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Optimization Automatic Irrigation Model for Urban Forests Based on Internet of Thing

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Abstract— Irrigation is one of the important factors in the agricultural and plantation industries. In addition, irrigation is also important for watering city parks and urban forests. Irrigation is needed to maintain water availability. Based on this, proper water management efforts are needed, especially for irrigation that is carried out conventionally because it is inefficient so that it requires a lot of water that does not match the needs. Conventional irrigation also takes a lot of time just to irrigate plants so that it is less effective for large and relatively large areas. For this reason, technology is needed that automatically carries out irrigation effectively and efficiently. This community service aims to be implemented in the Pondok Labu city forest which currently requires automatic watering to make it easier to carry out irrigation which can later be monitored. The system used in this study is automatic irrigation based on the Internet of Things (IoT). Automation uses Arduino Mega Pro Mini and other supporting components. Watering can be done automatically according to schedule or if the soil conditions are dry and stop watering on soil that shows moisture. Automatic irrigation can also be monitored using a smartphone by utilizing a smartphone application.

Keywords— Automatic Irrigation, Model, Urban Forest, Application, Smartphone

I. INTROCUTION

Pondok Labu is one of the sub-districts located in Cilandak, South Jakarta with area code 31.71.030.002. In 2018, this sub-district had a population of 45,407 people and an area of 39.1 km2 (Rachmat Hermawan, 2018). Pondok Labu Sub-district borders Cilandak Barat, Lebak Bulus. The name Pondok Labu comes from the words "Pondok" and "Labuh". The word "Pondok" means a place to stop, while "Labuh" means to anchor, so both words have the meaning of a temporary place for newcomers to stop (Triramanda Azhar, 2017). At first, people knew "Pondok Labu" when they rested or anchored around the river basin that connects the Pesanggrahan River and the Krukut River. The naming of this area should be written "Pondoklabuh", However, when the Dutch controlled Batavia, they named this area as "Pondoklaboe"

Like most areas in Jakarta in general, the population of Pondok Labu is quite dense, in the middle of the Pondok Labu Subdistrict area there is a city forest. Initially around 1803, the Pondok Labu area began to be said to have been owned by a landowner named Pieter Walbeck. At that time, Pondok Labu was part of the Simplicitas Market together with Lebakboeloes and Djoemahat Market (Saraswathi D, 2018). Pieter as the ruler of the Pondok Labu area had a rice mill and a rest house named Simplicitas. On the map made by the Topographic Bureau (Dutch: Topographisch Bureau), Batavia 1900, the rice mill and rest house were located not far from the Pesanggrahan River north of Rempoa. During the leadership of Governor Ali Sadikin, the agricultural and plantation areas in Pondok Labu began to turn into residential areas (Yani Prabowo, 2017). In addition, Governor Ali also built Jalan Pondok Labu which connects Bogor Regency, precisely Pangkalan Jati Village and Gandul Village in Limo with Jakarta.

Increasing flow of urbanization requires Pondok Labu to have access to education. Therefore, one of the community leaders, namely Haji Saleh, handed over land not far from his house to build an elementary school. The elementary schools are Pondok Labu 03, 04, 09, and 010 Pagi State Elementary Schools which have now been merged with Pondok Labu 03 State Elementary School.

Urban forests are one type of green open space in urban areas, urban forests are areas where there are quite dense trees and are an important conservation in urban environments because they have benefits as regulators of urban air heat, to prevent pollution of dust particles, as providers of O2, habitat centers for wild flora and fauna as well as providers of urban aesthetics (Abbasi, 2022). DKI Jakarta through the forestry service is maintaining several areas designated as urban forests, this is due to the massive changes in agricultural land in the capital city of Jakarta which have turned into residential areas (Saroisnong, 2022). Urban forests can be utilized by a local resident but it is not allowed to own the land area and it cannot be traded but the urban forest area can be utilized through farmer groups under the supervision of the apparatus (Fauzi, 2016).

The DKI Regional Government has created quite a lot of city park locations, but often these parks are not optimally maintained, due to personal and technological limitations (Paransi, 2021). One of the technological innovations in the plantation sector is sensor technology and automation technology. Internet technology has reached every line of life, with the internet supported by smartphones and support for embedded system technology that exists today, it is very possible to be applied in the plantation sector, especially for use in plant care and maintenance (R, 2021).

The plantation system based on computer technology in Indonesia has not developed much and not many have implemented it, because the price of these devices is currently mostly imported from abroad at a relatively expensive price. With expensive price, farmers generally will not implement the system. how to design a minimum system based on a microcontroller with IoT for plantations (Saini, 2020). So that if the system is produced, it can be utilized by business actors in the plantation sector at a low price.

Supervisory control and data acquisition system hereinafter referred to as SCADA is a control system architecture consisting of computers, network data communications and graphical user interfaces for high-level machine and process monitoring (Sharma, 2020). It also includes sensors and other devices, such as programmable logic controllers, that interact with the process plant or machine. Initially, SCADA systems were applied in large industries, but now with advances in computer technology and embedded systems, it is possible to apply them in the plantation sector. In 2008, Suhardianto et al conducted a study on the application of Progroninrable Logic Controller (PLC) for chrysanthemum cultivation (Herry Suhardiyanto, 2018). PLC is a control device that can be used for various purposes, but at that time PLC could not be connected to the internet, another problem was that PLC was less popular for application in plantations because the price was relatively expensive for farmers.

The research on automatic plant watering based on ATmega 85 microcontroller with soil moisture sensor, it was conducted on soil moisture measuring instrument based on microcontroller. In the research, microcontroller can be used as a measuring instrument. The next research was research on designing aeroponic system based on Arduino Uno and GSM communication for providing nutrient solution for vegetable cultivation, the research proved that microcontroller and communication capability can be used to provide nutrition in plantation business. The next researched implemented fish feeding using IoT device with NodeMcu microcontroller (E. B Agustina, 2023).

Based on the background of the problem, the problem is how to do or build an automatic watering system for the land based on a microcontroller via the Internet. To install the water management automation system, counseling, coaching and guidance will be held for the community (Kumar S, 2023).

The expected output targets through the Community Service program for the Pondok Labu Forest Farmer Group are described as follows;

a. Utilizing water resources so that they can be utilized optimally.
b. Learning for the community to utilize appropriate technology, namely for pump automation. to create an independent irrigation automation system, for various agricultural maintenance needs.

II. METHODS

The activity plan to be carried out by field surveys to partner locations. In this survey, a review is carried out starting from the urban forest location. Interview activities with partners are carried out to find out the problems and desires of partners in handling the watering. take the following steps as shown in Figure 1.

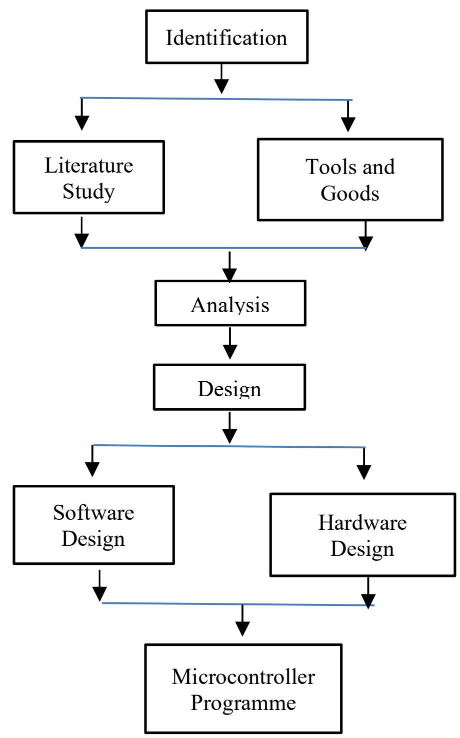

Figure 1. Activity flowchart

This research was conducted to overcome the problems faced by farmers. Making an automatic watering tool based on microcontrollers and IoT, by utilizing a soil moisture sensor as a soil moisture measuring tool, and a DHT11 sensor to measure room temperature and humidity. The use of an ESP32 controller as a controller to regulate the relay connected to the water pump.

In Identification, information about user needs (customer requirements) is needed. The objective will be collected primary data (through direct surveys) or secondary data (Evi Kurniati, 2017). Sometimes the information obtained is not specific enough to be translated into functional needs (functional needs in the functional domain). In such cases, the attributes will be developed using the objective tree diagram method. Analysts In this initial design, it is done to realize the attributes or design objectives and translate them into functions or processes (Singh, 2018). At this stage, the functions or sub-functions are also defined as well as the selection of components or subsystems and the layout of the components or subsystems in the system. After the system and subsystems are defined, the next stage is determining the parameters (sizing) of each component or subsystem.

Design is the final stage of the design process where the design results are poured into technical drawings. The research was conducted at the Budi Luhur University Laboratory and the testing and implementation of the sprinkler irrigation system in the Pondok Labu City Forest, South Jakarta. The sprinkler irrigation design in this design is to create a series of sprinkler irrigation systems that are easy for farmers to operate with relatively more economical manufacturing costs (Yue, 2020). The design of the sprinkler irrigation system scheme is made as in Figure 2;

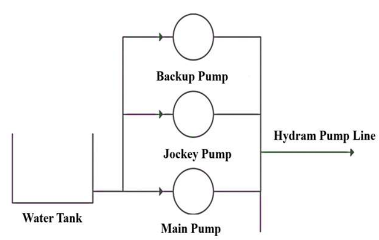

Figure 2. Sprinkle installation system

This system has 3 main parts, namely the driving force pump, the piping network system, and the sprinkler nozzle (Noerhayati, 2020). First, the pump used is a centrifugal type. The source of irrigation water can come from a well, river, reservoir, or other sources. Determination of the volume of the reservoir is analyzed based on the area of the planted area. The calculation of the analysis of the volume of the reservoir pool needs uses the following equation:

$$VP = (T \cdot Qs. N) / 1000 \quad (1)$$

description(1)
VP = volume of reservoir (m3);
T = irrigation duration (hours);
Qs = sprinkler discharge (l/jamhour);
N = number of sprinklers (pieces).

The three types of sprinklers used are Spray, the shape of the water jet spreads in all directions, some can be adjusted for distribution (25 to 360 degrees) and some only have certain shapes such as circles, half circles and quarter circles. The range of this type of sprinkler is relatively short/close (maximum 5 meters) so it is usually used for watering plant seedlings, small-scale plantations, narrow areas and hard-to-reach/hidden areas with the following specifications: operational pressure 2 – 4 bar with nozzle size 4 mm; sprinkler discharge 0.85 – 1.2 m3/hour;

The following is a schematic of the installation that will be installed in the city forest location can be seen in Figure 3;

Figure 3. Installation Plan

This irrigation system is designed to be operated manually by opening the tap and can also be operated by implementing Internet of thing technology. By adding a communication device connected to the pump machine (Murase, 2023).

Sprinkler irrigation is the provision of water on the surface of the land in the form of water splashes like rain showers. Sprinkling water is done by flowing pressurized water through a small hole (sprinkler/nozzle). Pressure is obtained from pumping the water source. To get a uniform flow, it is necessary to select the appropriate sprinkler size, operational pressure, spacing or distance between sprinklers (Haq, 2018).

The Steps

1. Plant Water Requirements Irrigation water provided is determined based on the water holding capacity of the soil which indicates the amount of available water (TAM, Total Available Moisture) and water absorption by plants. The amount of available groundwater, which is the difference between field capacity and the permanent wilting point. However, irrigation water must be provided immediately before the soil water content reaches the permanent wilting point, which is called the permissible water deficit (MAD, Management Allowed Depletion). Vegetables have a root depth of between 0.2 - 0.4 m, and soil moisture depletion is recommended at 25-40%.

a. Clean Irrigation Depth (d)

The clean depth of irrigation water can be calculated using the formula:

$$d = TAM \times MAD \times D \quad (2)$$

description
d = total remaining permitted groundwater availability (mm)
TAM = total available soil water (mm/m)
MAD = permitted soil water content (%)
D = plant root depth (m)

b. Gross Irrigation Depth (dg)

The gross irrigation water depth (dg) in sprinkler irrigation that has taken to account the clean water depth and irrigation efficiency itself can be formulated as follows:

$$dg = d\ Ea \quad (3)$$

Description(3)
dg = Gross irrigation water depth (mm)
d = Clean irrigation depth (mm)

Ea = Efficiency of irrigation system irrigation application (%)

2. Irrigation Interval

Determining the maximum water supply interval (Imax), this is to plan the lateral pipe schedule with the equation:

$$Imax = d\ ETc \quad (4)$$

Description(4)
Imax = Maximum irrigation interval (day)
d = net depth (mm)
Etc = peak plant evapotranspiration (mm/day)

3. Irrigation Water Requirements

The need for spray irrigation water during the irrigation water provision interval (Ig) with the formula:

$$Ig = Imax\ x\ ETc\ Ea \quad (5)$$

Description(5)
Ig = Irrigation water requirement (mm/hour)
Imax = maximum irrigation (day)
Etc = peak plant evapotranspiration (mm/day)
Ea = irrigation application efficiency (%)

The rate of water supply to the sprinkler for spray irrigation can be approached by the equation:

$$I = Q\ S1\ x\ S2\ x\ 3600 \quad (6)$$

Description(6)
I = watering rate (mm/hour)
q = sprinkler discharge (l/sec)
S1 = distance between sprinklers (m)
S2 = distance between lateral pipes (m)

The duration of irrigation water supply should not exceed 90% of the time available (24 hours) calculated using the formula:

$$t = dg\ I \quad (7)$$

Description(7)
t = operating time (hours)
dg = gross irrigation water depth (mm)
I = watering rate (mm)

Planning the Layout and Layout of Sprinkler Irrigation Networks.

1. Sprinkler Planning

Water particles moving with an initial velocity of V, and forming an angle to the horizontal of α, then the direction of the water particle velocity is as follows:

Vertical components = Vz
Horizontal velocity components = Vx
With:
Vz = V sin α
Vx = V cos α

The magnitude of the initial velocity at the distance of L is 24

with:
g = Constant 9.81
L = Planned spray distance (m)
α = Angle 45°2.

2. Sprinkler Speed and Height

The calculation of jet speed and height describes the relationship between the pressure applied to a certain sprinkler size and from the flow speed can be obtained the magnitude of the jet height.

Sprinkler speed formula:
with :
cv = velocity coefficient (0.82)
P = required pressure 12
V = velocity caused by jet length (m)

Sprinkler height formula :
with :
Vz = Vertical velocity
g = 9.81

3. Sprinkler Debit

Sprinkler discharge is calculated using the flow formula at the orifice (Teoricelli):
with:
ɑ = nozzle cross-sectional area (m2)
g = gravity (m/sec)
h = pressure on the sprinkler/nozzle (m)
C = discharge coefficient (0.96)

Hydraulics of Sprinkler Irrigation Networks

1. Major Head Loss Calculation of head loss due to major losses can be calculated using the following formula (Sapei A, 2006):

For large pipes (>125mm)
Head loss due to friction:

$$Hf1 = J\ x\ F\ x\ (\ LÚ100\ )$$

$$F = 1\ 2{,}75\ x\ 1\ 2N\ x\ (\ 1{,}75-1)\ 0{,}5\ 6N2 \quad (8)$$

Description(8):
J = gradient of head loss (m/100 m)
F = reduction coefficient
N = number of laterals or sprinklers

2. Minor Head Loss Losses at bends and pipe joints can be calculated using the equation:

with:
Hf2 = head loss at bends (m) v
= flow velocity (m/s)
k = coefficient loss at bends or joints
g = acceleration of gravity (9.8 m/s)

The flow velocity can be calculated using the formula:

With:
V = flow velocity (m/s)
Q = discharge in flow (m3/s)
A = area in pipe (m2)

Head loss due to narrowing of pipe diameter can be calculated using the following formula:

with:
Hf2 = head loss at bends (m)
v = flow velocity (m/s)
k = coefficient of loss at bends or joints
g = acceleration of gravity (9.8 m/s)3.5.

Total Dynamic Head (TDH)

The total dynamic head (TDH) is calculated using the equation (Sapei A, 2006):

$$TDH = SH + E + Hf1 + Hm + Hf2 + Hv + He + Hs \quad (9)$$

Description(9)

SH = difference in elevation between the water source and the pump (m)
E = difference in elevation between the pump and the highest land (m)
Hf1 = loss of head due to friction along the distribution and supply pipes (m)
Hm = loss of head at joints and valves (m).

Partner participation in the implementation of the program is to help find data related to the location of the land to be installed, then measure the distance from the potential place for the installation of the pump to where the water is needed and measure the difference in vertical height (David Vallejo-Gómez, 2023). The vertical drop from the water source to the pump must also be measured, from the water source to the place where the pump will be installed. In addition, the community is expected to participate in the manufacturing process to installation. Each partner prepares materials and tools to make the pump and will then be given counseling, guidance and assistance in manufacturing until all equipment can be operated properly.

III. Result and Disccusion

This community service activity began with the pre-implementation stage from September 2022, the team leader reviewed the case that was to be used as an activity idea from problems in the surrounding environment. The long dry season and complaints from Pondok Labu urban forest farmers finally gave the idea for this activity. The pre-implementation stage itself began by reviewing the feasibility of the activity through surveys and dialogue with representatives of local farmer groups, then an activity proposal was prepared until it was finally approved by Univeristas Budi Luhur.

The next stage is the planning stage, where in this stage the team is assisted by water resource specialist experts for the planning. The team previously reviewed the main problems at the Pondok Labu City Forest location, which include; Limited water sources for agriculture due to long dry season, threat of delay, not optimal irrigation management system.

The long dry season has caused the irrigation flow for the urban forest farmer group's rice fields to dry up. Another reliable water source is drilled well water found at several points, as seen in Figure 4.

Figure 4. Apart of Pondok Labu Forest

The water distribution system from this source is constrained by the availability of equipment, namely pumps and pipe networks. Only one person from all members of the farmer group has a pump, and because it is privately owned, the pump cannot be flexibly used together.

Based on these problems, the team and farmer groups agreed to plan the procurement of pumps and water distribution pipes owned and managed by the farmer groups. The procurement of pumps and pipes was carried out in a participatory manner, where the UBL team provided financial assistance and the farmer group members added the deficiencies. Additional pumps and pipes can be an alternative to optimize irrigation in the dry season. One irrigation with a pump for one rice field takes approximately 3 hours, with two pumps, 4-6 plots of land can be irrigated in one day, if previously only 2-3 rice fields. This is also supported by the many well points that facilitate access to water sources.

The next plan is to design a system for using pumps and pipes, through a joint discussion, a person in charge is decided, the two plans above, also a plan for rotating irrigation through an open-close system, this is based on input from civil water resources experts. The irrigation rotation method is divided into two, namely irrigation of the northern and southern bulak or plot groups. This division is done to optimize the amount of water entering each bulak. So far, when irrigating from irrigation channels, all bulaks are irrigated simultaneously, so that it takes a long time to meet its water needs, with an alternating system, by closing water access from the northern bulak to the southern bulak, water filling will be faster. The open-close system with a higher priority for the northern part to be filled with water first, then the southern part, this aims to reduce water absorption into the soil when filling the southern part which is more gentle, so that the water filling time is faster, especially during the dry season where the amount of water is limited. An illustration of the channel opening and closing plan can be seen in the Figure 5 bellow.

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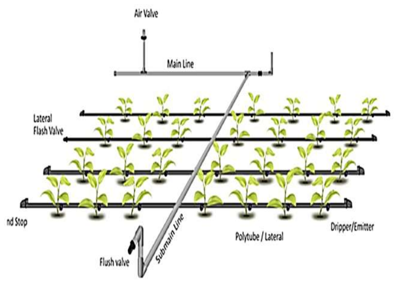

Figure 5. Plot of land used

One of the biggest challenges with this design was the number of sets. When we first designed the system, it was designed for two sets. Given the layout of the site, it was perfectly capable of having one set. This was done to save on piping costs. If we had chosen to do two sets, two main lines would have been required. If two sets were chosen, this would have changed the entire size of the piping used. We would then have two installations per set. Once the design was refined to just one set, there could have been three manifolds used. For cost reasons, we decided to go with just two because they did a good job of distributing the pressure in the system. Even with that decision, the overall system still ended up with good uniformity of distribution. Everything about this design is unique. It is very difficult to get two designs that are the same. This includes the soil type, the size of the site, and the slope of the site. These are all key aspects of this design.

A. Definition of Sprinkler Irrigation

Sprinkler irrigation is the provision of water to the surface of the soil in the form of water splashes like raindrops. Sprinkling water is done by flowing pressurized water through a small hole (sprinkler/nozzle).

Pressure is obtained from pumping the water source. To get a uniform flow, it is necessary to select the appropriate sprinkler size, operational pressure, spacing or distance between sprinklers.

B. Calculation

First, Plant Water Needs Irrigation water provided is determined based on Sprinkler Discharge Calculation Sprinkler discharge of plot 1 can be calculated using the flow formula at the orifice (Toricelli). From these data, the amount of sprinkler discharge (Q) can be determined.

Sprinkler Irrigation System Capacity Sprinkler system capacity depends on the area of land to be irrigated, the gross irrigation depth for each water supply and the permitted operational time, an example of calculation in plot one (1) is as follows: Water supply rate Layout of Sprinkler Irrigation Network Design.

Determination of the layout of the sprinkler irrigation network based on the components needed according to needs. Where these components consist of pumps, reservoirs, flow measuring valves, filters, main pipes, lateral pipes, and sprinklers. In this study planning, the planning example used is plot one (1) with an area of 1.33 hectares.

The sprinkler irrigation network design to be used is permanent, where the lateral pipes and main pipes will be buried in the ground so that they are not easily damaged by sunlight, so that they are permanent or solid set.

Irrigation Network of Broadcast, the planned broadcast distance is 18 meters with a broadcast speed of 10.9866 m/s. Broadcast Height then the planned broadcast height is 18 meters with a broadcast speed of 3.764 m

Sprinkler Planning, the planning of the layout and design of sprinklers in the spray irrigation network includes the number of plants per plot, the need for clean plant water per plot, sprinkler spacing planning, lateral pipe spacing, so that the nozzle discharge per plot is obtained, then the number of sprinklers is planned and the discharge per sprinkler is known. After the sprinkler discharge is known, the type of sprinkler and its specifications can be determined. Sprinkler type in spray irrigation planning. The sprinkler that will be used is the rotary ace type, because it has 3 water emitting holes, and its function is to irrigate large agricultural land with a rotation angle of 360 °.

Types of Pipes in the Planning of Sprinkler Irrigation Networks The type of pipe that will be used in the planning of sprinkler irrigation networks is PVC pipe. The length of the PVC pipe is 4 m. The diameter for each pipe is different, as shown in the table below: Table 1. Diameter of PVC Pipes in Sprinkler Irrigation Networks. (Source: www.wavin.co.id)

Table 1. Diameter of PVC pipes in irrigation networks

AreaWide	**Sprinkler's Kind**	**Sprinkler (m) Scope Distance**	**Debit Sprinkler's Debtit (L/S)**	**Main Pipe Size (inch)**	**Add Pipe Size (inch)**
< 100 m²	Micro sprinkler / Drip Jet	2 – 4	5 – 15	½" (1/2 inch)	¼" – ½"
100 – 500 m²	Pop-up small sprinkler pop-up	3 – 5	10 – 20	¾"	½" – ¾"
500 – 1000 m²	Rotary sprinkler	5 – 10	20 – 40	1"	¾"
> 1000 m²	Impact sprinkler	10 – 15	30 – 60	1.25" – 1.5"	1"

The PVC pipes needed for automatic irrigation installation networks are as shown in the Table 1. provided with the following description as;

1. Hydraulics of Irrigation Network This calculation is used to determine the amount of pressure loss that occurs in the sprinkler, lateral pipe and main pipe.
2. Major Pressure Loss The major pressure loss in the riser, lateral pipe and main pipe is the pressure height due to friction that occurs in the pipe. The amount of pressure in the planning of the irrigation network varies because the length is not the same.
3. Minor Pressure Loss Minor pressure loss in the pipes of the irrigation network is caused by bends in the pipe, pipe branches and valves.
4. Total Pump Head The ground level elevation in the SBK-115 well is +33.12 and the water level elevation

on the outlet side of the highest rice field in plot one is +40.93. The groundwater level is at a depth of 6.50 meters or at an elevation of +26.62.

So the total size of the Total Pump Head (TDH)

$$TDH = SH + E + Hf1 + Hm + Hf2 + Hv + Ha + Hs$$
$$= 0 + 10 + 0{,}29 + 4{,}11 + 6{,}1 + 0{,}3 + 30{,}59 + 0{,}88$$
$$= 52{,}19 \text{ m}$$

The irrigation installation is carried out at a predetermined angle. This is to try the effectiveness of the automatic irrigation system and to see the difference with the side where the irrigation is still done conventionally. The side or plot that has been equipped with automatic irrigation as seen in Figure 6.

Figure 6. Installation of irrigation pipes

The flush manifold at the drip line end is equipped with a flush riser and valve to allow flushing of the drip line. When the flush valve is opened, the flow rate and velocity through the drip line are greater than in normal operating mode. The higher flow rate allows the removal of settled solids and sediment from the system, preventing them from clogging the drip lines. The flow regime may be quite complex in irregularly shaped fields with different drip line lengths within the same irrigation zone. Since the SDI zone with flush manifold is a closed loop system, the pressure tends to equalize and zones with different drip line lengths are designed using the average drip line length. The flush manifold pipe size is determined by considering the flow through the drip line end during flushing.

The flush manifold is sized for a minimum flow velocity of 0.5 m/s (1.65 ft/s) through the drip line to ensure sediment removal. Flushing will temporarily increase the system flow requirement, which in turn will decrease the system pressure. Automatic irrigation is controlled by a control panel that has been prepared in advance. The automatic irrigation control panel is as shown in Figure 7.

Figure 7. Automatic Irrigation Control Panel

In some cases, to achieve the desired velocity, especially with regulated zone pressures or with irregular field shapes, system design may require a large amount of piping to connect the ends of all drip lines in a particular section or zone. A careful balance between the flushing velocity at the manifold and the drip lines is essential. When the zone is relatively large, to allow the pumping system to supply the flow rate required to achieve the desired flushing velocity at the drip line ends, the irrigation zone is divided into two or more flushing manifolds. This separation will allow the maintenance of the proper flushing pressure. Another solution to supply the flow rate required for flushing is to use an additional pump at the top of the system. The additional pump will only be activated during flushing to supplement the missing flow rate.

IV. Conclusion

The results obtained from this community service activity about solutions to the problem of lack of irrigation water sources for the Urban Forest farmer group, through optimization of irrigation from drilled wells. Implementation of practical participation of the Urban Forest farmer group residents in overcoming agricultural problems through this community service program. Optimization of the agricultural irrigation system of the Urban Forest farmer group through an open-close irrigation system. Transfer of planning knowledge from the community service team to the Urban Forest farmer group residents.

This community service was also closed with several inputs or suggestions from the farmer group members, including, the residents hope that the community service activities will continue in their area, especially in overcoming local agricultural problems. The residents conveyed several other agricultural problems that could possibly be helped through UBL community service activities

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