

INTEGRATED LAB SUPPORTIVE SYSTEM

GROUP 36

Faculty of Information Technology
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Project Final Evaluation Presentation

Level 1

Integrated Lab Supportive System

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PROBLEM IN BRIEF

- While working in a chemical laboratory there are some difficulties that can be encountered.
- Before starting, **all needed equipment and tools must be gathered into the place** where we work. **Keeping them back one by one in separate places** is also another must.
- **Accuracy of measurements** : When using analog measuring equipment read value could differ compared to the shown value by the scale due to the observational error. Sometimes recognizing may be not perceivable for eye when expecting a gas (colorless) as a product of a chemical reaction or identifying almost similar colors of solution apart.

PROBLEM IN BRIEF Cont.

- **Maintaining a constant temperature** : Attention and patience are needed on the sample, which may be a tedious task while other observations about sample are supposed to be taken. Sometimes the temperature value being maintained could be exceeded because of this.
- **Traditional experimental actions have to be done step by step** manually which makes the evaluation of experiment harder and slower. Process becomes even harder when two parameters need to be observed synchronously.

PROPOSED SOLUTION

- For address every difficulty mentioned earlier **an all-in-one integrated lab supportive system** was proposed to be made.
- It contains,
 - ✓ Automatic stirring arm and stand
 - ✓ Digital display and controller panel
 - ✓ Sensor probes rack
 - ✓ Working board (included : heating unit, weight measuring unit)

AIM AND OBJECTIVES

Aim

- Providing an all-in-one system (multifunctional equipment) that can achieve different tasks of different laboratory instruments, while helping to avoid difficulties of taking measurements.

AIM AND OBJECTIVES

Objectives


- Bringing all basic laboratory measuring and tasks into one unit reducing the time needed for reaching various instruments.
- Providing an automated functionality for gathering measurements from experiments needing consecutive measurements and observations.
- Providing real-time tabulating and graphing functionalities.
- Providing a way to take two measurements types simultaneously.
- Making the heating process easier, adjustable, measurable.
- Providing ability of maintaining a constant temperature for heating systems.

AIM AND OBJECTIVES Cont.

Objectives

- Providing a way to recognize observations that are not perceivable for the human eye (Reactions with colorless gas releasing, precise color recognition) .
- Making the experiment easier for user by making hands free of instruments as much as possible which also allows to be more focused on observation than handling instruments (Automatic stirring mechanism) .

CONTENTS

1. INTRODUCTION
 2. MEASURING SYSTEM
 3. HEATING SYSTEM
 4. OPERATING ARM
 5. DIGITAL DISPLAY AND CONTROLLER PANEL
- 
- A decorative teal-colored curved shape located in the bottom right corner of the slide, starting from the bottom edge and curving upwards and to the left.

01. INTRODUCTION

- An Integrated Lab Supportive System can be introduced as a system bringing various lab instruments into a one system creating an all-in-one mini lab.
- Having different measuring instruments in a distance that can be reached by hand is the basic functionality of this system.
- It supports different ways of taking measurements and observations in automated ways.

01. INTRODUCTION Cont.

This entire system consists four main sections

1	Measuring System
2	Heating System
3	Operating Arm
4	Digital Display and Controller Panel

01. INTRODUCTION Cont.

1. Measuring System

Measuring system consists five parameters.

- I. **Weight**
- II. **Temperature**
- III. **Gas Concentration**
- IV. **Color**
- V. **pH**

01. INTRODUCTION Cont.

2. Heating System

Heating system consists two heaters.

- I. Heating Plate

- II. Heating Probe

3. Operating Arm

Operating arm is used for stirring and it also consists a temperature sensor.

4. Digital Display and Controller Panel

Digital display is an LCD graphical display. A keyboard is used to input commands.

02. MEASURING SYSTEM

- Temperature of a solution, pH value of a solution, weight of a sample and gas concentration (or gas detection), color of a solution are the main measurements handled by the system.
- Both single and dual channel modes are available.
 1. **Single mode** - One measurement type
 2. **Dual mode** - Two measurement types simultaneously
- Two methods are available for measuring inputs as Direct and Period.
 1. **Direct** - Direct input value / direct action
 2. **Period** - Gather inputs periodically

03. HEATING SYSTEM

- Heating system is used to control temperature.
- Heating system has two modes as Direct and Constant.
 1. **Direct mode** - Direct input value / direct action
 2. **Constant mode** - Maintain a constant temperature
- Heating system is divided into two sub systems.
 1. **Heating Plate**
 - Heating plate is used for heating beakers and crucibles.
 - This is turned off automatically after heating process is finished ensuring that there will be no burning damages.

03. HEATING SYSTEM Cont.

2. Heating Probe

- Heating probe is used for heating test tubes.
- Action of the heating probe is similar to the action of the bunsen burner.

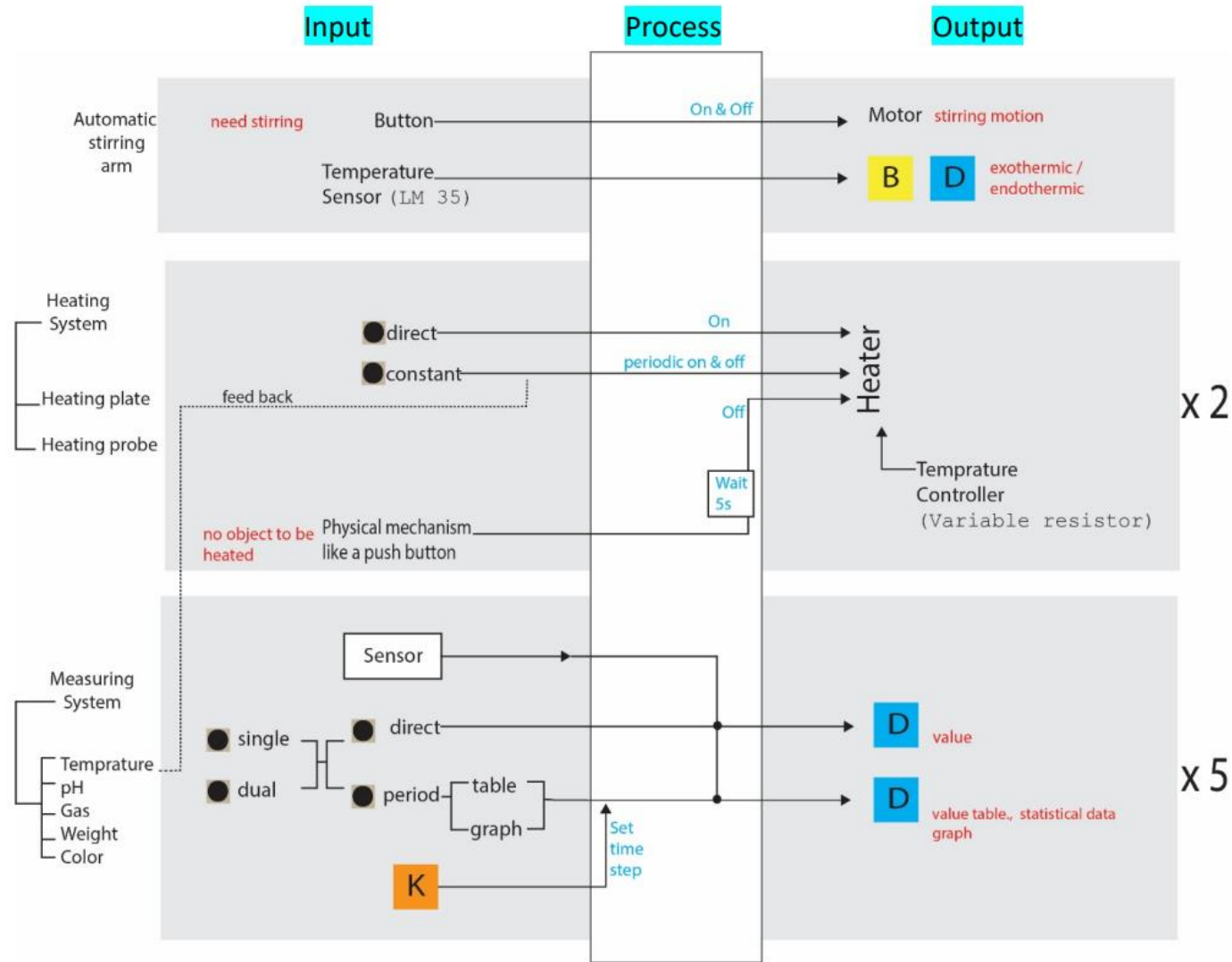
04. OPERATING ARM

- A motor is used which can give gentle motions (circular motion) to stir the solution in a test tube.
- A temperature sensor is positioned in a way that it contacts with surface of test tube to identify whether **heat emitting(exothermic)** or **heat absorbing(endothermic)** reaction is happening.

05. DIGITAL DISPLAY AND CONTROLLER PANEL

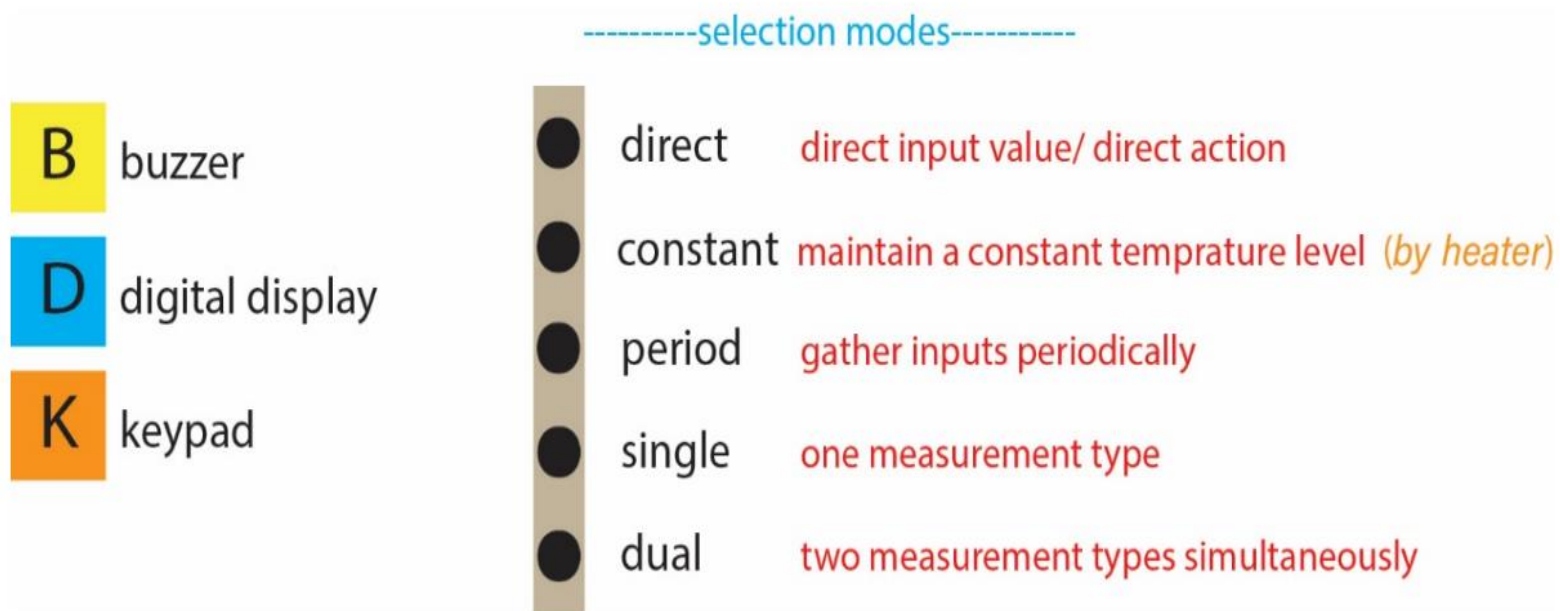
- Selections and measurement data are displayed on an LCD graphical display. GUI menu is used for selections.

BLOCK DIAGRAM



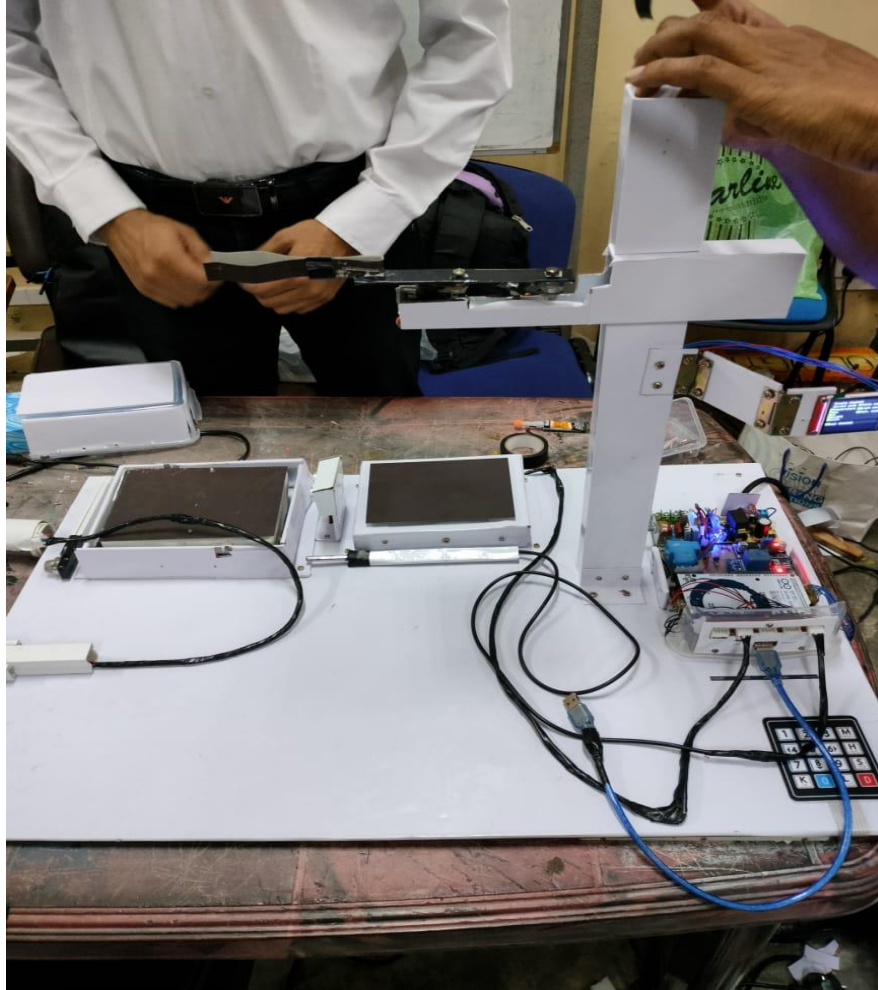
***Most of user inputs related to this sytem (option selection, turning on & off, numerical inputs) are given by a GUI menu*

BLOCK DIAGRAM



Key for the block diagram

Implementation



THANK YOU

A large, solid teal curved shape that starts from the bottom right corner and sweeps upwards and to the left, ending near the center of the right edge of the frame.