🚀 Quick Start Guide

Get your grow tent automation system up and running in minutes!

Prerequisites

- Raspberry Pi 4 (connected to your network)
- MicroSD card with Raspberry Pi OS installed
- SSH or physical access to the Pi

Installation (One Command)

```
git clone <your-repo-url> grow_tent_automation
cd grow_tent_automation
./install.sh
```

The installation script will:
1. Install system dependencies
2. Install libcamera-apps for camera support
3. Create Python virtual environment
4. Install Python packages
5. Set up configuration files
6. Create data directories
7. Test the installation
8. Optionally install systemd service

Quick Configuration

1. Get Telegram Bot Token

1. Open Telegram, search for @BotFather (https://t.me/botfather)
2. Send `/newbot` and follow instructions
3. Copy the bot token

2. Get Your Telegram Chat ID

1. Send a message to your bot
2. Visit: `https://api.telegram.org/bot<YOUR_TOKEN>/getUpdates`
3. Find your `chat.id` in the JSON response

3. Configure Environment

```
nano .env
```

Update these values:

```
TELEGRAM_BOT_TOKEN=your_bot_token_here
TELEGRAM_CHAT_ID=your_chat_id_here
```

Running the System

Option 1: Manual Run

```
./run.sh
```

Option 2: As a Service (Auto-start on boot)

```
sudo systemctl start grow-tent
sudo systemctl enable grow-tent  # Start on boot
```

Access the Web Interface

Open your browser and navigate to:

```
http://<raspberry-pi-ip>:8000
```

Find your Pi's IP:

```
hostname -I
```

Test Hardware

Before connecting real devices, test in simulation mode:

```
python test_hardware.py
```

This will verify:
- ✅ GPIO/Relay control (9 relays)
- ✅ BME680 sensor reading
- ✅ Camera functionality (rpicam-jpeg)

Test Camera Manually

```
# Test camera capture
rpicam-jpeg -o test.jpg --width 1920 --height 1080

# If command not found, install libcamera-apps:
sudo apt install libcamera-apps
```

First Steps in the Web Interface

1. **Create a Project**
   - Navigate to “Projects” page
   - Click “New Project”
   - Name your grow (e.g., “Tomatoes 2024”)

2. **Configure Devices**
   - Go to “Settings” page
   - Adjust schedules for each device
   - Set temperature/humidity thresholds

3. **Monitor Dashboard**
   - Real-time sensor data
   - Device controls (all 9 devices)
   - Live camera feed

4. **Start Time-lapse** (Optional)
   - Go to “Time-lapse” page
   - Set interval (e.g., 300 seconds = 5 minutes)
   - Click “Start Capture”

Telegram Bot Commands

Send these commands to your bot:

- `/status` - Current readings and device states
- `/devices` - List all 9 devices
- `/on lights` - Turn lights on
- `/off nutrient_pump` - Turn nutrient pump off
- `/photo` - Get snapshot
- `/alerts` - View alert settings

Device Names (9 Relays)

Device Name	Display Name	GPIO Pin
`lights`	Lights	GPIO 5
`air_pump`	Air Pump	GPIO 6
`nutrient_pump`	Nutrient Pump	GPIO 13
`circulatory_fan_1`	Circulatory Fan 1	GPIO 16
`circulatory_fan_2`	Circulatory Fan 2	GPIO 19
`exhaust_fan`	Exhaust Fan	GPIO 20
`humidifier`	Humidifier	GPIO 21
`heater`	Heater	GPIO 23
`dehumidifier`	Dehumidifier	GPIO 24

Common Issues

Can’t access web interface

```
# Check if service is running
sudo systemctl status grow-tent

# Check Pi's IP
hostname -I

# Allow port in firewall
sudo ufw allow 8000/tcp
```

Sensor not detected

```
# Enable I2C
sudo raspi-config
# Interface Options → I2C → Enable

# Check I2C devices
sudo i2cdetect -y 1
```

Camera not working

```
# Install camera support
sudo apt install libcamera-apps

# Enable camera
sudo raspi-config
# Interface Options → Camera → Enable

# Test camera
rpicam-jpeg -o test.jpg --width 640 --height 480
```

File Structure

```
grow_tent_automation/
├── install.sh          # Installation script
├── run.sh              # Quick run script
├── test_hardware.py    # Hardware testing
├── requirements.txt    # Python dependencies
├── .env                # Your configuration
├── README.md           # Full documentation
├── backend/            # Python backend
├── frontend/           # Web interface
├── data/               # Database and photos
└── logs/               # Application logs
```

Service Management

```
# Start
sudo systemctl start grow-tent

# Stop
sudo systemctl stop grow-tent

# Restart
sudo systemctl restart grow-tent

# View logs
sudo journalctl -u grow-tent -f

# Check status
sudo systemctl status grow-tent
```

Default Device Settings

- **Lights**: On 06:00-22:00 (16 hours)
- **Exhaust Fan**: 15 min/hour + auto (temp > 28°C or humidity > 75%)
- **Circulatory Fan 1**: Always on
- **Circulatory Fan 2**: Always on
- **Humidifier**: Auto (humidity < 50%)
- **Dehumidifier**: Auto (humidity > 70%)
- **Heater**: Auto (temp < 18°C)

- **Nutrient Pump**: 5 min at 08:00 and 20:00
- **Air Pump**: Always on for oxygenation

All settings can be customized in the web interface!

Need Help?

1. Check full documentation: `README.md`
2. View logs: `tail -f logs/grow_tent.log`
3. Test hardware: `python test_hardware.py`
4. Check service status: `sudo systemctl status grow-tent`

Safety Note

⚠️ **Important**:
- Start with LOW power devices for testing
- Verify relay wiring before connecting high-power equipment
- Use proper electrical safety equipment
- Consider using safety relays and circuit breakers
- Never leave high-power devices unattended during initial testing

Next Steps

Once everything is working:

1. ✅ Fine-tune device schedules in Settings
2. ✅ Configure alert thresholds
3. ✅ Start documenting in Grow Diary
4. ✅ Set up time-lapse for your grow
5. ✅ Use plant health analysis to monitor progress

Happy growing! 🌱

Note: The web interface runs on the Raspberry Pi. Access it from any device on your network using the Pi's IP address.