**Báo cáo tiến độ dự án**

**US-01-TÍNH CHỌN CAMERA**

1. **Tính toán các thông số kĩ thuật:**

* Kích thước khay làm việc: 400mm\*400mm
* Khoảng cách dự kiến từ hộp camera tới khay làm việc: 800mm

1. **Tính góc nhìn của camera:**

* Góc nhìn của camera đặc trưng cho độ rộng, độ mở của vùng quan sát. Đối với những camera có góc nhìn lớn thì có tiêu cự nhỏ, ngược lại những camera có góc nhìn nhỏ thì có tiêu cự lớn.
* Tính toán góc nhìn tối thiểu cho camera:

**![Chart

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V2d3h5eoOEhYaHiImKkpOUlZaXmJmaoqOkpaanqKmqsrO0tba3uLm6wsPExcbHyMnK0tPU1dbX2Nna4eLj5OXm5+jp6vHy8/T19vf4+fr/xAAfAQADAQEBAQEBAQEBAAAAAAAAAQIDBAUGBwgJCgv/xAC1EQACAQIEBAMEBwUEBAABAncAAQIDEQQFITEGEkFRB2FxEyIygQgUQpGhscEJIzNS8BVictEKFiQ04SXxFxgZGiYnKCkqNTY3ODk6Q0RFRkdISUpTVFVWV1hZWmNkZWZnaGlqc3R1dnd4eXqCg4SFhoeIiYqSk5SVlpeYmZqio6Slpqeoqaqys7S1tre4ubrCw8TFxsfIycrS09TV1tfY2dri4+Tl5ufo6ery8/T19vf4+fr/2gAMAwEAAhEDEQA/APpGiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAK83+PGu6h4c+FdzqGkTm3uVuYVDjsC2DXpFeT/ALSn/JGLv/r7g/8AQ6AOIng8WWPgxfEI8ewmUWouRbOF5O3dt6/hXr3ws8Saj4r+HthqusR+XdSblbAxnBwD+OK8Ofw78LJfh9HNJ4qRdT+xK5hF4WIk2crtLY69q9S+Aesahq3w8U34BiglMdvIEC70BI6D6CgD1CiiigAork9M8d2t54u1HQruI20ltceRBI33ZztBwD/ewScegrrKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKztc0HTfEmltp+s2y3NqzBjGxIBI5HStGigDiV+D/gZGDLoMOQcj5m/xrrrGwtdNtEtbGBIIYxhUQYAqxRQAUUUUAefaRodtrt54ut7gbZBqxMUq/eRvLTkGtnw5rlzFeNoPiA7dRhH7uU8C4X+8PfrUPgv/AJDniz/sLH/0WtaviPw/Frlmu1jBeQnfb3CfeRv8D0oA2aK53w14hlu5JNK1hRBq1qP3idpB2dfY4NdFQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAcj4L/AOQ54s/7Cx/9FrXXVyPgv/kOeLP+wsf/AEWtddQBg+JfD39qxx3djJ9m1K1O+Cdevup9j0/Gl8NeIf7Xhe2vU+z6lbHbPAf/AEIex5rdrnPEvh+a5mTV9FYQarbjIb/nsvdD9RwPrQB0dFY/h3xBDrtkW2mG6iOyeBuGRhwfwzmtigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigDkfBf/ACHPFn/YWP8A6LWuurkfBf8AyHPFn/YWP/ota66gAooooA5bxFolzBejXvD+Ev4wPOi7XKD+E++OAe2a19C1y217Txc2xKsp2yxNw0bDggj65+taVcjrulXOi6gfEOgoSQP9MtF6TL6gf3gB+tAHXUVS0nVbbWdPju7NwyMOR3U9wau0AFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQByPgv/kOeLP8AsLH/ANFrXXVyPgv/AJDniz/sLH/0WtddQAUUUUAFFFFAHGarY3HhPUn1vR42ksJDm+s0Gcf7aD19h1zXV2F/b6nYxXdnIskUgyrA1OyhlIYAg9Qa4u7gm8D6m+oWStJotw+66hHP2c/3lHp7cDmgDtaKitrmK8to7i2cSRSDcrA8EVLQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAcj4L/5Dniz/sLH/wBFrXXVyPgv/kOeLP8AsLH/ANFrXXUAFFFFABRRRQAU2WJJomjlUOjDDKwyDTqKAOIzN4D1I7t8ugXL/ePP2Nj6/wCz7+prtY5FljV4yGVhkEd6Zc20V5bPBcIJI5BhlYda4+zuJvBGpLp18zSaLcNi1nbn7Of7h9vzOTQB2tFAIIyDkeoooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooA5HwX/yHPFn/YWP/ota66uR8F/8hzxZ/wBhY/8Aota66gAooooAKKKKACiiigAqtqFhb6nYyWt5GJIpBgg9verNFAHG6RfXPhXUk0LWHaSyfixvH7j+4fcD+ddlnPSqOsaRa63pslnexh0bkHurDkEe4PNYGhatdaRqI8P6+5ZwP9EvGPE6+hP94Dr654oA62iiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKAOR8F/8AIc8Wf9hY/wDota66uR8F/wDIc8Wf9hY/+i1rrqACiiigAooooAKKKKACiiigArM17QrbX9PNvcjDqd8Ug6xuOQR+IFadFAHL+HdcuYrxtC8QHbqEI/dynpOnYg+uOv1rqKx/EXh+LXLNdreTeQHfb3C9Ub/Dpkd6qeG/EEt1JJpWsIINUtuHUniVezr65HJx0zQB0dFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQByPgv/kOeLP8AsLH/ANFrXXVyPgv/AJDniz/sLH/0WtddQAUUUUAFFFFABRRRQAUUUUAFFFFABWD4l8Pf2tHHd2L/AGfU7Y7reccc/wB0+oPHFb1FAGF4a8Q/2tE9rep9n1K2O2eFuM/7Q9Qev41u1zniXw/Ncypq+iERatbD93k4WYf3G+vHPNW/DviCHXLNuDFdwHZcQNw0be4/WgDYooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooA5HwX/yHPFn/AGFj/wCi1rrq5HwX/wAhzxZ/2Fj/AOi1rrqACiiigAooooAKKKKACiiigAooooAKKKKACuX8RaHcw3i674fAXUIR+8h6LcL/AHT79OevFdRRQBmaFrlrr2ni4tjh1O2aI/eib0IrTrktd0m60fUTr/h+Pcw/4/LReky+oHr0/Kt/SNWtda02O8spA8bjPuD6GgC9RRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFAHI+C/+Q54s/7Cx/8ARa111cj4L/5Dniz/ALCx/wDRa111ABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAEZGD0rjdVsLrwtqkmt6LGZbOY5vbNf/Q19+ntgV2VIyh1KsMgjBB70AV9P1C21SxivLGVZoJV3Ky9xVmuKvILjwTqjahYo0mjXL5uLdf+WDH+Mfp+VdhbXMN5bJPbSLJFIMqy9CKAJaKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooriPin4jvPDPhyzvbGZYS2oW8Ujt0CNIA36UAdvRXO6T440LVrxbK2vlNwRwrjaH/3Sev4V0VABRRRQByPgv/kOeLP+wsf/AEWtddXI+C/+Q54s/wCwsf8A0WtddQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFADZI0mieOVQyOCrKe4NcV++8B6kB8z+H7h8KqjJtHJ/9BPAHpiu3qK5tory2kt7lBJFIpVlI6g0APilSaJZImDowyrKcginVxVpcT+CNTXT75mk0W4bFtMefIY/wH25AHTFdorBlDKQVIyCD1oAWisDxp4mHhTw5JqAhM8zOIoIgcb5DnAz+Fc5Y6x47sdR0+bW7a2utPvpFUrbR7XtwwzknJzQB6FRQDkA0UAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAV5n8dEgl8F2Md5j7O2q2ol3dNvmjP6V6ZWP4m8LaX4u0tdP1uJ5bdZUlCo5X5lORyPegDgPiRp2kado/hybRIYIb8aharbGFQGaMsM9Oo6Zr1SAsbeMyff2Dd9cVyWj/DHw/o2sLqUIvLiaPPlLdXTzJF/uqxIH4V2FABRRRQByPgv/AJDniz/sLH/0WtddXI+C/wDkOeLP+wsf/Ra111ABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFAFbUNPttTsZLS9jEkUgwQe3uPeuW0q/ufCuppoetSGS0lP+hXbdMdkY9iMgD1rsqo6vpNrrWmyWd6m5HHDDhlPYg9j70Ac78TNDvdd8JKNKQS3Vncpdxxk43lAeP1rItvGuu6zc6Zpuh6Rc2cquovpry3ZURAMNtLAA846VtaFq91o+pL4f8QPlzxZ3RHEy/3Sf7wyB711tACLnaN3JxzS0UUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQByPgv/AJDniz/sLH/0WtddXI+C/wDkOeLP+wsf/Ra111ABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQBma7odtr2nNbXBMb9Y5k+9G3Yg1leHdcuYbw6Dr+I9QiH7l+1wg/iH6CuorH8ReH4tdswFc293Cd1vcoPmjb19/pQBsUVznhrxBLdSyaTrCeRqlsPmU9JV/vr6jkfjXR0AFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQByPgv/kOeLP+wsf/AEWtddXI+C/+Q54s/wCwsf8A0WtddQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFAGD4l8O/2vDHc2Un2bUrY77edeoPofajw14i/taOS1vY/s2pWp2zwH19R7VvVzniXw/LdyR6rpD/AGfVLUZVh0mX+43tyfxoA6Oisfw54gj12yJdDb3kR23Fs/3om7j/APVWxQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAcj4L/wCQ54s/7Cx/9FrXXVyPgv8A5Dniz/sLH/0WtddQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQBy/iLQ7iK8GvaBiPUIhiVO1wg/hP5kj3rV0LXLfXtOW5gBjcfLLC/wB6Nu4NadclrukXOj6kfEPh9Myf8vtsOkyeo/2hknvmgDraKo6Rq9rrWnR3lm+Uccqeqn0I7Gr1ABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFAHI+C/8AkOeLP+wsf/Ra111cj4L/AOQ54s/7Cx/9FrXXUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFHXrRRQBxuq6fc+FtTfXNFjMlpIc3tmvT3dR68kn1rqdP1C21Sxiu7KQSRSLkEdvY+h9qsMoZSrAEEYIPeuLvLefwTqbahYo0mjXDZuYBz5DH+MD05JNAHa0VFa3MN5bR3Fs4kikUMrA9RUtABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAcj4L/5Dniz/sLH/wBFrXXVyPgv/kOeLP8AsLH/ANFrXXUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABTZI0miaOVVdGGGVhkEU6igDiMTeA9SyN0nh+4Yl2Y5No5P/oPJPXjArtYpUmiSWJgyOAysO4NMubaG8t3guY1kikGGVhkEVx9pPP4I1NbC+dpNFuXxb3DH/UMf4CfTr+VAHa0UisHUMpyCMgjvS0AFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFAHI+C/wDkOeLP+wsf/Ra111cj4L/5Dniz/sLH/wBFrXXUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAVWv9PttTsZLS+iWWGUYZTVmigDjdKv7rwrqceia1IZLOZsWN43f/AGG9+v4CuyByMjpVLV9Jtda06SzvYw8bjHuD6iue0LVrrRtRHh/xBJub/lzu2/5br6H/AGuvpwKAOuooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooA5HwX/AMhzxZ/2Fj/6LWuurkfBf/Ic8Wf9hY/+i1rrqACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACszXdDtte09re5GHX5opR96NvUVp0UAct4d1y5gvG0LxAdt/CP3cx4W4X+8P149q6msfxF4fh12zXJMV3Ad9tOvDRt6g/pVPw14gmuZX0jWwItWth8+BhZh/fX688dRQB0lFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAcj4L/wCQ54s/7Cx/9FrXXVyPgv8A5Dniz/sLH/0WtddQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFYXiTw9/a8SXNm/wBn1G2O6CdeDn+6fY9PxrdooAwfDXiH+1Y5LS/TyNTtjtnhPGT/AHh6g81vVzviXw/LdyR6ro7i31S25VwOJV7o3rkcDPTNWfDniCLXLRtymG8gOy4t24ZG/wAOuD3oA2aKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigDkfBf/Ic8Wf9hY/+i1rrq5HwX/yHPFn/AGFj/wCi1rrqACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAK5fxHodzFdrrugfJqEI+eIfdnTuCPXHT611FFAGZoOu22vaeLi3O2RTsmiPWNxwQfxzWnXJa7pF1pOo/8JB4fQtIP+PqzQcTL3IH94D881v6Pq9rrempeWMgdG4IH8LDgg+4PFAF6iiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigDyLS7XV7zxh4uNh4gutNjTVSvlQxowP7tefmFal3p3iO2sp518Y6gxjjZwDBFzgZ/u1H4X/AORq8Zf9hg/+i0rd1P8A5BF5/wBcH/8AQTXTGMXE55Sakavg2/uNU8FaTfXsnmXFxao8jkfeJHJrbrnPh7/yTrQv+vKP+VdHXMdAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFAB161xur2Fz4W1J9d0ZGks35vrNB94f31HqB+HNdlQQGBDDIPUGgCtp+oW+qWMV3ZyCSKQZBH8qs1xV7bzeCNSfUrFWk0a4bN1AP+Xc/wB8e3+NdhbXMV5bJPbuJI5BlWHegBLy7hsLOW6unEcMSlnY9AK8huPj2bmaebw74cvNS063Yh7pF+U46kc10vxvluIfg/rjWm4N5S5K9QN6034O22nL8HNEKRxFXs1NwcdWxzmgDc8DeOdM8d6ENR0ssmDtkicYZD710tc/4Xh8MRC5HhVbZRvPn+QT973zXQUAFFFFABRRRQAUUUUAFFFFABSMwRSzHAAySe1LXGfFbxQnhP4e6hek4llQwRAddzggEfnQB5snx61B/ip/ZQtof7D+0/ZfPwch920nOcdc172jB0V0OVYZBHcV8YNfH/hVP9mf8I3qQ1X7T9sOpbDt+8W9Pevpz4UeKV8WfD6wvCf30SCGVe4K/Lz+VAHaUUUUAcVc/DaOTWdQ1Cz8QarYNqE/nzRW8ihd2AOMr6Co5PhtLLG0cni7XGRwVYGVOQf+A13NFO7FZHG2Hw/m03T4bKz8V61HBAgSNBImFA7fdqx/whl9/wBDfrn/AH9T/wCJrqqKQzlf+EMvv+hv1z/v6n/xNH/CGX3/AEN+uf8Af1P/AImuqooA5X/hDL7/AKG/XP8Av6n/AMTR/wAIZff9Dfrn/f1P/ia6qigDlf8AhDL7/ob9c/7+p/8AE0f8IZff9Dfrn/f1P/ia6qigDlf+EMvv+hv1z/v6n/xNH/CGX3/Q365/39T/AOJrqqKAOV/4Qy+/6G/XP+/qf/E0f8IZff8AQ365/wB/U/8Aia6qigDlf+EMvv8Aob9c/wC/qf8AxNH/AAhl9/0N+uf9/U/+JrqqKAOV/wCEMvv+hv1z/v6n/wATR/whl9/0N+uf9/U/+JrqqKAOV/4Qy+/6G/XP+/qf/E0f8IZff9Dfrn/f1P8A4muqooA5X/hDL7/ob9c/7+p/8TR/whl9/wBDfrn/AH9T/wCJrqqKAOV/4Qy+/wChv1z/AL+p/wDE0f8ACGX3/Q365/39T/4muqooA5X/AIQy+/6G/XP+/qf/ABNH/CGX3/Q365/39T/4muqooA5X/hDL7/ob9c/7+p/8TR/whl9/0N+uf9/U/wDia6qigDlf+EMvv+hv1z/v6n/xNH/CGX3/AEN+uf8Af1P/AImuqooA5X/hDL7/AKG/XP8Av6n/AMTR/wAIZff9Dfrn/f1P/ia6qigDlf8AhDL7/ob9c/7+p/8AE0f8IZff9Dfrn/f1P/ia6qigDlf+EMvv+hv1z/v6n/xNH/CGX3/Q365/39T/AOJrqqKAOV/4Qy+/6G/XP+/qf/E0f8IZff8AQ365/wB/U/8Aia6qigDlf+EMvv8Aob9c/wC/qf8AxNH/AAhl9/0N+uf9/U/+JrqqKAOTfwTeSxlJPFutsrDBBkTn/wAdrS8L+GovC2l/YLe8ubqLduU3DAlfYYFbVFAFPVtMttZ0q40++jEkFwhR1NeNr8GvGuiRTaZ4T8aCz0aUkCCUMWUHr0GOle4UUAch8OvAFr4A0E2cUpubmVi89w3Vyf6V19FFABRRRQAUUUUAFFFFABRRRQAVzHjLwJpnjiOzi1h5/KtZRII4pNocgg8+vSunooArf2fb/wBljTymbYRCHZ/s4xj8qwPBfgLTPAyX0ejvOY7ybznSWTcFPPT0HNdRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFZupeItJ0hwmo6hbwOedjyqGx64zWlXj149lqnjzVxoPhdPEF7HiK5l1CcLHCQTkLuBHr0oA9ZsdQtNStluLC5iuIm6PE4YfmKsV5P8ABIzRv4gtZY44BFev/o8ThkiO45AxxXrFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAVxF98MbGfXrvU7K/u7Jr3m5jhlYBzzk8EYPNdvRQBzXhLwNpvg2S7OlNMVuiGcSuXOeecn610tFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAf/9k=)**

a = 200mm, b = 800mm

Góc chiếu: 2\*alpha = 2\*arctan(200/800) = 2\*15° = 30°

Lựa chọn camera có vùng hoạt động lớn hơn 30°

1. **Tính toán độ phân giải dự kiến:**

* Vì dự án này cần detect phải detect tọa độ của các vật thể trên khay nên yêu cầu là sai số phải nhỏ.
* Giả sử cho sai số là: 0.5 mm
* Ta có được công thức tính độ phân giải: R = (400\*2)/0.5 = 1600
* Vậy ta cần camera có độ phân giải tối thiểu là: 3MP

1. **Độ nhạy sáng:**

* Độ nhạy sáng của camera đặc trưng cho khả năng cảm nhận ánh sáng của camera trong một môi trường nhất định.
* Đơn vị của độ nhạy sáng là Lux. Với những ánh sáng yếu (lux thấp) thì bề mặt vật thể sẽ không được thấy rõ. Độ nhạy sáng càng cao đặc trưng cho khả năng nhìn trong điều kiện thiếu sáng của camera càng tốt.

1. **Khả năng chống rung**

* Khả năng chống rung là khả năng chống rung hình, chống co giật và chớp chớp hình ảnh khi có sự khác nhau giữa tần số camera và tần số ảnh sáng tại khu vực quan sát.

1. **Tiêu chí lựa chọn camera:**

* Camera có độ phân giải là 2MP trở lên.
* Camera phải có vùng hoạt động trên 30°.
* Camera nhỏ, gọn để có thể dễ thiết kế hộp module.
* Có khả năng chống rung (Anti – Flicker)
* Có độ nhạy sáng tốt, có khả năng chống ngược sáng.
* Có hỗ trợ POE để tối ưu hóa số cổng kết nối.
* Có thể thay đổi tiêu cự.

1. **Lựa chọn camera**
2. Camera hồng ngoại 4MP HKVision DS-2CD1043G0E-IF



* Thông số kĩ thuật:

|  |  |
| --- | --- |
| Tên sản phẩm | Camera hồng ngoại 4MP HKVision |
| Mã sản phẩm | DS-2CD1043G0E-IF |
| Độ phân giải | 4MP |
| Cảm biến | CMOS |
| Tiêu cự | 4.0mm |
| Góc nhìn | 73° |
| Độ nhạy sáng | 0.01 lux |
| Điện áp | 12VDC, có hỗ trợ POE (802.3af) |
| Chuẩn nén | H.264, H.264+, H.265, H.265+, MJPEG |
| Kích thước | 105\*300 mm |
| Trọng lượng | 1.18 kg |
| Các tính năng khác | - Hỗ trợ dịch vụ HIK Connect  - Chống ngược sáng DWDR, HLC, BLC: 3D BNR  - Hỗ trợ thẻ nhớ 256GB |
| Giá sản phẩm | 1.215.000 VND |
| Shop | Vu Hoang Telecom |

1. Camera HIK Vision DS-2CD1143G0E IF-H265+



* Thông số kĩ thuật

|  |  |
| --- | --- |
| Tên sản phẩm | Camera HKI Vision 4MP |
| Mã sản phẩm | DS-2CD1143G0E IF |
| Độ phân giải | 4MP (2560x1440) |
| Cảm biến | CMOS |
| Tiêu cự | 2.8mm/ 6mm (đặt hàng) |
| Góc nhìn | 110°/52° |
| Độ nhạy sáng | 0.028 lux |
| Điện áp | 12VDC, có hỗ trợ POE |
| Chuẩn nén | H265+, H265, H264+, H264 |
| Kích thước | Φ111×82.4mm |
| Trọng lượng | 0.41 kg |
| Tính năng | - Chống ngược sáng DWDR, HLC, BLC: 3D BNR.  - Hỗ trợ dịch vụ HIK Connect  - Có kháng nước IP67 |
| Giá sản phẩm | 1.090.000 VND |
| Shop | Hacom |

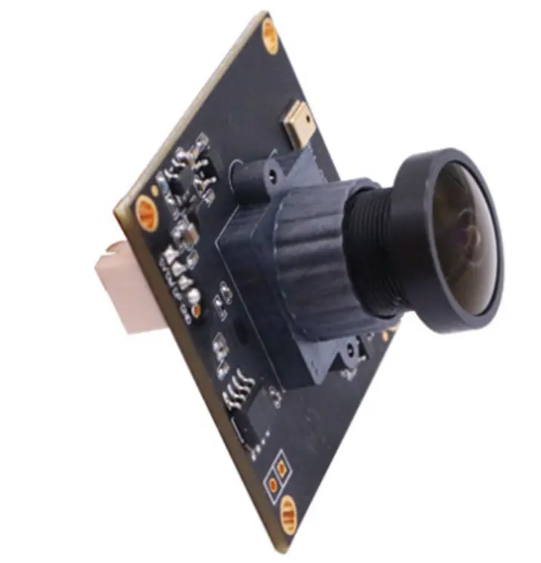
1. Camera EZVIX C60N 4MP



* Thông số kĩ thuật

|  |  |
| --- | --- |
| Tên sản phẩm | Camera EZVIX C60N |
| Mã sản phẩm | D0-8B4WF |
| Độ phân giải | 4MP (2560x1440) |
| Cảm biến | CMOS |
| Tiêu cự | 4mm |
| Góc nhìn | 60-70° |
| Độ nhạy sáng | 0.028 lux |
| Điện áp | 12VDC |
| Kết nối | Wifi, LAN RJ45 |
| Chuẩn nén | H265, H264 |
| Kích thước | 88\*88.2\*119mm |
| Trọng lượng | 0.252 kg |
| Tính năng | - Chống ngược sáng DWDR, HLC, BLC: 3D BNR.  - Hỗ trợ dịch vụ HIK Connect |
| Giá sản phẩm | 709.000 VND |
| Shop | Vu Hoang Telecom |

1. Camera HDV-USB800MP38-L3.6:



* Thông số kĩ thuật:

|  |  |
| --- | --- |
| Tên sản phẩm | Camera HDV-USB800MP38-L3.6 |
| Mã sản phẩm | USB800MP38-L3.6 |
| Độ phân giải | 8MP (3840\*2160) |
| Cảm biến | CMOS |
| Tiêu cự | 8 mm |
| Góc nhìn | 40° |
| Độ nhạy sáng | 1000Mv/lux - sec |
| Điện áp | 5VDC (85 mA) |
| Kết nối | USB 2.0 |
| Chuẩn nén | YUY2, MJPEG, H.264 |
| Kích thước | 38mm\*38mm |
| Trọng lượng | 110 g |
| Hỗ trợ hệ thống | - WinXP, Window7, Window8, Android, Linux, Rasperry |
| Giá sản phẩm | 62.40 US$ |
| Link sản phẩm | [Link](https://vietnamese.alibaba.com/p-detail/4K-1600146587635.html?spm=a2700.wholesale.0.0.78af2ef2Qnlw45) |

1. Camera Varifocal 8MP:



* Thông số kĩ thuật:

|  |  |
| --- | --- |
| Tên sản phẩm | Camera Varifocal 8MP |
| Độ phân giải | 8MP (3264\*2448) |
| Cảm biến | Sony IMX179 1/3.2 inch |
| Tiêu cự | Varifocal 5-50mm |
| Độ nhạy sáng | 0.65V/lux-sec@550nm |
| Kiểu màn trập | Rolling shutter / Frame exposure |
| Điện áp | 5VDC |
| Dòng điện hoạt động | 150mA – 240mA |
| Nhiệt độ hoạt động | 10°C – 70°C |
| Kết nối | USB 2.0 tốc độ cao |
| Chuẩn nén | YUY2, MJPEG |
| Kích thước | 41mm\*41mm |
| Trọng lượng | 300g |
| Hỗ trợ hệ thống | - Hỗ trợ WinXP/Vista/WIN7/WIN8 /, Linux with UVC, Mac-OS X 10.4.8 or later , Wince with UVC, Android 4.0 or above.  - Tương thích với raspberry pi, Ubuntu, Opencv, Amcap và nhiều phần mềm khác. |
| Giá sản phẩm | 3190000 VND |
| Link sản phẩm | [Link](https://kyoo.info/product/camera-webcam-cong-nghiep-08-mp-3264x2448-sony-imx179-ong-kinh-5-50mm-varifocal-hang-nhap-khau/) |

1. **Đánh giá camera dựa trên các tiêu chí**

|  |  |  |  |
| --- | --- | --- | --- |
| Camera | Ưu điểm | Nhược điểm | Điểm |
| Camera hồng ngoại 4MP HKVision | - Độ phân giải cao.  - Có vùng hoạt động lớn.  - Có độ nhạy cao, có khả năng chống ngược sáng.  - Hỗ trợ POE, giúp giảm cổng kết nối. | - Chưa có khả năng chống rung  - Kích thước còn hơi lớn.  - Là camera góc rộng nên ảnh hưởng đến chất lượng ảnh đầu ra. | 6 |
| Camera EZVIX C60N 4MP | - Kích thước nhỏ gọn  - Có vùng hoạt động lớn.  - Có độ nhạy tốt, có khả năng chống ngược sáng. | - Chưa có khả năng chống rung  - Chưa có kết nối POE để giảm cổng kêt nối.  - Là camera góc rộng nên ảnh hưởng đến chất lượng ảnh đầu ra. | 6 |
| Camera HIK Vision DS-2CD1143G0E IF | - Kích thước nhỏ, gọn.  - Độ phân giải cao.  - Có tùy còn tiêu cự lớn, vùng hoạt động rộng.  - Độ nhạy sáng cao, có khả năng chống ngược sáng, chống nhiễu.  - Hỗ trợ kết nối POE giúp giảm cổng kết nối. | - Chưa có khả năng chống rung  - Là camera góc rộng nên ảnh hưởng đến chất lượng ảnh đầu ra. | 7 |
| Camera HDV-USB800MP38-L3.6 | - Kích thước nhỏ, gọn, nhẹ, dễ thiết kế hộp.  - Độ phân giải rất cao.  - Có tùy còn tiêu cự lớn, vùng hoạt động nhỏ, tập trung nhiều lên trung tâm là khay.  - Độ nhạy sáng cao.  - Hỗ trợ kết nối USB 2.0. | -Chưa có hỗ trợ kết nối POE.  - Phải đặt hàng sản phẩm từ nước ngoài | 8 |