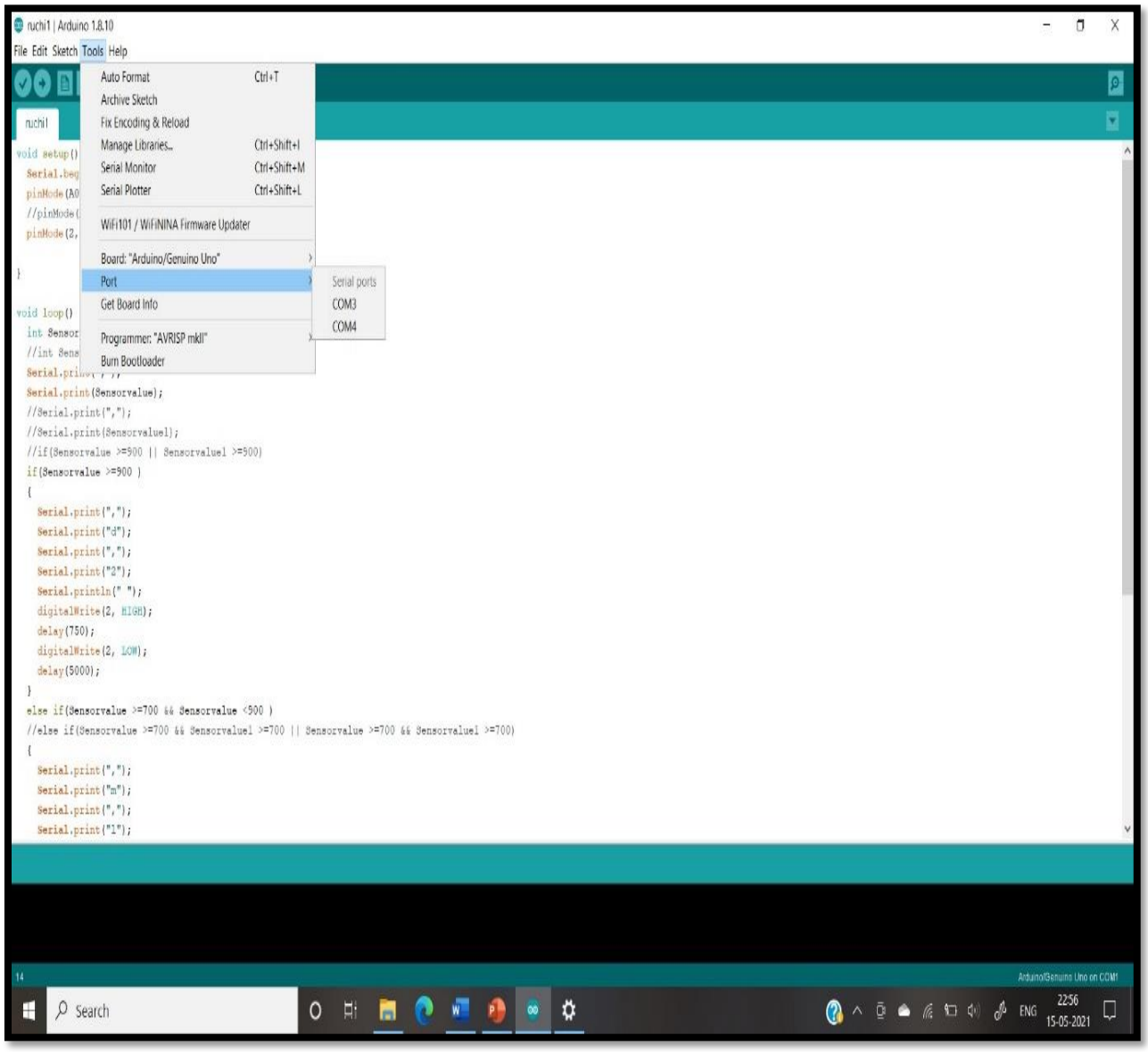

Fig. 2.2.6 Select the serial port

STEP: 6. Once the setting is complete, we are ready to download the program on Arduino board. We can test the setup by programming Arduino bard with an example code (sketch). Go to : **File > Examples > 01.Basics > Blink**

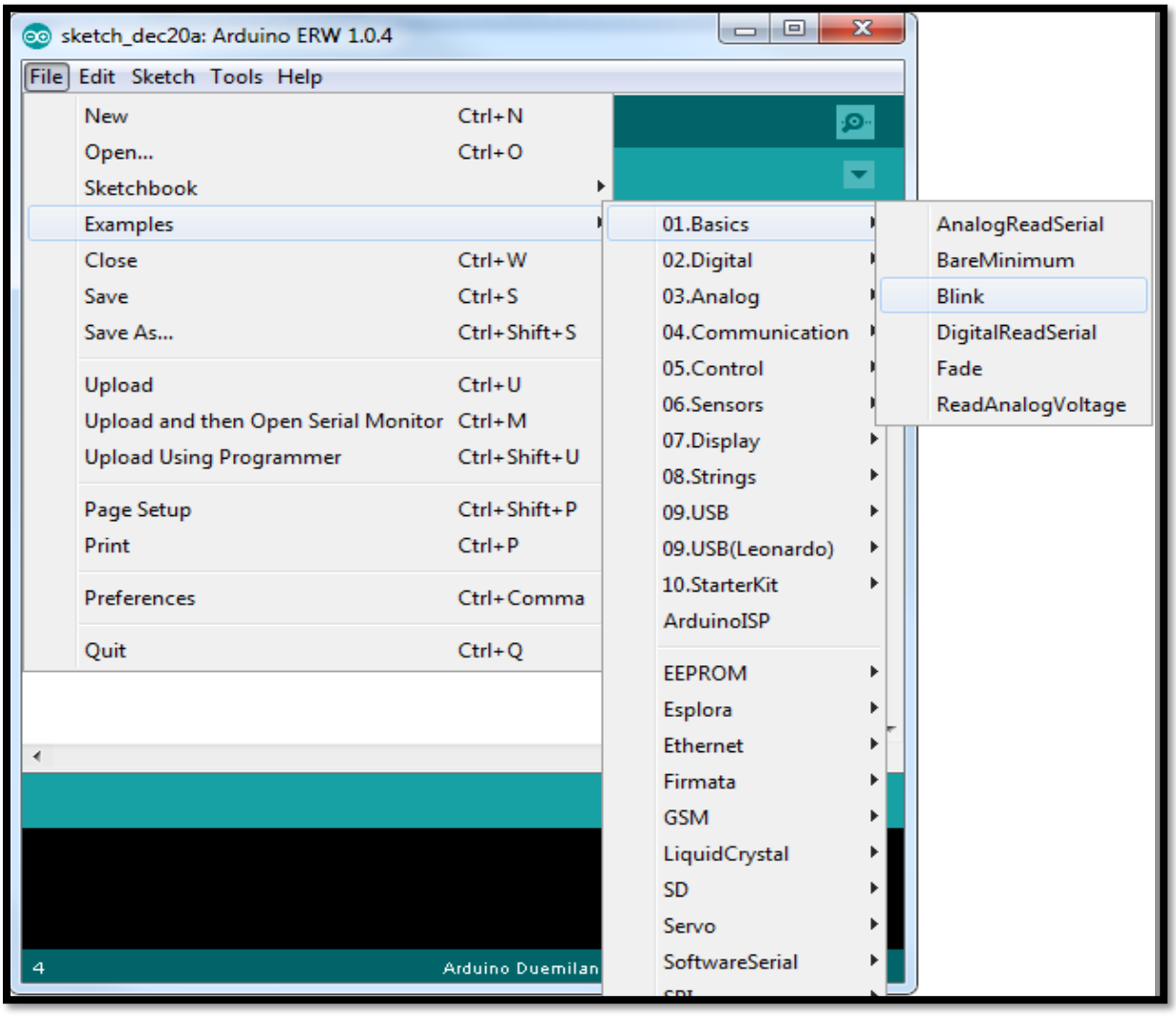

Fig. 2.2.7 Example of blink

STEP: 7. Click on the Right Arrow button (highlighted in orange color in the image below) to compile and upload the binary to Arduino board. Once the upload is done, you will see 'orange LED' on board flashing – on for 1 second and off for 1 second.

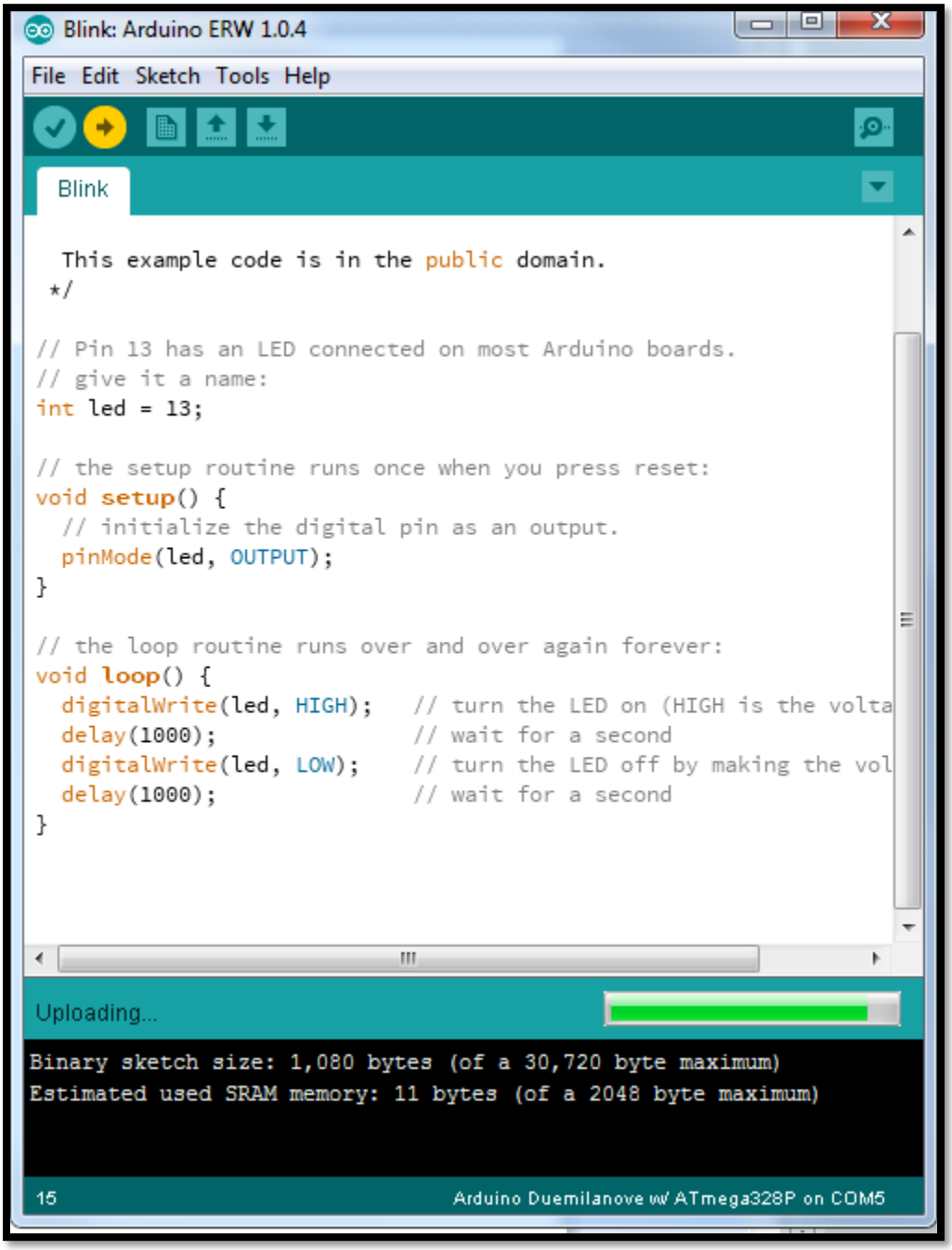

Fig. 2.2.8 Code to blink the LED

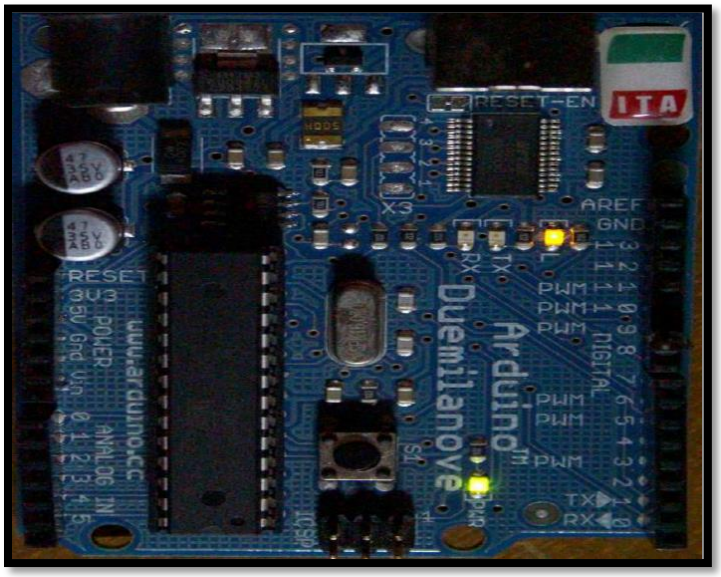

Fig. 2.2.9 Successfully Blinked LED

STEP: 8. Now that setup is successfully completed and tested, open the relevant program (.ino file as specified by the lab experiment) using menu option – **File > Open**

STEP: 9. Using UPLOAD button (circular button with arrow pointing to right) we can compile the program and upload the compiled binary file to Arduino board.

STEP: 10. Once the board is programmed, it will start generating signals at specified pins. The board is ready to probe (or to connect external RC circuits) as per lab needs

Chapter 3

Engineering Economics Of Design

3.1 Cost Estimation

The cost of any insects or reptiles affordable. The cost estimation is based on what an and which type of components we will used in the project to make a device .To make this device the cost of the component are affordable for any user /consumer. The overall cost of product must be minimum to produce so the user can use it . This is made low cost product so that customer can buy product and use it. For making any device we have to first purchase all the components and the price of components are:

Arduino UNO- Rs.449

PCB- Rs. 35

Moisture sensor-Rs.80

Pipe- Rs.25

DC submersible moter-Rs.145

Adapter DC +5Voaltage- Rs.100

3.2 Labor, Material and Overhead Cost

There are many factors to consider when estimating the total cost of a project. These include labor, hardware and software purchases or rental, travel for meeting and testing purpose, telecommunications, training courses and so on.

Labor Cost:

The simplest labor cost can be obtained by multiplying the project's effort estimate (in hours) by a general labor rate. A more accurate labor cost would result from using a specific labor rate for each staff position.

In our project, no any extra labor cost is there, because we developed our project in group of 4 people. There is no any type of extra labor work required. Our project is purely based on coding work and do not contract out so labor work of our project is supposedly 0.

Material Cost:

Material cost of any software project is generally calculated from the price of materials which is used to develop any project. The price of materials can be used in any software project is counted as Material cost of a project. Material cost can be calculated from number of hardware used in our project and purchasing any software for our project development.

Overhead cost:

Effort costs are not just the salaries of the project engineers who are involved in the project. Organization compute effort cost in terms of overhead cost where they take the total cost of running the organization and divide this by the number of productive staff.

Counting all above cost the project cost termination is done by **Rs. 809**.

3.3 The Time Value of Money

Money has time value. A rupee today is more valuable than a year hence. It is on this concept "the time value of money" is based. The recognition of the time value of money and risk is extremely vital in financial decision making. Most financial decisions such as the purchase of assets or procurement of funds, affect the firm's cash flows in different time periods. For example, if a fixed asset is purchased, it will require an immediate cash outlay and will generate cash flows during many future periods. Simillarly if the firm borrows funds from a bank or from any other source, it receives cash and commits an obligation to pay interest and repay principal in future periods. The firm may also raise funds by issuing equity shares. The firm's cash balance will increase at the time shares are issued, but as the firm pays dividends in future, the outflow of cash will occur. Sound decision-making requires that the cash flows which a firm is expected to give up over period should be logically comparable. In fact, the absolute cash flows which differ in timing and risk are not directly comparable. Cash flows become logically comparable when they are appropriately adjusted for their differences in timing and risk. The recognition of the time value of money and risk is extremely vital in financial decision-making. If the timing and risk of cash flows is not considered, the firm may make decisions which may allow it to miss its objective of maximizing the owner's welfare. The welfare of owners would be maximized when Net Present Value is created from making a financial decision. It is thus, time value concept which is important for financial decisions.

- Money has time value because of the following reasons:

1. **Risk and Uncertainty:** Future is always uncertain and risky. Outflow of cash is in our control as payments to parties are made by us. There is no certainty for future cash inflows. Cash inflows is dependent out on our Creditor, Bank etc. As an individual or firm is not certain about future cash receipts, it prefers receiving cash now.
2. **Inflation:** In an inflationary economy, the money received today, has more purchasing power than the money to be received in future. In other words, a rupee today represents a greater real purchasing power than a rupee a year hence.
3. **Consumption:** Individuals generally prefer current consumption to future consumption.
4. **Investment opportunities**: An investor can profitably employ a rupee received today, to give him a higher value to be received tomorrow or after a certain period of time.

Chapter 4

Design for Use, Reuse and Sustainability

4.1 Design for Use

4.1.1 Reliability

Software Reliability is the probability of failure-free software operation for a specified period of time in a specified environment. Software Reliability is also an important factor affecting system reliability. It differs from hardware reliability in that it reflects the design perfection, rather than manufacturing perfection. The high complexity of software is the major contributing factor of Software Reliability problems. Software Reliability is not a function of time - although researchers have come up with models relating the two. The modeling technique for Software Reliability is reaching its prosperity, but before using the technique, we must carefully select the appropriate model that can best suit our case. Measurement in software is still in its infancy. No good quantitative methods have been developed to represent Software Reliability without excessive limitations. Various approaches can be used to improve the reliability of software, however, it is hard to balance development time and budget with software reliability.

This project is very reliable as it reduce the human work and save the environment and water.

This project provides the required information in on time and also helps in quicker decision making.

4.1.2 Maintainability

Software maintainability is defined as the degree to which an application is understood, repaired, or enhanced. Software maintainability is important because it is approximately 75% of the cost related to a project.

In future there will be some errors occurs in our project maintainability will used.

4.2 Design for Reuse

Design reuse is the process of building new software applications and tools by reusing previously developed designs. New features and functionalities may be added by incorporating minor changes.

Design reuse involves the use of designed modules, such as logic and data, to build a new and improved product. The reusable components, including code segments, structures, plans and reports, minimize implementation time and are less expensive. This avoids reinventing existing software by using techniques already developed and to create and test the software.

Design reuse is used in a variety of fields, from software and hardware to manufacturing and aeronautics.

Design reuse requires that a set of designed products already exist and the design information pertaining to the product is accessible. Large software companies usually have a range of designed products. Hence the reuse of design facilitates making new and better software products. Many software companies have incorporated design reuse and have seen considerable success. The effectiveness of design reuse is measured in terms of production, time, cost and quality of the product. These key factors determine whether a company has been successful in making design reuse a solution to its new software needs and demands. With proper use of existing technology and resources, a company can benefit in terms of cost, time, performance

A proper process requires an intensive design reuse process model. There are two interrelated process methodologies involved in the systematic design reuse process model. The data reuse process is as follows:

1. Gathering Information: This involves the collection of information, processing and modeling to fetch related data.
2. Information Reuse: This involves the effective use of data.

The design reuse process has four major issues:

1. Retrieve
2. Reuse
3. Repair
4. Recover

These are generally referred to as the four Rs. In spite of these challenges, companies have used the design reuse concept as a successfully implemented concept in the software field at different levels, ranging from low level code reuse to high level project reuse.

4.3Design for Sustainability

Design for sustainability is an approach that puts the well being of people and the sustainability of the environment first. Designing sustainable products, services and business processes is the best way to develop a sustainable economy.

Design for sustainability must be focused on the function or services of a product rather than on the product it self. The basic principle is get more “service” from less product.

Design for sustainability will incorporate the following key principles:

- Thinking in systems – deciding how things relate to their larger system.
- Dematerialization – get more ‘service’ from less product.

Chapter 5

Prototyping

5.1 Prototype Model

In our intelligent irrigation system, we are developed a Arduino based watering model. The concept is to train the model to supply the water automatically by getting readings of moisture and this reading will useful for create a database which will compute total water demand for crop. In this we are using IOT devices like Bluetooth module, for communication. Other components like moisture sensor, pump, pipe, jumper wires etc. First of we connect all parts to Arduino board then whole code will upload to it through PC or laptop. To create a database, we have to consider type of crop and soil and moisture readings to compute total water demand for individual crops which will create a centralized database to transmit the sustainable data to app which will access the application and then it accesses the model to water the plants. This is applicable for farms, green house, gardens.

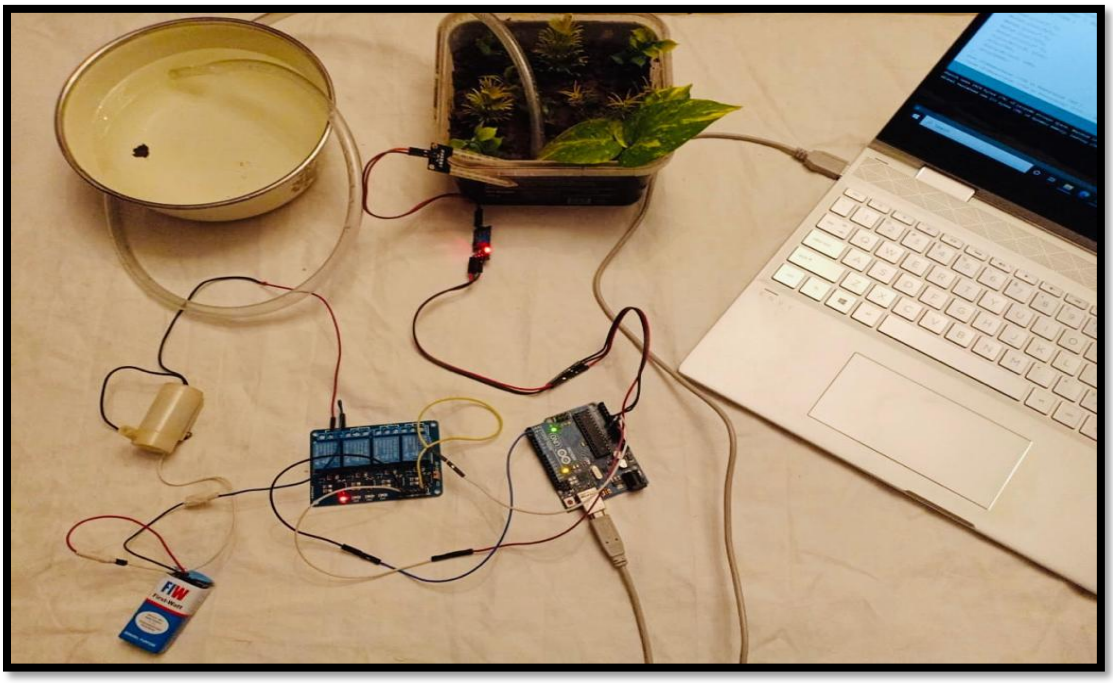

Fig 5.1.1 prototype model

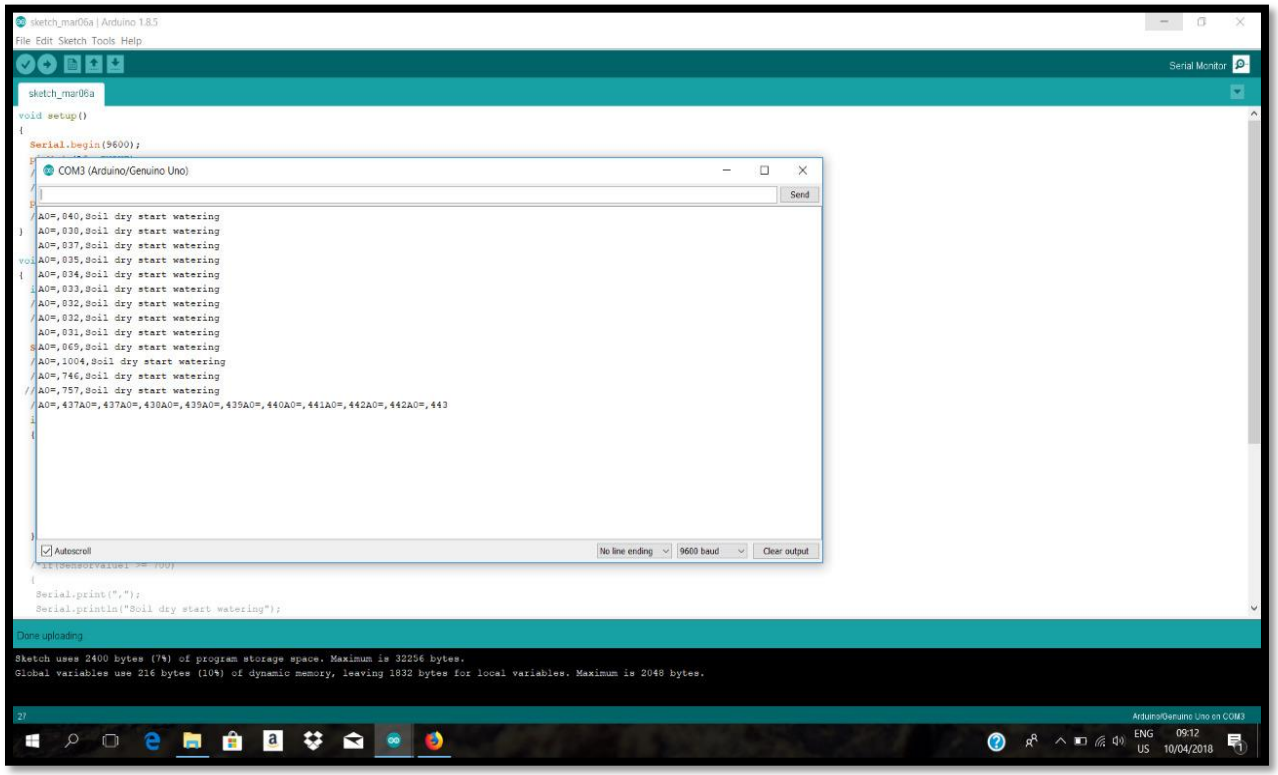

Fig 5.1.2 simulator reading

Chapter 6

Test The Prototype

6.1 Validation

Questions of how to assess the appropriateness of these systems for their intended purposes and how much refinement to carry out have not yet been adequately addressed. While it is sometimes possible to compare the output of an expert system against that of a human expert, many practical difficulties can arise. Some of the evaluation procedures for farming systems models, as well as some of the pitfalls of these procedures, are relevant to the testing of expert systems. Judgment of the market place will be an important component of system evaluation.

6.2 Problems may cause in your System

In our system there may cause problem of hardware components. In monsoon season there may occur some water related problem on hardware component. So, we have to protect it further. Access of water also causes some problem. In, water accessing from the pump the speed of releasing water is very high. Hence, water tank will gradually empty and waste of water will occur.

6.3 Simulation Tools

The tools that are used in our project are listed below:

Simulation Tool: Arduino Uno IDE

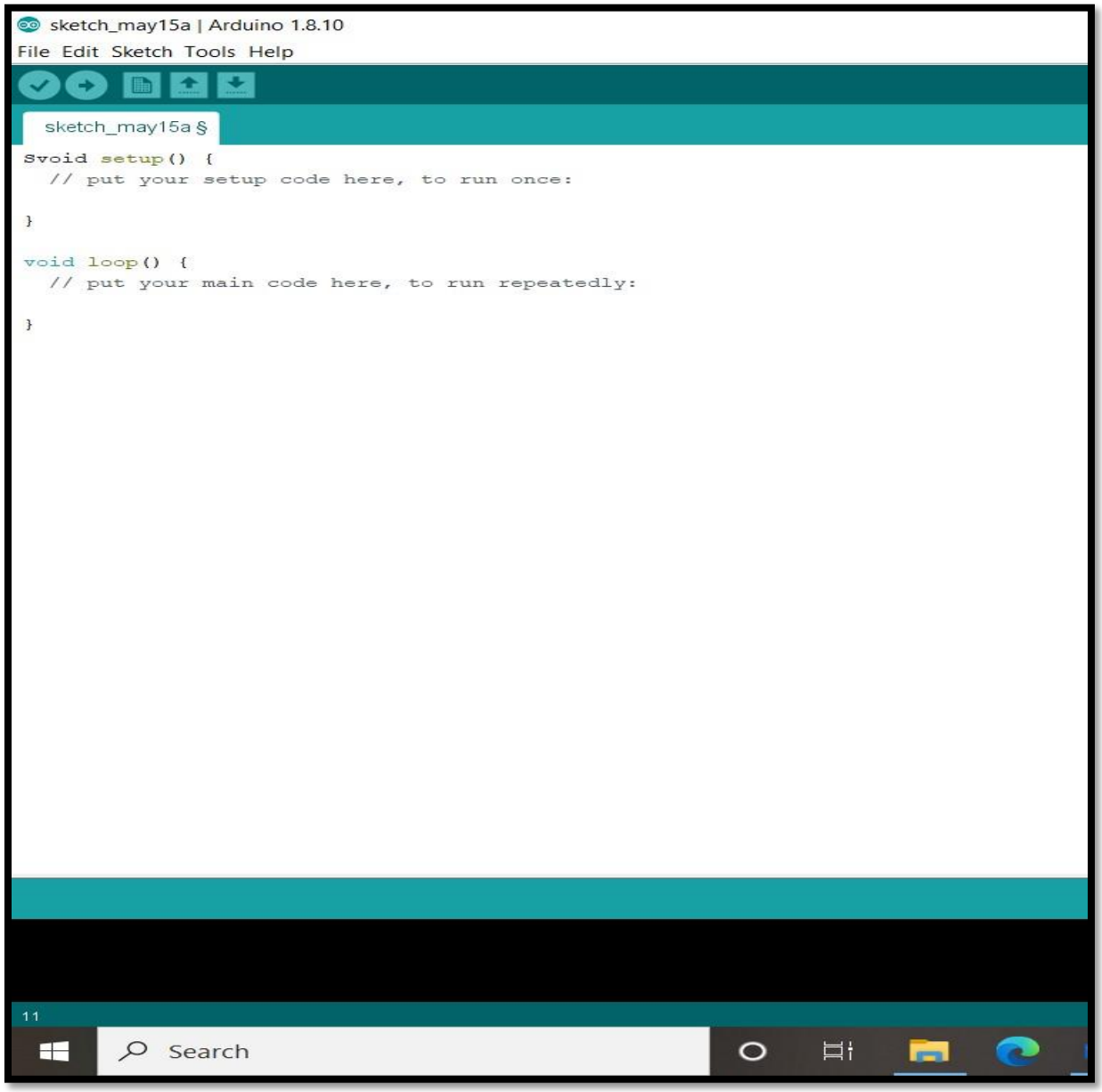

Fig. 6.3.1 Arduino IDE software

Conclusion

This proposed technique is designed to operate a water pump automatically based on the soil moisture sensor detection of sufficient water to the plant or in fields and also temperature sensor based fan speed control. The switching mechanism can be done automatically with the help of microcontroller using relays. The proposed controller eliminates the manual switching mechanism used by the farmers to ON/OFF the irrigation system. The system is also designed for temperature sensor based fan speed control. Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology.

References

Ref Number	Name
1	www.wikipedia.org/wiki/Electronic_pest_control
2	www.arduino.cc/en/Main/ArduinoBoardUno
3	www.arduino.cc
4	www.arduino.Software
5	www.developer.android.com
6	www.nostarch.com/arduino
7	https://howtomechatronics.com/
8	https://www.goodhousekeeping.com/home/gardening/a20706580/soaker-hose-drip-irrigation-system/ , https://www.theartofdoingstuff.com/drip-irrigation/

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Chapter 1 Introduction
1.1 Introduction to Concept/Idea
In India irrigation is maximum dependent on the monsoons, which are not a reliable source of water because the rain in monsoon season is not regular. Depending on the soil type the requirement of the water is different , plants are to be provided with water, which is known as intelligent irrigation system. This project give the prototype design of microcontroller based Intelligent irrigation system so we do not need to go the place and automatic watering is on and off if plant need water which will allow irrigation to take place in zones where watering is required, while bypassing zones where soil moisture is indicated. At present need the system in which we apply cost saving technology, labor-saving are key issues in-irrigation can be solve.
We all know the agriculture plays the important role in the economy and development of the country in India. In our country, the farmers have been using manual control techniques for irrigation in this days. Land is irrigated only at the regular intervals/seasons and the other time land becomes the unfertile and unused without water. In this manual control process, few plants receive more water and for few other plants water reaches late due to which the crops get dried and some plant ﷺ l with extra water.
So there is a need in the residential/commercial irrigation industry for an irrigation controller that responds to soil moisture sensors in individual areas as a way of conserving water and to save the water. An ideal controller should be "user friendly" so customer or user use the controller with ease ,and easy to program and requiring a minimum number of code and logic or buttons to operate the controller. This controller system should also allow irrigation to take place in areas where watering is required, while bypassing areas where soil moisture is indicates by the sensor. The system should be easy in the event of faults in any of the plurality of area and the system is very reliable for the users.
1.2 Scope and Purpose
India is a rural nation, and consequently a ton of water is required for cultivating. Water is

to be utilized as a part of an appropriate way. We propose a microcontroller based system for irrigation system. We make utilization of the different sensors like moisture sensor, water stream meter to keep a beware of the measure of water utilized. By this technique we can control the moisture substance of the dirt in the developing ﷺ'ld. The water stream will be checked and in view of the information accessible, investigation and expectation will be ﷺ] ished. This will help the client to utilize water in future.
In our proposed system, the sensors transmit the information to the server through microcontroller after the ﷺ』 ed time. There are prede ﷺ] ed esteems put away in the database for the speci ﷺ… intervals. These qualities will be contrasted with the qualities from the sensors. In the event that the qualities from the sensors are surface the prede ﷺ] ed consideration then the microcontroller will trigger the pump to water the plants. While crops are being watered, the qualities from the sensors will be observed after the settled time. The qualities will be checked till the qualities are coordinated or over the edge time in the database. In the event that the qualities are coordinated or are over the limit period in the database then the microcontroller will trigger the pump to quit watering the plants. The measure of water stream will be checked between watering the ﷺ'lds and the perusing will be put away in the database. The client will be told between each opening of watering the plants.
The purpose of this project is to mainly reduce the human work and to save the water and environment.

Sources	Similarity
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6.1 Validation
Questions of the way to assess the appropriateness of those systems for his or her intended purposes and the way much refinement to hold out haven't yet been adequately addressed. While it's sometimes possible to match the output of an expert system against that of a person's expert, many practical difficulties can arise. Some of the evaluation procedures for farming systems models, also as
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